

Ph.D. General Examinations Proposal

Understanding the Spaces and Designing the Technologies for Social Learning

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MIT Media Laboratory
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Proposal Overview

I am deeply interested in the situatedness of learning: how people's social, physical and mental space impacts how and what they learn. By approaching this interest from three very different perspectives—1.) constructionist and related theories of learning, 2.) the ongoing work in architectural spaces for work and the design of workplaces, and 3.) the burgeoning field of social networks—I will have the foundation to address the critical questions in this area. How do learners within a community support one another and how do they not? How does the physical structure of a learning environment impact what people are motivated to learn and what they do learn? Which workplace designs support collaborative learning of different types? What are the conceptual and methodological tools for analyzing how a communities of learners function?

The main area, *Constructionist Learning*, provides the foundation for understanding the situatedness of learning: how community and context influences individual learners and how we learn through designing. The contextual area, *Physical Spaces for Work and Learning*, considers the physical spaces of learning. In particular, it focuses upon people's experience of place and how to design physical and virtual spaces for work and learning activities. The technical area of the exam will provide me with the tools to untangle the complexities of communities of learners from a very different perspective than typical of my main area. Though constructionist learning environments value many of the characteristics highlighted by social network research, the *Tools and Methods for Analyzing Social Networks* have been applied to learning environments in only the most limited way.

The nature of learning environments is rapidly changing with technology's quick pace. I believe having a deep understanding of the nature of situated learning environments through a multidisciplinary approach to physical and social learning spaces would be the foundation for me to make a potentially unique contribution to the design of technologies for social learning.

Main Area: *Constructionist Learning*

Mitchel Resnick, LEGO Papert Associate Professor of Learning Research, MIT Media Laboratory.

Contextual Area: *Physical Spaces for Work and Learning*

William Porter, Professor Emeritus, Department of Architecture, MIT.

Technical Area: *Tools and Methods for Analyzing Social Networks*

Alex "Sandy" Pentland, Toshiba Professor of Media Arts and Sciences, MIT Media Laboratory.

**Main area:
Constructionist Learning**

Examiner

Mitchel Resnick
LEGO Papert Associate Professor of Learning Research
MIT Media Laboratory

Description

The main area of my general exams focuses on how learning is grounded in context: how people learn in groups and how people learn through designing. I am studying several different theories on these topics including the socio-cultural approach of Vygotsky, activity theory, situated cognition, the constructivism of Piaget and constructionism as defined by Papert.

Written requirement

The written requirement for this area will be satisfied with a paper of publishable quality in the area of constructionist learning. Professor Resnick will evaluate the paper.

Signature _____ Date: _____

Main area reading list: Constructionist Learning

Learning Through Designing

- Dewey, J. (1963). *Experience and education*. New York, Collier Books.
- DiSessa, A. A. (2001). *Changing minds : computers, learning, and literacy*. Cambridge, Mass., MIT Press.
- Druin, A. (1999). *The design of children's technology*. San Francisco, Morgan Kaufmann Publishers.
- Eisenberg, M. (2003). Mindstuff: Educational technology beyond the computer. *Convergence*.
- Fischer, G. (2002). Beyond "Couch Potatoes": From Consumers to Designers and Active Contributors.
- Harel, Idit, ed. (1991). *Children Designers: Interdisciplinary Constructions for Learning and Knowing Mathematics in a Computer-Rich School*. Greenwood Pub Group.
- Illich, I. (1973). *Tools for Conviviality*. Harper & Row Publishers, New York.
- Kolodner, Janet L., et al (1998). Learning by Design from Theory to Practice. *Proceedings of ICLS 98*. Atlanta, GA, 16-22.
- Papert, S. (1980). *Mindstorms: children, computers, and powerful ideas*. New York, Basic Books.
- Papert, S. (2000). What's the big idea? Steps toward a pedagogy of Idea Power. *IBM Systems Journal* 39(3-4).
- Perkins, D. N. (1986). *Knowledge as design*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Schön, D. A. (1983). *The reflective practitioner: how professionals think in action*. New York, Basic Books.

