

# **The Psychology of Technology** **and Instructional Design**

Spring Quarter, 2010 – LOC346 / PSYCH314  
Tuesdays and Thursdays 10:00AM to 11:20AM, Annenberg Hall 303

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## **Instructor: Dr. David N. Rapp**

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This course provides an introduction to theory and practice in the development and assessment of technologies for both formal and informal learning. These learning settings include the classroom, the workplace, and our everyday world. The course will examine a variety of design approaches for developing and implementing effective instructional/training materials for individuals and organizations. We will study case examples, theoretical discussions, and empirical investigations that rely on:

- Learning perspectives from educational psychology and the learning sciences
- Human factors approaches to effective design and content delivery
- Research from cognitive science on knowledge acquisition and application
- Technology development intended to support learning activities

Thus, we will be interested in the design, use, and assessment of instructional technologies. Conceptual understanding of the theoretical and evidence-based principles intended to make instruction more effective will be emphasized. This necessitates attention to the applied use of educational technologies, utilizing both classic and contemporary work from the above mentioned domains.

## **Course Goals**

- To acquire knowledge about theoretical and practical approaches to learning, as they pertain to instructional design.
- To evaluate instructional media using informed research and theory in educational technology.
- To develop an understanding of important issues in the implementation of educational methodologies, and to become aware of current trends in the fields of instructional design and the learning sciences.

## Required Materials

Course topics include psychological principles of design and instruction, constructivist learning, motivation, interactivity, learning models, multimedia and hypermedia effectiveness, interface design, and technology assessment. Due to the lack of any broad-based text covering these issues, as well as the paucity of introductory texts that specifically target educational technology, the instructor has compiled a set of papers that represent core topics, discussions, and trends in the field.

You are required to read the assigned readings prior to each class. While the course readings are sizeable, they are manageable if you plan accordingly. The readings will be made available to you via the Blackboard website for the course.

## Course Outline

**March 30                      Orientation and Introduction to the Course and Course Topics**

**April 1, April 6              What Is (EFFECTIVE) Instructional Design?**

READINGS:

Norman, D.A. (1988). *The design of everyday things* (pp. 167-235). New York, NY: Doubleday.

Wolf, M. S., Davis, T. C., Shrank, W., Rapp, D. N., Bass, P. F., Connor, U. M., Clayman, M., & Parker, R. M. (2007). To err is human: Patient misinterpretations of prescription drug label instructions. *Patient Education and Counseling*, 67, 293-300.

**ASSIGNMENT #1 handed out on April 1, due April 8**

**ALSO: Begin Daily Diary Assignment on April 1 up until (and including) April 30.**

**April 8, April 13              Interface Design**

READINGS:

Clark, R., & Wittrock, M.C. (2000). Psychological principles in training. In S. Tobias & J.D. Fletch (Eds.), *Training and retraining: A handbook for business, industry, government, and the military* (pp. 51-84). New York: Macmillan.

**ASSIGNMENT #2 handed out on April 13, due April 20**

**April 15, April 20, April 22 Psychological Foundations of Learning and Instruction**

**READINGS:**

Reigeluth, C.M., & Moore, J. (1999). Cognitive education and the cognitive domain. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Volume II, pp. 51-68). Hillsdale, NJ: Lawrence Erlbaum Associates.

de Vries, E. (2003). Educational technology and multimedia from a cognitive perspective: Knowledge from inside the computer, onto the screen, and into our heads? In H. van Oostendorp (Ed.), *Cognition in a digital world* (pp. 155-174). Hillsdale, NJ: Lawrence Erlbaum Associates.

***ASSIGNMENT #3 handed out on April 22, due April 27***

**April 27, April 29 Constructivist Approaches to Learning**

**READINGS:**

Jonassen, D.H., Peck, K.L., & Wilson, B.G. (1999). *Learning with technology: A constructivist perspective* (pp. 1-18). Columbus, OH: Prentice Hall.

Jonassen, D. (1999). Designing constructivist learning environments. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Volume II, pp. 215-239). Hillsdale, NJ: Lawrence Erlbaum Associates.

