

# Cognition & Instruction

16:300:582:01, Spring 2012  
Wednesday, 4:50-7:30 pm, GSE Room 347

Professor Toni Kempler Rogat

Office: GSE, Room 317

Phone: (732) 932-7496 ext. 8318 (office)

E-mail: [toni.kempler.rogat@gse.rutgers.edu](mailto:toni.kempler.rogat@gse.rutgers.edu)

Office hours: Wednesdays 2:00-4:00 pm, and by appointment (via skype, phone, or in person)

## Course Description

The purpose of this course is to introduce a psychological perspective to cognition, learning, and instruction in classroom contexts. We will focus on some basics, but the real emphasis will be on current issues in the theoretical and empirical literatures concerning cognition and instruction. First, we will discuss, critique, and integrate a range of relevant conceptual and empirical readings. Next, we also will work to apply these theories and empirical findings in order to explain specific cases, make predictions, and for the design of instruction. Finally, a third focus of the course will be evaluating empirical research in terms of the employed methodology, analyses, and presented interpretations in light of the evidence. We will address questions such as:

- *What is learning? Is learning the acquisition of knowledge, the development of expertise, or is learning socially constructed?*
- *When do knowledge and skills transfer? Is it possible to teach general higher order thinking skills or are cognitive skills dependent on the context?*
- *How do novices and experts differ?*
- *How do we encourage students to become self-regulated learners?*
- *What is the role of motivation in learning?*
- *How can we use this information to improve instruction and design better learning environments?*

## Course Organization

This course will primarily be conducted as a seminar. While I may lecture from time to time, the majority of time will be devoted to discussion. All seminar participants will be actively involved in leading and contributing to the seminar. You are expected to make each session stimulating by keeping up with the readings, organizing your thoughts before each session, submitting thoughtful discussion questions, and by participating actively in class discussions.

## Course Readings

A reading list is attached and all readings are available electronically on Sakai. Readings include a balance of review papers, conceptual/theoretical papers (to give you a broad overview of the current knowledge base, issues, constructs, and research traditions characterizing a particular field of study), and empirical reports (to give you a sense of how a prototypical investigation in a particular area of study is actually conducted and written up). In addition, some reading assignments may include a number of companion papers (i.e., article, commentaries on article, “reply to” commentaries) that reflect current controversies in the field.

**Note: Syllabus subject to change at discretion of the instructor.**

## General Approach to the Readings

Approach readings in an active, systematic, and deliberate way (skipping occasional paragraphs is often acceptable). *Read to understand, not just memorize.* After you complete a reading, you should be able to summarize the main thesis of the article and evaluate the research evidence presented by the authors in support of that thesis (or the coherence of a theoretical framework/perspective).

For purposes of summarization, ask yourself the following:

- What is the issue of most concern to the author?
- Why does the author think this issue is important?
- What are the conceptual/theoretical underpinnings or framework of the author's work? That is, what theoretical assumptions guide the questions and the interpretation and integration of findings?
- What are the main findings of the study, or in the case of a nonempirical paper, what are the main points made by the author and what is the most critical evidence presented in support of these points?

For purposes of evaluation, ask yourself the following:

- What are the strengths and weakness of the author's work (e.g. its theoretical or empirical contribution, credibility of assumptions, appropriateness of research design, measures, sample selection, the soundness of the interpretation of the data, and its applications)?
- How would you improve on this work?
- What questions provoked by the author merits further study?

## Requirements and Grading

Participation & Weekly Posts	20%	Final Paper	25%	
3 Reaction Papers (each worth 15%)	45%	Leading Class Discussion	10%	
90% A	80% B	70% C	60% D	50% F

### Active Class Participation

**20% of final grade**

Active class participation refers to attending class, being well prepared to discuss, critique and synthesize the readings, posing questions/issues, and contributing in a thoughtful manner to class discussion. My evaluation will be based primarily on the degree to which your contributions indicate that you have read and thought about the material and its applications. Participation is less satisfactory when students do not provide evidence of having read or reflected on the course material. In addition, more than one unexcused absence will lead to a reduction in your course grade. .

