Theme #2: Stratégies and territories (regions)

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Teaching and Learning in Stanford's Smart Classrooms

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1 Purpose and Context of the Study

Recent research in the science of learning (National Research Council 2000) emphasizes the importance of active, lifelong learning requiring students to be active inventors rather than passive recipients. Furthermore, new technologies are becoming an increasingly integral part of university learning and teaching in an age of telecommunications and multimedia. Consequently, both instructors and students face new challenges, since the design of technology-enhanced learning environments as well as active learning are crucial. Thus, with its high performance learning spaces Wallenberg Hall,[1] the home of the Stanford Center for Innovations in Learning (SCIL)[2], and with CourseWork, a university-wide course management system, Stanford University provides a rich and flexible state-of-the-art learning environment facilitating innovative pedagogies and active student learning.

To learn more about how faculty and students at Stanford University meet future challenges, and how teaching and learning occur in one of the high performance learning spaces, the author attended and observed courses conducted at Stanford's Wallenberg Hall in 2006. The goal was to analyze how the technology-enhanced learning spaces can be utilized to facilitate different learning activities and active student learning to foster key competencies.

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[1] Wallenberg Hall was designed to provide technology-enhanced learning spaces for university classes as well as state-of-the-art facilities for research in learning and education, both national and in collaboration with international partners.

[2] The Stanford Center for Innovations in Learning (SCIL, http://scil.stanford.edu/), a research center within the Stanford University School of Education and located at Wallenberg Hall, conducts scholarly research to advance the science, technology and practice of learning and teaching.

2 Pedagogical Innovations

Following a ‘situative’ approach (Greeno, 2006), learning processes are based upon two perspectives that attempt to interrelate their strengths (Cole & Wertsch, 1996; Salomon & Perkins, 1998): (1) cognitive science, and (2) interaction approaches.

While cognitive, acquisition-orientated views of learning focus on the individual learner, emphasizing the acquisition of knowledge and cognitive skills (individuals’ knowledge construction), the situative, participatory-oriented approach views learning “as a collective, participatory process of active knowledge construction, emphasizing context, interaction and situatedness” (Salomon & Perkins, 1998, p. 2). An integrated view of the learning process together with the importance of active lifelong learning and the increasing influence of technologies has implications for both learning, and the design of learning environments. Facing current and future challenges, learning has to become a holistic phenomenon requiring motivated learners, who are able to self-regulate and actively engage within a learning community utilizing new technologies. I refer to this understanding as “learning in activity” following Greeno (2006).

For learning in activity to occur, an appropriate learning environment must be designed. First and foremost, a change in the nature of learning goals is necessary. Future learning aims at students who are motivated and able to plan, conduct, assess and regulate their own learning, while simultaneously actively engaging within a learning community making full use of the new technologies. Moreover, effective learning environments depend on the degree to which they are learner-centered, knowledge-centered, assessment-centered, and community-centered (National Research Council, 2000). Exploring classrooms from these perspectives can provide a scientifically guided framework for the design and analysis of technology-enhanced learning environments. However, there is a fifth perspective on learning environments that is becoming equally important in higher education.

3 Technological Innovations

Traditional classrooms at universities are often furnished with heavy, inflexible furniture, a blackboard, an overhead projector, a video projector and occasionally Internet access

for instructors. As new technologies are now playing an increasingly important role in all spheres of daily and academic life, traditional “low-tech” equipment can hardly serve current and future educational challenges. However, with its state-of-the-art classrooms such as those at Wallenberg Hall, Stanford University supplies “high-tech” learning and teaching environments offering a set of general capacities to facilitate learning and teaching activities and to assist students in attaining their learning goals (Gilbert & Nash, 2003, 2004). Within my research paper, I will highlight the following two resources: high performance learning spaces and a university-wide course management system.

4 Consequences for the design of learning environments

Traditional lecture-based classes have an extremely simple and stable structure because the instructor is in charge of planning, managing and guiding all the classroom activities as well as presenting the subject matter. In contrast, the technology-enhanced classrooms in Wallenberg Hall provide a much more complex structure, allowing innovative modes of learning that place students and their learning activities in the foreground. The simultaneous presence of a variety of technical and human resources, all available to be incorporated into classroom activities, present opportunities for learning in activity and innovative pedagogies. However, the use of new technologies must be driven by pedagogic principles. Taking technological innovations into account, I propose that the design of technology-enhanced learning environments, facilitating learning in activity, incorporates a fifth perspective on learning environments (see Figure 1): technology centeredness. On the one hand, this technology-centered feature is altering and enhancing traditional class activities. On the other hand, it is also influencing, or rather expanding the four perspectives proposed by the National Research Council (2000).