***ASSIGNMENT #4 handed out on April 29, due May 4***

***NOTE: Last day for Daily Diary Assignment is April 30.***

**May 4 Motivation and Instruction**

**READINGS:**

Cordova, D.I., & Lepper, M.R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, 88, 715-730.

Stevens, R., Satwicz, T., & McCarthy, L. (2008). In-game, in-room, in-world: Reconnecting video game play to the rest of kids' lives. In K. Salen (Ed.), *The Ecology of games: Connecting youth, games, and learning* (pp. 41-66). Cambridge MA: The MIT Press.

**May 6 Interactivity and Adaptive Instruction**

**READINGS:**

Shute, V.J., Lajoie, S.P., & Gluck, K.A. (2000). Individualized and group approaches to training. In S. Tobias & J.D. Fletch (Eds.), *Training and retraining: A handbook for business, industry, government, and the military* (pp. 171-207). New York: Macmillan.

Sims, R. Interactivity: A forgotten art? [Online] Available <http://www2.gsu.edu/~wwwitr/docs/interact/>, March 22, 2010.

***ASSIGNMENT #5 handed out on May 6, due May 11***

**May 11                      Affective Education**

READINGS:

Martin, B.L., & Reigeluth, C.M. (1999). Affective education and the affective domain: Implications for instructional-design theories and models. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Volume II, pp. 485-509). Hillsdale, NJ: Lawrence Erlbaum Associates.

**May 13                      Models and Learning Environments**

READINGS:

Kafai, Y.B., Franke, M.L., Ching, C.C., & Shih, J.C. (1998). Game design as an interactive learning environment for fostering students' and teachers' mathematical inquiry. *International Journal of Computers for Mathematical Learning*, 3, 149-184.

Allen, S. (2004). Designs for learning: Studying science museum exhibits that do more than entertain. *Science Education*, 88, S17-S33.

**ASSIGNMENT #6 handed out on May 13, due May 18**

**May 18                      The Media Debate**

READINGS:

Clark, R.E. (1994). Media will never influence learning. *Educational Technology, Research, and Development*, 4, 21-29.

Kozma, R.B. (1994). Will media influence learning? Reframing the debate. *Educational Technology, Research, and Development*, 42, 7-19.

**May 20                      Multimedia and Hypermedia Part I**

READINGS:

Mayer, R.E. (2001). *Multimedia learning* (pp. 183-194). Cambridge, UK: Cambridge University Press.

Hegarty, M., Narayanan, N.H., & Freitas, P. (2002). Understanding machines from multimedia and hypermedia presentations. In J. Otero, J.A. Leon, & A.C. Graesser (Eds.), *The psychology of science text comprehension* (pp. 357-384). Hillsdale, NJ: LEA.

Tversky, B., Morrison, J.B., & Betrancourt, M. (2002). Animation: Can it facilitate? *International Journal of Human-Computer Studies*, 57, 247-262.

**ASSIGNMENT #7 handed out on May 20, due May 25**

**May 25                      Multimedia and Hypermedia Part 2**

**READINGS:**

Lajoie, S.P., & Azevedo, R. (2006). Teaching and learning in technology rich environments. In P.A. Alexander, & P.H. Winne (Eds.), *Handbook of Educational Psychology*, 2nd edition (pp. 803-821). Hillsdale, NJ: LEA.

Renshaw, C.E., Taylor, H.A., & Reynolds, C.H. (1998). Impact of computer-assisted instruction in hydrogeology on critical-thinking skills. *Journal of Geoscience Education*, 46, 274-279.

Johnson, C.I., & Mayer, R.E. (2009). A testing effect with multimedia learning. *Journal of Educational Psychology*, 101, 621-629.

**May 27                      Current Trends in the Examination and Usage of Educational Technology**

**READINGS:**

Rapp, D.N., Culpepper, S.A., Kirkby, K., & Morin, P. (2007). Fostering students' comprehension of topographic maps. *Journal of Geoscience Education*, 55, 5-16.

Graesser, A.C., Lu, S., Jackson, G.T., Mitchell, H.H., Ventura, M., Olney, A., & Louwerse, M.M. (2004). AutoTutor: A tutor with dialogue in natural language. *Behavior Research Methods, Instruments, & Computers*, 36, 180-192.