To facilitate discussion, you should post 2 questions/comments about the readings before each class on the Sakai website. These posts will be used to both facilitate our class discussions, and will also serve to further our discussion on-line. In addition, you need to respond to one of your peer's posts by Tuesday evening. All questions must be posted - by **Monday at 6 pm.** These questions should go beyond definitional issues or areas of confusion (if you have more basic questions, please bring them up at the start of class). In particular, questions should attempt to make connections among the readings for the week and try to tie the current week's topic with topics covered in other weeks. It would also be acceptable to write questions stating an argument or point that you derive from the

articles and asking if others agree. You could also propose an extension of the current work or an additional research question. A critical reading of the research is expected.

**Leading Class Discussion** **10% of final grade**

Each seminar participant will lead a discussion of the week's readings over the course of the semester. This presentation should provide an overview of the readings and serve as an introduction to the major issues from the assigned readings. The purpose of the introduction is to highlight critical issues from the articles that will serve as the basis for our discussion. This presentation is not a summary of each reading. Instead, you should integrate across articles and present a broader overview of the topic for the week. The presentations should include a handout for the class. Following the introduction, you will lead a whole class discussion focused initiated by a few questions that you develop. You will serve as a guide throughout the day's discussion. You will be evaluated based on the quality and accuracy of the synthesis of the articles and the clarity of the presentation.

**Reaction Papers** **45% of final grade**

The purpose of these papers is to give you an opportunity to engage in a theoretical analysis/synthesis of the readings. You may pick **3 of the 4** assigned reflection papers topics. The reaction papers should be approximately 4-6 typed pages and focused on the assigned topic. I will pass out some suggested reaction paper topics/questions the week before they are due. The general topics for the papers and the dates that the topics will be **handed out** are listed below (also see course outline of readings).

**Reaction Paper Schedule:**

1st Reaction Paper	Feb 8	Info Processing; Experts & Novices
2 <sup>nd</sup> Reaction Paper	Feb 22	Social and Situative Theoretical Perspectives
3 <sup>rd</sup> Reaction Paper	Mar 21	Transfer, Conceptual Change, SRL
4 <sup>th</sup> Reaction Paper	Apr 4	Motivation

**Final Paper** **25% of final grade**

For the final paper, you will be asked to write a paper that is approximately 20 pages in length (double spaced, Times New Roman 12pt font). There are a couple of formats from which to choose, so that you can find a topic that is relevant to your interests and of value to your future work. The paper will give you the opportunity to explore an aspect of the course in greater detail or extend a topic to another area. I am open to other suggestions, so let me know if you have another idea.

a) Theoretical Review Paper. This would be a comprehensive paper synthesizing, reviewing and critiquing a specific topic related to the course. This would involve exploring a particular issue in greater depth, and would require accessing 10-20 additional articles and resources on the selected topic. The paper would summarize and introduce the concept under study, highlight the main issues in the field, present contrasting points of view and debates in the field. In the discussion, you will need to critique the research by considering its limitations and strengths, and by recommending future directions or avenues for research.

b) Research Proposal. A formal proposal for a research project. Consider a question that comes out of a theoretical perspective or issue related to the course content. Propose a research question(s) and a way to examine this issue that might lead to a potential study (i.e., prethesis project, research study, dissertation work). The paper would include a literature review that provides a background of the

issue, terms, and relevant work in the area. The literature review would also need to present the hole in the extant research and propose how your proposed work can fill that hole. The paper would go on to introduce a research question that comes out of this work as an extension or application of the area. You will introduce the context in which you plan to conduct the study, the sample, measures, preliminary analysis ideas, and the implications of the proposed research.

c) Case study. An analysis and/or evaluation of a school program, intervention, curriculum, lesson plan or developed unit (at least two days), group interaction among students, therapy sessions, or piece of software, from a motivational perspective. Alternatively, your final paper could develop and create a program or unit grounded in theories of motivation studied over the course of the semester. The case should apply motivational theories and constructs to your analysis and evaluation of the setting. This paper would first present a description of the context of your case or the developed program. Following or in an integrated manner, the paper would connect the program's features to relevant motivational literature (5-10 new references). A discussion would follow in which you would discuss the strengths and weakness of the program given these motivational ideas and make recommendations to further improve the design.