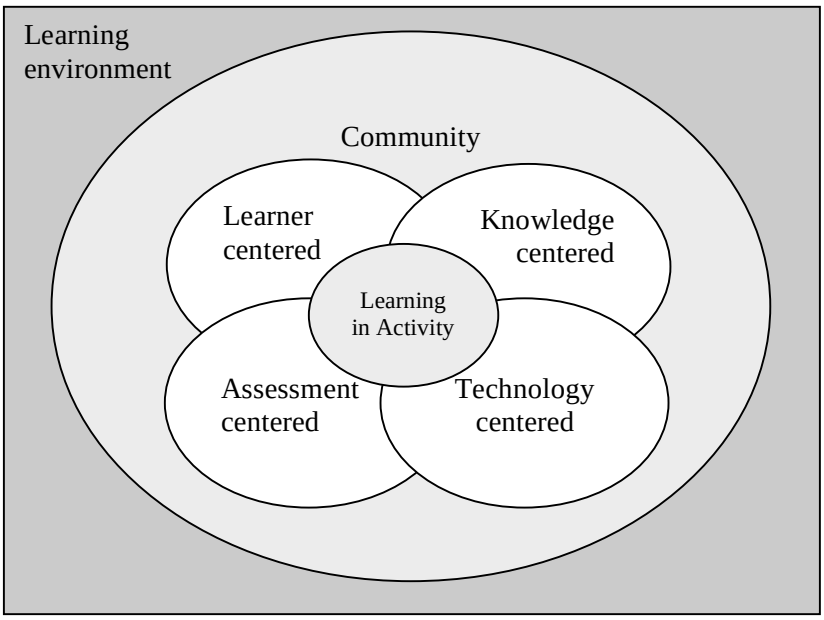

Fig. 1: Five perspectives on learning environments (based on Bransford et al., 1998)

5 Findings of the Case Study

Learning and teaching in Wallenberg Hall presents challenges and opportunities for both instructors and students. To make full use of high performance learning spaces, the importance of designing classrooms around the kinds of activities that instructors are likely to do is essential. Pedagogy drives the use of the technologies, which means the specific activity is altered and enhanced by the use of technology. The analysis of the class activities is guided by five questions related to the five perspectives on learning environments (following National Research Council, 2000).

The analysis shows that the instructor fosters not only professional competencies but also technical, learning, social, and metacognitive skills. Furthermore, students frequently produce “learning products” which they present to the whole class. Furthermore, this study provides ideas for an innovative technology-enhanced pedagogy. Learning in activity and the pedagogically guided design of technology-enhanced learning environments involve the following learning and teaching activities:

The instructor

- fosters professional competencies and also technical, learning and social skills.
- provides an organized course and knowledge structure as well as possibilities for formative feedback.
- creates a learning environment where students play an active role and have to take responsibility for their learning process within both individual and group activities.
- integrates the resources provided by technology enhanced classrooms in a valuable way and thus, functions as role model.

The students

- are active originators of their learning and actively engage within the learning community utilizing new technology. They are participating actively in collaborative practices.
- are engaged in self-study forms in order to create knowledge and understanding (knowledge production) while applying the methods and strategies of a discipline.
- perform and share their thinking and understanding in representational practices, compare their solutions with expert interpretations and with one another within class discussions guided by the instructor using annotation techniques and as a consequence create joint knowledge (complementing one another).
- actively reviewing and improving their own understanding (metacognition) while getting opportunities to revise thinking continuously as they have opportunities to use feedback immediately.
- making full use of environmental resources like cultural artifacts (e.g. media) and social mediators within and without the classroom.

6 Conclusions

Referring to the National Research Council (2000) new developments in the science of learning have important implications for the design of learning environments. Moreover, the exploration of successful educational settings also reveals valuable insights to bridge theory and practice. It is obvious that there is a strong need to intertwine pedagogical as well as technological innovations wherein the use of new technologies is guided by pedagogical principles.

I argue that learning in activity, that is, motivated students, who are able to learn in a self-regulated manner and to actively engage within a learning community utilizing new technologies, is crucial. Learning in activity at a university seems to interrelate four components: motivation, self-regulation, participation and utilization to foster lifelong learning. As a result, I propose that it is an important goal in higher education to facilitate learning in activity, and thus, to create a learning environment that enables students to acquire knowledge, which is applicable and transferable and facilitates lifelong learning. Consequently, the learning environment has to be designed, that means, it has to be student-centered, knowledge-centered, assessment-centered, community-centered, and technology-centered.

7 References

Anderson, J. R., Reder, L. M., and Simon, H. A. (1996). Situated Learning and Education. *Educational Researcher,* 25, 5-11.

Cole, M., and Wertsch, J. V. (1996). *Beyond the individual-social Antimony in Discussions of Piaget and Vygotsky*. Retrieved from http://www.massey.ac.nz/~alock/virtual/colevyg.htm

Gilbert, D., and Nash, J. (2003). *Got Teaching: How Faculty Perceive New Classrooms in a Research University*. Presentation given at Syllabus Annual Conference, Stanford, CA. Retrieved from http://scil.stanford.edu/about/staff/bios/PDF/Got_Teaching.pdf

Gilbert, D., and Nash, J. (2004). *New Spaces, New Activities: Effective Instruction in High – Tech Classrooms.* Poster presented at National Education Computing

Conference (NECC). New Orleans, LA. Retrieved from http://scil.stanford.edu/about/staff/bios/PDF/Stanford_NECC_poster.pdf

Greeno, J. G. (2006). Learning in activity. In K. Sawyer (Eds.), *Cambridge Handbook of the Learning Sciences*. New York: Cambridge University Press.

National Research Council (2000). *How people learn: Brain, mind, experience and school (expanded edition)*. Committee on Developments in the Science of Learning. J.D. Bransford, A.L. Brown, A., and R.R. Cocking (Eds.) Washington DC: National Academy Press.

Salomon, G., and Perkins, D. (1998). Individual and social aspects of learning. *Review of Research in Education*, 23, 1-24.