Communities and Context

- Brown, J.S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18:1, 32-42.
- Carpendale, J. I. M. (1997). An explication of Piaget's constructivism: Implications for social cognitive development. In S. Hala (ed.), *The development of social cognition*, 35-64. London: University College London Press.
- Chaiklin, S. & Lave, J. (1993). *Understanding Practice: Perspectives on Activity and Context*. Cambridge: Cambridge University Press.
- Duckworth, E. (1987). *The Having of Wonderful Ideas and Other Essays on Teaching and Learning*. Teacher's College, Columbia University, New York.
- Engeström, Y. Miettinen, R. & Punamäki R-L.,Eds. (1998). *Perspectives on activity theory*. Cambridge: Cambridge University Press.

Green, Susan K., & Gredler, Margaret E.,A. (2002). Review And Analysis Of Constructivism For School-Based Practice. *School Psychology Review*, 0279-6015, 31:1.

Lave, Jean & Etienne Wenger. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Koschmann, T. D. (1996). *CSCL, theory and practice of an emerging paradigm*. Mahwah, N.J., L. Erlbaum Associates.

Nardi, B., Ed. (1996). *Context and Consciousness: Activity Theory and Human-Computer Interaction*. Cambridge: MIT Press.

B. Rogoff, & J. Lave. (1984). *Everyday cognition: its development in social context*. Cambridge, Mass.: Harvard University Press.

Suchman, L. A. (1987). *Plans and Situated Actions*. Cambridge University Press, Cambridge, UK.

Vera, A.H. & Simon, H.A. (1993). Situated action: A symbolic interpretation. *Cognitive Science*, 17, 7-48.

Vygotsky, L.S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press, especially Ch 1 & 6.

Wegner, E. (1998). *Communities of Practice, Learning, Meaning & Identity*. Cambridge University Press.

Wertsch, J. *Vygotsky and the Social Formation of Mind*. Cambridge: Harvard University Press, 1985.

**Contextual area:
Physical Spaces for Work and Learning**

Examiner

William Porter
Professor Emeritus
MIT Department of Architecture

Description

The contextual area focuses upon three aspects of physical space relevant to situated learning: how people experience place, how different workplace designs support different types of work and learning, and how the artifacts we work with embody the activities we can do with them.

Written requirement

The written requirement for this area will consist of a 24-hour take-home examination to be administered and evaluated by Professor Porter.

Signature _____ Date: _____

Contextual area reading list: Physical Spaces for Work and Learning

How People Experience Place

- Barker, R. G., & Wright, H. F. (1951). *One boy's day*. New York: Harper & Row.
- Bloomer, Kent C. & Moore, Charles W. (1977). *Body Memory and Architecture*. New Haven: Yale University Press.
- Brand, S. (1995). *How Buildings Learn: What Happens After They're Built*. New York: Penguin Books.
- Casey, E. S. (1993). *Getting Back into Place: Toward a Renewed Understanding of the Place-World*. Bloomington: Indiana University Press.
- Durrell, Laurence. (1969). *Landscape and Character*. In *The Spirit of Place*. Oxford: Faber.
- Glassie, Henry H. (1995). *Passing the Time in Ballymenone: Culture and History of an Ulster Community*. Bloomington: Indiana University Press.
- Moore, Charles, et al. (1973). *The Place of Houses*. Austin: Holt, Rinehart and Winston.
- Rasmussen, S.E.. (1962). *Experiencing Architecture*. Cambridge: MIT Press.