Your proposed final paper topic must be turned in by **February 1<sup>st</sup>**. This initial proposal should be 1-2 pages long and should focus on providing details about the main issues, points, or controversy you plan to address (a few paragraphs). Please feel free to discuss your initial ideas prior to this deadline. An outline that will detail key points and your list of references is due **March 21<sup>st</sup>**. The final paper will be due **April 25<sup>th</sup>**, the last day of class for the semester. On the final day of class, you will present your final paper research or proposal ideas as a powerpoint presentation to your peers.

I encourage you to use references from the course readings, but you will need to extend your research to articles that were not a part of the course. The references should be from psychological or educational journals or edited books. You may find the following journals particularly useful (although feel free to use other journals as well): Journal of Educational Psychology, Educational Psychologist, Child Development, Developmental Psychology, Journal of Applied Developmental Psychology, Contemporary Educational Psychologist, American Psychologist, Journal of Personality and Social Psychology, and The Elementary School Journal. I also recommend looking at recent edited book chapters. Edited books and handbooks often provide good overviews of a particular topic.

### Course Schedule

I have included a list of the topics to be covered over the course of the semester - but these readings will be significant updated. As mentioned above, all readings are empirical articles and theoretical reviews. These will be made available on Sakai. A complete list of readings will be made available at the start of the semester.

January 18 <sup>th</sup>	<b>Introduction</b>
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January 25 <sup>th</sup>	<b>Information Processing: The structure of memory</b>
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- Jonides, J., Lacey, S.C., Nee, D.E. (2005). Processes of working memory in mind and brain. *Current Directions in Psychological Science*, 14, 2-5.
- Miyake, A., & Shah, P. (1999). Toward unified theories of working memory: Emerging general consensus, unresolved theoretical issues, and directions for future research. In A.

Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 442-481). New York: Cambridge University Press

*Recommendations for further reading:*

- Baddeley, A. (2004). Your memory: A user's guide (pp. 9-65). Buffalo, NY: Firefly.
- Ericsson, K.A. & Delaney, P.F. (1999). Long-term working memory as an alternative to capacity models of working memory in everyday skilled performance. In A. Miyake & P. Shah (Eds.), *Models of working memory: Mechanisms of active maintenance and executive control* (pp. 257-297). New York: Cambridge University Press.
- Gathercole, S.E., Pickering, S.J., Ambridge, B., & Wearing, H. (2004). The structure of working memory from 4 to 15 years of age. *Developmental Psychology*, 40, 177-190.
- Jonides, J. (1995). Working memory and thinking. In E.E. Smith & D. Osherson (Eds.), *Thinking* (pp 215-266). Cambridge, MA: MIT Press.

February 1 <sup>st</sup>	<b>Information Processing: Cognitive Processes</b>
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- Feldon, D.F. (2007). Cognitive load and classroom teaching: The double edged sword of automaticity. *Educational Psychologist*, 123-138.
- Van Merriënboer, J., Kirschner, P.A., & Liesbeth, K. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist*, 38, 5-14.
- *Handbook chapter.*

*Recommendations for further reading:*

- Sweller, J. & Chandler, P. (1994). Why some material is difficult to learn. *Cognition and Instruction*, 12, 185-223.

*Final Paper Topic Proposal Due.*

February 8 <sup>th</sup>	<b>Experts and Novices</b>
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- Chi, Feltovich & Glaser (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science*, 5, 121-152.
- Feltovich, P.J., Prietula, M.J., & Ericsson, K.A. (2006). Studies of expertise from psychological perspectives. In K.A. Ericsson, N.Charness, P.J. Feltovich, and R.R. Hoffman (Eds.), *The Cambridge Handbook of Expertise and Expert Performance* (pp. 41-67). New York: Cambridge University Press.

