# First Sources Model

## PRIMARY SOURCES

1. Pea, R. (1993). *Practices of distributed intelligence and designs for education*. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations. (pp. 47-87). Cambridge: Cambridge University Press.

   Roy Pea's article clearly articulates the basic idea of distributed cognition (distributed intelligence) and discusses a variety of issues relating to the phenomenon. He discusses distributed cognition as a framework for inquirey. He reviews the history of distributed cognition. He discusses big ideas relating to the concept from big thinkers of the past and the present. The clarity with which he discusses subtle issues is in the field of education. Since my work proposes that distributed cognition be used as the guiding force behind design of a CS1 course, much of this chapter has relevance to my work.

2. Perkins, D. N. (1993). *Person-plus: a distributed view of thinking and learning*. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations. (pp. 47-87). Cambridge: Cambridge University Press.

   Perkins contrasts the Person-Plus model of learning in with the Person-Solo model. He introduces the *equivalent access hypothesis* in terms of an *access framework* consisting of knowledge, representation, retrieval, and construction. He dismisses the "fingertip effect" as a sham, and elaborates on why this is significant for educators to appreciate.

3. Salomon, G. (1993). *No distribution without individuals' cognition: a dynamic interactional view*. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations. (pp. 47-87). Cambridge: Cambridge University Press.

   Salomon presents a balanced view of distributed cognition in education that respects individual cognition in a manner that seems relevant to educational concerns. He defends his claim that one does need to consider the individual within the distributed cognition framework, and he surveys the history of ideas relating to distributed cognition as he does so. He champions the idea that individuals' cognitions and distributed cognitions interact in a spiral-like fashion that promotes development of the system and its components. He discusses educational goals and the design of tools within the distributed cognition framework.

4. Guzdial, M. & Soloway, E. (2002). *Teaching the nintendo generation to program*. Communications of the ACM. Vol=45 and Issue=4 and pages = 17 to 21. New York: ACM.

   This article suggests that ``multimedia programming first'' may be the most appropriate basis for designing a computer programming courses for today's students. This is relevant to the distributed cognition framework since the framework affords multimedia programming by potentially providing cognitive artifacts in the form of graphical and musical microworlds that render meaningful multimedia programming accessible to beginning students. In fact, this is precisely the approach adopted in the CS1 course offered for consideration.

5. Claxton, G. (1999). *Wise-up: the challenge of lifelong learning*. New York: Bloomsbury.

Claxton champions the 3Rs of learning. He discusses the importance of immersion, immitation, and intuition. He discusses the significance of play. The chapter "Learner-Plus: Making Use of Technology" is essentially related to our work. One theme of the envisaged CS1 course is to infuse it with the common sense approach to learning described by Claxton.

6. Robins, A., Rountree, J., & Rountree, N. (2003). *Learning and teaching programming: a review and discussion*. Norwood, NJ: Albex.

   This survey paper discusses object-orientation and procedural programming, suggesting the question of which should be featured first or foremeost in a CS1 course has is not an easy one. The authors discuss characteristics of novice programmers and expert programmers. More significantly, the authors contrast effective novices vs ineffective novices. There is a good section on CS1 course design and teaching methods. Since CS1 course design is part of our work, this section of the paper will help to inform our narrative.

7. Siegfried, R., Chays, D., & Herbert, K. (2008). *Will there ever be consensus on CS1?*, Proc. 2008 International Conference on Frontiers in Education: Computer Science and Computer Engineering – FECS '08, 18–23. CSREA Press, 2008.

   This article presents the problems and promises associated with the idea of achieving consensus on approaches to the CS1 course.

8. Graci, C. (2009). *A brief tour of the learning sciences via a cognitive tool for investigating melodic phenomena*. Journal of Educational Technology Systems, 38(2), 181-211.

   This article discusses the learning sciences in terms of a system of principles. Furthermore, it discusses each of the principles presented in the context of a computational learning environment.

## SECONDARY SOURCES

1. Martinez, S. & Stager, G. (2013). *Invent to learn: making, tinkering, and engineering in the classroom*. Torrance, California: Constructing Modern Knowledge Press.

   This work pays homage to Seymour Papert's views on education. It contextualizes constructionism, and champions its value as an educational philosophy. The text discusses powerful ideas in constuctionist education, integrating the arts in education, what makes for a good project, tinckering as play, creativity as an educational value, thinking about thinking, and many other important issues.

2. Perry, M. (2003). *Distributed cognition*. In HCI Models, Theories, and Frameworks: Towards a Multidisciplinary Science, John M. Carroll (ed.). San Francisco, CA: Morgan Kaufman.

   A survey of DCog, the brand of distributed cognition pioneered by Edwin Hutchins. Concept, theory, and practice of DCog are well represented. The emphasis on DCog as an extention, not a replacement, for traditional cognitive science is significant with respect to our work, and the viability of realizing a CS1 course based on DCog.

3. Lambert, C. (2012) *Twilight of the lecture*. Harvard Magazine. Cambridge, MA: Harvard Magazine, Inc.

   This article summarizes the ideas on learning and teaching that have recently been given

voice by Eric Mazure, a physicist and educator at Harvard. Mazure advocates a form of interactive learning that features peer instruction. He argues that this provides a more appropriate learning environment for women in fields of science than what is generally found in universities today. He talks about giving students a problem to work on, and then encouraging them to figure out what needs to be done, to make appropriate assumptions, to engage in real problem solving. He distinguishes between real problems where the solution is unknown and mere exercises.

4. Martinez, M. (2010). *Learning and cognition: the design of the mind*. Boston: Merrill.

   A cognitive psychology text with an emphasis on learning. Metacognition. Habits of mind. Synesthesia. Cognitive modeling. Vygotsky. Complex cognition. Heuristics. Assessment. Bloom's taxonomy. Can relate it to Mazure. Theories of education. Lots of bid ideas that should be find voice in our CS1 description.