Workplace Design

- Cuff, Dana. (1991). *Architecture: The Story of Practice*. Cambridge: MIT Press.
- The Gartner Group and MIT. (2001). *The Agile Workplace: Supporting People and Their Work*. Cambridge: The Gartner Group and MIT.
- Horgen, Turid H. et al. (1998). *Excellence By Design: Transforming Workplace and Work Practice*. New York: John Wiley & Sons Inc.
- Powell, K. & Duffy, F. C.. (1997). *The New Office*. London: Conran Octopus.
- Zelinsky, M. (1998). *New Workplaces for New Workstyles*. New York: McGraw-Hill Professional.

Designing for Embodied Interactions

- Card, Stuart K., Moran, Thomas P., Newell, Allen. (1983) *The Psychology of Human-Computer Interaction*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Dourish, Paul. (2001). *Where The Action Is: The Foundations of Embodied Interaction*. Cambridge: MIT Press.
- Ehn, Pelle. (1990). *Work-Oriented Design of Computer Artifacts*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Harrison, S. & Dourish, P. (1996). Re-place-ing space: The roles of place and space in collaborative systems. In M. S. Ackerman (Ed.), *Proceedings of the ACM Conference on Computer Supported Cooperative Work* (pp. 67-76). New York: ACM Press."

Norman, D. A. (1999). *The invisible computer : why good products can fail, the personal computer is so complex, and information appliances are the solution*. Cambridge: MIT Press.

Woodman, R. W., J. E. Sawyer, and R.W. Griffin. (1993). "Toward a theory of organizational creativity" in *Academy of Management Review* 18: 293-321.

**Technical area:
Tools and Methods for Analyzing Social Networks**

Examiner

Alex "Sandy" Pentland
Toshiba Professor of Media Arts and Sciences
MIT Media Laboratory

Description

This area focuses upon social network theory, the methodologies employed for the analysis of it, and its application to communities, particularly learning communities.

Written requirement

The written requirement for this area will consist of a 24-hour take-home examination to be administered and evaluated by Professor Pentland.

Signature _____ Date: _____

Technical area reading list: Tools and Methods for Analyzing Social Networks

Methodologies for Social Network Data Collection & Analysis

Erickson, Bonnie H. (2001). Good Networks and Good Jobs: The Value of Social Capital to Employers and Employees. Nan Lin, Karen Cook, and Ronald S. Burt (eds.), *Social Capital: Theory and Research*, 127-158. New York: Aldine de Gruyter.

Erickson, Bonnie, & Nosanchuk, T.A.. (1983). Applied Network Sampling. *Social Networks* 5:367-82.

Freeman, Linton C. (1979). Centrality in Social Networks: Conceptual Clarification. In *Social Networks* 1:215-239.

Killworth, Peter, et al. (1990). Estimating the size of personal networks. *Social Networks* 12:289-312.

Lin, (2001). Building a Network Theory of Social Capital. In Nan Lin, Karen Cook, & Ronald S. Burt (eds.), *Social Capital: Theory and Research*. New York: Aldine de Gruyter.

Lin, Nan, Walter Ensel, & John C. Vaughn. (1981). Social Resources and Strength of Ties: Structural Factors in Occupational Status Attainment. In *American Sociological Review* 46:393-405.

Lin, Nan, Yang-chih Fu, & Ray-May Hsung. (2001). The Position Generator: Measurement Techniques for Investigations of Social Capital. In Nan Lin, Karen Cook, & Ronald Burt (eds.) *Social Capital: Theory and Research*, 57-84. New York: Aldine De Gruyter.

Marsden, Peter & Karen Campbell. (1984). Measuring Tie Strength. *Social Forces* 63: 482-501.

van der Poel, Mart G. M. (1993). Delineating personal support networks. *Social Networks* 15:49-70.

Social Network Analysis of Learning Environments

Reffay, C. Chanier, T. (2003). How social network analysis can help to measure cohesion in collaborative distance learning. In *Designing for Change in Networked Learning Environments: Proceedings of the International Conference on Computer Support for Collaborative Learning*. Kluwer Academic Pub.