*Recommendations for further reading:*

- Ericsson, K.A., & Lehmann, A.C. (1996). Expert and exceptional performance: Evidence of maximal adaptation to task constraints. *Annual Review of Psychology*, 47, 273-305.

*Reaction Paper 1 handed out.*

February 15 <sup>th</sup>	<b>Social views of Learning</b>
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- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26.

- Derry, S.J. (1996). Cognitive schema theory in the constructivist debate. *Educational Psychologist*, 31(3&4), 163-174.
- Palincsar, A. (1998). Social-constructivist perspectives on teaching and learning. *Annual Review of Psychology*, 49, 345-375.

*Recommended for further reading:*

- Resnick, L.B. (1991). Shared cognition: Thinking as a social practice. In L.B. Resnick, J.M. Levine, & S.D. Teasley, (Eds.), *Perspectives on socially shared cognition* (pp. 1-20). Washington, DC: American Psychological Association.

*Reaction Paper 1 due.*

February 22<sup>nd</sup>

### **Situated Views of Learning**

- Greeno, J.G. (2006). Learning in activity. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences*. New York, NY: Cambridge University Press.
- Lave, J. (1991). Situated learning in communities of practice. In L.B. Resnick, J.M. Levine, & S.D. Teasley, (Eds.), *Perspectives on socially shared cognition* (pp. 63-82). Washington, DC: American Psychological Association.

*Recommendations for further reading:*

- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Anderson, J.R., Reder, L.M., & Simon, H.A. (1996). Situated learning and education. *Educational Researcher*, 25, 5-11.
  - Greeno, J. (1997). On claims that answer the wrong questions. *Educational Researcher*, 26, 5-17.
  - Anderson, J.R., Reder, L.M., & Simon, H.A. (1997). Situated versus cognitive perspectives: Form versus substance. *Educational Researcher*, 26, 18-21.

*Reaction Paper 2 handed out.*

February 29<sup>th</sup>

### **Self-Regulated Learning**

- Zimmerman, B.J. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist*, 33(2/3), 73-86. [See recommended Zimmerman, 1989 below for more on a social cognitive perspective].
- Wolters, C. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of Educational Psychology*, 95, 179-187.
- McCaslin, M. (2004). Coregulation of opportunity, activity, and identity in student motivation. In D. McInerney & S. Van Etten (Eds.), *Big theories revisited: Research on sociocultural influences on motivation and learning* (Vol. 4, pp. 249–274). Greenwich, CT: Information Age.

*Reaction Paper 2 due.*

March 7<sup>th</sup>

### **Transfer**

- Salomon, G. & Perkins, D.N. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist*, 24(2), 113-142.
- Bransford, J. & Schwartz, D. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of research in education*, 24, 61-100.

March 10-18

## Spring Break

March 21<sup>st</sup>

## Conceptual Change

- Vosniadou, S. & Brewer, W.F. (1992). Mental models of the earth: A study of conceptual change in childhood. *Cognitive Psychology*, 24, 535-585.
- Wiser, M. & Amin, T. (2001). "Is heat hot?" Inducing conceptual change by integrating everyday and scientific perspectives on thermal phenomena. *Learning and Instruction*, 11(4-5), 331-355.
- Smith, J.P., diSessa, A.A., & Roschelle, J. (1993). Misconceptions reconceived: A constructivist analysis of knowledge in transition. *The Journal of the Learning Sciences*, 3, 115-163.
- Pintrich, P.R., Marx, R.W., & Boyle, R.A (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research*, 63, 167-199.