**\*\*Popular press article critique is due in class today, May 27, at 10:00AM\*\***

**June 1, June 3                      NO CLASS – WCAS Reading Week**

**June 11                      \*\*Software evaluation assignment due by 5:00\*\* If not received by 5:00, the assignment will be considered late.**

Grades will be based on the following course requirements:

- 1) **Homework assignments**: (10 points each: total 70 points). **The purpose of these assignments is to evaluate your understanding and integration of the lecture materials and the assigned readings, as well as to help you think critically about core course topics.** Over the course of the semester you will be given 7 reflection/reaction/task assignments to complete. Assignments will be due as indicated on the assignment sheet, and scored as delineated on the assignment sheet requirements. Each assignment will, in general, require 1 to 4 pages of written product. Homework assignments are due at the beginning of each class or else will be considered late.
  
- 2) **Diary assignment**: (20 points). **The purpose of this assignment is to become acquainted with a research methodology, and to consider your everyday experiences learning about the world.** Over the course of the quarter you will be asked to complete a daily diary assignment, keeping track of information you experience during your daily everyday activity. The assignment will require you to prepare online diary entries for a period of 30 days beginning on April 1 until (and including) April 30. You will receive instructions for this, as well as a link to the website to prepare your entries, in a handout. In class we will provide you with a diary code that you will use to log into the website and enter your diary information. You will be asked to prepare at least one entry per day, but may prepare more entries as you see fit. A daily reminder will be e-mailed to you to help you remember to complete the task (but check your spam folder early on if you don't receive anything).
  
- 3) **A 4-6 page critique of a popular press article addressing issues in Educational Technology** (20 points). **The purpose of this assignment is to require you to think critically about common beliefs and expectations with respect to instructional technology.** You must read and critique an article from a popular press source discussing educational technology. Papers will be graded based on the following four criteria: Quality of your summary of the article (5 points), degree to which you connect the article's claims with principles of educational technology discussed in class, both in terms of what the article might get right and what it might get wrong (5 points), implications of the information described in the article for actual educational settings (5 points), and the clarity of your writing (5 points). Your critique should be conceptualized as an informed discussion of the article you choose. You **\*MUST\*** clear the article with the instructor before writing up your critique. The critique is due on May 27 at the beginning of class (10:00AM) or else it will be considered late.

- 4) **A 5-7 page software evaluation**: (30 points). **The purpose of this assignment is to provide you with an opportunity to apply what you've learned with regards to a technology of your own interest.** Your evaluation will be graded with respect to the degree to which you construct logical, coherent arguments, and your use and understanding of principles/research/theory we have discussed in class. In other words, you are to go beyond simply writing an opinion piece – this should be an evaluation of the technology/software with respect to principles of education. Papers will be graded based on the following three criteria: Quality of your summary of the software (10 points), evaluation of the software with respect to course principles and theories (10 points), and the clarity of your writing (10 points). Your evaluation must be an informed discussion of the technology you choose. You **\*MUST\*** clear the software technology with the instructor before writing up your evaluation. The evaluation is due on June 11 by 5:00PM or else it will be considered late.
- 5) **Participation in class** (10 points). Participation in class is expected and therefore part of your grade requirements. This includes attendance (not just being in class, but also showing up on time for class), participation in in-class assignments, and discussions. It also includes preparation for each class. You are responsible for having read the assigned readings prior to class, and for being prepared to discuss the issues addressed in those readings. (Also note that you will only receive access to Powerpoint slides for classes that you have attended.)

Here is a summary of the points you can gain over the semester:

HW#1 (10 points) + HW#2 (10 points) + HW#3 (10 points) + HW#4 (10 points) + HW#5 (10 points) + HW#6 (10 points) + HW#7 (10 points) + Diary Study (20 points) + Popular Press Critique (20 points) + Software Evaluation (30 points) + Participation (10 points) = 150 points. Grades will be assigned according to the following scale of total final points:

- A : 138-150
- A- : 135-137
- B+ : 132-134
- B : 124-131
- B- : 120-123
- C+ : 117-119
- C : 109-116
- C- : 105-108
- D+ : 102-104
- D : 90-101
- F : below 90