Nurmela K.A., Lehtinen E., Palonen T. (1999). Evaluating CSCL log files by Social Network Analysis. *Proceedings CSCL'1999 Conference, Palo Alto, CA: Stanford University*, 434-444.

Woodruff E. (1999). Concerning the Cohesive Nature of CSCL Communities. *Proceedings of CSCL'1999 Conference, Palo Alto, CA: Stanford University*, 677-680.

Palonen, T., & Hakkarainen, K. (2000). Patterns of Interaction in Computer-Supported Learning: A Social Network Analysis. In B. Fishman & S. O'Connor-Divelbiss (Eds.), *Fourth International Conference of the Learning Sciences*, 334-339. Mahwah, NJ: Erlbaum.

Virtual Communities

Hampton, Keith N. (2003). Grieving For a Lost Network: Collective Action in a Wired Suburb. *The Information Society* 19(5), 1-13.

Hampton, Keith N. & Wellman, Barry. (2003). Neighboring in Netville: How the Internet Supports Community and Social Capital in a Wired Suburb. *City and Community* 2(4), 277-311.

Wellman, Barry & Gulia, Milena. (1999). Net Surfers Don't Ride Alone: Virtual Community as Community. In Barry Wellman (ed.) *Networks in the Global Village*, Pp. 331-67. Boulder, CO: Westview Press.

Wellman, Barry (2001). Physical Place and Cyber Place: The Rise of Personalized Networking. *International Journal of Urban and Regional Research* 25(2), 227-252.

Social Network Theory

Burt, Ronald S. (1993). The Social Structure of Competition. In Richard Swedberg, (ed.) *Explorations in Economic Sociology*. New York: Sage.

Fischer, Claude. (1982). *To dwell among friends*. Berkeley: University of California Press.

Gladwell, M. (2000). *The tipping point: how little things can make a big difference*. Boston: Little Brown.

Granovetter, M. (1982). The strength of weak ties: A network theory revisited. In Peter Marsden and Nan Lin (eds.) *Social Structure and Network Analysis*. Beverly Hills: Sage.

McPherson, Smith-Lovin, & Cook. (2001.) Birds of a feather: Homophily in Social Networks. *Annual Review of Sociology* 27:415-44.

Milgram, Stanley. (1967). The Small-World Problem. *Psychology Today* 1:62-67.

Valente T. W. (1996). Social network thresholds in the diffusion of innovations. In *Social Networks*, 18: 69-89.

Valente, Thomas W. (1995). *Network models of the diffusion of innovations*. Cresskill, N.J.: Hampton Press.

Wellman, Barry. (1999). The Network Community: an Introduction. In Barry Wellman (ed.) *Networks in the Global Village*, 1-48. Boulder: Westview Press.

Weimann, G. (1982). On the importance of marginality: One more step into the two-step flow of communication. In *American Sociological Review*, 47, 764-773.

Biography of Bill Porter, Professor Emeritus of the MIT Department of Architecture

William Porter joined the faculty of the MIT Department of Architecture in 1967, was dean of the school from 1971 to 1981, and retired from MIT in 2004. He founded the school's Laboratory of Architecture and Planning. With Oleg Grabar, professor emeritus of Fine Arts at Harvard, he founded the Aga Khan Program for Islamic Architecture in 1979 and was its co-director until 1985. In 1979, with Professor Donlyn Lyndon of Berkeley, he co-founded Places, a Journal of Environmental Design, and served as co-editor until 1989. His research has focused on methods and processes of design of individuals and groups. He has led the SMArchS program focusing on these areas for the last dozen years. Porter earned his BA from Yale College in 1955, the MArch from Yale's School of Art and Architecture in 1957, and the PhD from MIT in 1969.

Recent publications have included *Excellence by Design: Transforming Workplace and Work Practice* and *The Agile Workplace*, both co-authored with colleagues; and, most recently, *Design Representation*, a study of how designers in a variety of fields represent ideas and employ those representations in their practice, co-edited with Gabriela Goldschmidt.