### *Recommendations for further reading*

- Chi, M.T.H. (2005). Commonsense conceptions of emergent processes: Why some misconceptions are robust. *The Journal of the Learning Sciences*, 14, 161-199.
- Vosniadou, S. (2002). Exploring relationships between conceptual change and intentional learning. In G.M. Sinatra & P.R. Pintrich (Eds.), *Intentional conceptual change* (pp. 347-374). Mahwah, NJ: Erlbaum.
- Strike, K.A., & Posner, G.J. (1992). A revisionist theory of conceptual change. In R.A. Duschl & R. J. Hamilton, (Eds.), *Philosophy of science, cognitive psychology, and educational theory and practice* (pp. 147-176). Albany, NY: SUNY Press

*Outline and References for Final Paper Submitted.*

*Reaction Paper 3 handed out.*

March 28<sup>th</sup>

## Motivation to Learn

- Pugh, K.J., & Bergin, D.A. (2006). Motivational influences on transfer. *Educational Psychologist*, 41, 147-160.
- Wolters, C. A. (1999). The relation between high school students' motivational regulation and their use of learning strategies, effort, and classroom performance. *Learning and Individual Differences*, 9, 281-301.

*Reaction Paper 3 due.*

April 4<sup>th</sup>

### Motivation in Context

- Perry, N. E., Turner, J. C., & Meyer, D. K. (2006). Classrooms as contexts for motivating learning. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of Educational Psychology* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Hickey, D. T. (2003). Engaged participation versus marginal nonparticipation: A stridently sociocultural approach to achievement motivation. *Elementary School Journal*, 103(4), 401-429.
- Nolen, S.B. (2007). Young children's motivation to read and write: Development in social contexts. *Cognition and Instruction*, 25(2), 219-270.

*Reaction Paper 4 handed out.*

April 11<sup>th</sup>

### Instructional Practices

- Palincsar, A.S. & Brown, A.L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1(2), 117-175.
- Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.) *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (p. 453-494). Hillsdale, NJ: Lawrence Erlbaum.
- Tabak, I. (2004). Synergy: A complement to emerging patterns of distributed scaffolding. *The Journal of the Learning Sciences*, 13(3), 305-335.

*Recommended for further reading:*

- Reiser, B. (2004). Scaffolding complex learning: The mechanisms of structuring and problematizing student work. *The Journal of the Learning Sciences*, 13(3), 273-304.
- Kazemi, E. & Stipek, D. (2001). Promoting conceptual thinking in four upper-elementary mathematics classrooms. *The Elementary School Journal*, 102(1), 59-80.

*Reaction Paper 4 due.*

April 18<sup>th</sup>

### Learning Environments

- Brown, A.L. (1997). Transforming schools into communities of thinking and learning about serious matters. *American Psychologist*, 52, 399-413.
- Scardamalia, M & Bereiter, C. (2006). Knowledge building: Theory, pedagogy, and technology. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 97-115). New York: Cambridge University Press.
- Barron, B. J. S., Schwartz, D. L., Vye, N. J., Moore, A., Petrosino, A., Zech, L., Bransford, J. D., & The Cognition and Technology Group at Vanderbilt. (1998). Doing with understanding: Lessons from research on problem and project-based learning. *Journal of the Learning Sciences*, 3/4, 271-312.

*Recommendations for further reading:*

- Brown, A.L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2, 141-178.
- Kirschner, P.A., Sweller, J., Clarke, R.E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential and inquiry-based teaching. *Educational Psychologist*, 41(2), 75-86.

- Schmidt, H.G., Loyens, S.M.M., van Gog, T., & Paas, F. (2007). Problem-based learning *is* compatible with human cognitive architecture: Commentary on Kirschner, Sweller & Clarke (2006). *Educational Psychologist*, 42(2), 91-97.
- Hmelo-Silver, C., Duncan, R.G., & Chinn, C.A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller & Clarke (2006). *Educational Psychologist*, 42(2), 99-107.
- Kuhn, D. (2007). Is direct instruction an answer to the right question? *Educational Psychologist*, 42(2), 109-113.

April 25<sup>th</sup>

**Final Presentations**