### **Policy for late homework and papers**

The due date for each homework and paper assignment can be found in the class outline. Homework is due at the beginning of each class (10:00AM). Papers are due at the indicated date/time for the assignments. Anything past those times will be considered late, and extensions on these deadlines will not be accepted. Please be responsible and ensure you not only complete your assignments before they are due, but that you also hand them in before they are due. Late assignments will be deducted 25% of the achieved grade on that paper for each day late, including Saturday and Sunday. You may submit your papers by e-mail but they must be received by the same deadlines to qualify as being on time. This means that the date/time stamp on the e-mail received by the instructor must indicate you have submitted by the required deadline. Anything beyond that time will be considered late, regardless of when it might have been sent – no exceptions. (Note: No computer excuses will be accepted for late assignments.)

### **Policy for course incomplete**

A grade of incomplete ('I') will be given only in extreme circumstances (e.g., illness) and must be pre-approved by the instructor. If approved, a contract will be drawn up specifying the work to be done as well as subsequent due dates.

### **Policy regarding extra credit**

There will be no extra credit opportunities given under any circumstances.

### **Policy regarding Powerpoint slides**

Students can have access to slides for classes they have attended. If you have not attended a particular class, you will not be given access to the slides from that class. Students will have access to the slides at the conclusion of each class.

**Northwestern University Policy on Academic Integrity.** Students are expected to conform to all of Northwestern's policies regarding academic integrity, as published in the *Northwestern University Student Handbook* and *Undergraduate Study*. Numerous sources are available to assist you in proper citation and attribution in your written assignments; many of the sources are available from the Office of Studies. Instances of plagiarism and other forms of academic dishonesty will be taken seriously, and suspected instances will be addressed following the procedures outlined by the Office of Studies.

Registration at NU requires adherence to the University's standards of academic integrity. These standards may be intuitively understood, and cannot in any case be listed exhaustively; the following examples represent some basic types of behavior that are unacceptable:

- 1. Cheating:** using unauthorized notes, study aids, or information on an examination; altering a graded work after it has been returned, then submitting the work for regrading; allowing another person to do one's work and submitting that work under one's own name; submitting identical or similar papers for credit in more than one course without prior permission from the course instructors.
- 2. Plagiarism:** submitting material that in part or whole is not entirely one's own work without attributing those same portions to their correct source.
- 3. Fabrication:** falsifying or inventing any information, data or citation; presenting data that were not gathered in accordance with standard guidelines defining the appropriate methods for collecting or generating data and failing to include an accurate account of the method by which the data were gathered or collected.
- 4. Obtaining an Unfair Advantage:** (a) stealing, reproducing, circulating or otherwise gaining access to examination materials prior to the time authorized by the instructor; (b) stealing, destroying, defacing or concealing library materials with the purpose of depriving others of their use; (c) unauthorized collaborating on an academic assignment (d) retaining, possessing, using or circulating previously given examination materials, where those materials clearly indicate that they are to be returned to the instructor at the conclusion of the examination; (e) intentionally obstructing or interfering with another student's academic work or (f) otherwise undertaking activity with the purpose of creating or obtaining an unfair academic advantage over other students' academic work.
- 5. Aiding and Abetting Academic Dishonesty:** (a) providing material, information, or other assistance to another person with knowledge that such aid could be used in any of the violations stated above, or (b) providing false information in connection with any inquiry regarding academic integrity.
- 6. Falsification of Records and Official Documents:** altering documents affecting academic records; forging signatures of authorization or falsifying information on an official academic document, grade report, letter of permission, petition, drop/add form, ID card, or any other official University document.
- 7. Unauthorized Access to computerized academic or administrative records or systems:** viewing or altering computer records, modifying computer programs or systems, releasing or dispensing information gained via unauthorized access, or interfering with the use or availability of computer systems or information.

#### **Americans with Disabilities Act.**

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Northwestern's Services for Students with Disabilities (SSD) at 847-467-5530. The SSD office, at 601 University Place, Evanston, serves both the Evanston and Chicago campuses. In response to a request made by a qualified student with a disability, the University will arrange, at no cost to the student, for the provision of educational auxiliary aids, including sign-language interpreters, real-time captioners, note takers, readers, and tutors, determined by the University to be necessary to afford such student the opportunity for full participation in University programs.