2005 The next 10 years !

CSCL
Computer Supported Collaborative Learning

COMMUNITY EVENTS

Edited by Timothy Koschmann, Daniel D. Suthers, Tak-Wai Chan

TAIPEI, TAIWAN May 30-June 4, 2005

CSCL05

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Table of Contents

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Community Memory
Ricki Goldman, New Jersey Institute of Technology

Tutorials
Cindy Hmelo-Silver, Rutgers University
Fe-Ching Chen, National Central University

Workshops
Gerry Stahl, Drexel University

Student Community
Clayton Lewis, University of Colorado at Boulder
Chris Quintana, University of Michigan
Fu-Yun Yu, National Cheng-Kung University

Student Paper Prize
Timothy Koschmann, Southern Illinois University

Interactive Events
Anders Mørch, University of Oslo
Hiroaki Ogata, University of Tokushima

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- Naomi Miyake, Chukyo University, Japan
- Riichiro Mizoguchi, Osaka University, Japan

- Anders Morch, University of Oslo, Norway
- Bonnie Nardi, University of California, Irvine, USA
- Aug Nishizaka, Meiji Gakuin Univiversity, Japan
- Miguel Nussbaum, Pontificia Universidad Católica de Chile, Chile
- Hiroaki Ogata, University of Tokushima, Japan
- Claire O'Malley, University of Nottingham, UK
- Roy Pea, Stanford University, USA
- Peter Reimann, University of Sydney, Australia
- Tim Roberts, Central Queensland University, Australia
- Jeremy Roschelle, SRI International, USA
- Marlene Scardamalia, University of Toronto, Canada
- Baruch Schwarz, Hebrew University of Jerusalem, Israel
- David W. Shaffer, University of Wisconsin, USA
- Mike Sharples, University of Birmingham, UK
- Simon Buckingham Shum, The Open University, UK
- Gerry Stahl, Drexel University, USA
- Reed Stevens, University of Washington, USA
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KEYNOTES

Learning from Commonsense: Ethnomethodology and Systems Design

Graham Button

Ethnomethodological studies of work have become an increasingly used resource in the design of computer systems for well over a decade. The analysis of the constitutive practices of work by ethnomethodologists has had both a general methodological influence on design, and a practical consequence for the design of particular systems. On the one hand the idea that human action and interaction is situated has led to a methodological argument that in order to better design systems for the work place it is necessary to analyse the work a system will support from within the context of its production and within the swarm of contingencies it will encounter. On the other hand, actual studies of work have provided requirements for actual systems that have reduced the gap between the technology and the work of those who use it.

However, with the emphasis upon work practice, and within the inevitable turbulences of communicating across disciplines, many of the underpinnings of ethnomethodological investigation have been glossed in the dialogue between ethnomethodologists and computer system designers. One of those underpinnings is the interest that ethnomethodologists have in practical reasoning and understanding, that is, with the way in which people use their stock of commonsense knowledge to reason about and understand social action and interaction. Yet, the ways in which people make sense of the things they see and hear, employing their socially organised commonsense ways of reasoning in their interactions with one another, may be a valuable resource for the design of systems to support learning situations.

In the manner of ethnomethodology, this is not an abstract argument, it is one that can be articulated in study and design practice. To make it I will take a case study which was done by the Work Practice Technology group at Xerox Research Centre Europe (XRCE) consisting of Stefania Castellani, Antonietta Grasso, Peter Tolmie, Jacki O'Neill and myself. We have been interested in the way in which designers of on-line systems to support users of technology in solving problems they are having can learn from the ways in which troubleshooters at call centres, dealing with the same sorts of problems, make sense of the problem descriptions provided by customers in order to work out a solution.

Users of on-line systems often find it difficult to use the system to resolve their problem. This is because the design of the system makes it difficult for them to reason through from their problem to the solution due to the fact that the system embodies a technical world view. The studies done by the Work Practice Technology group at XRCE of troubleshooters on help desks made it clear that there are commonsense practices employed by both troubleshooters and customers in their interaction in order to arrive at descriptions of problems and ways to go about solving them that are coherent to both parties. That is, troubleshooters work on the telephone as a bridge between commonsense reasoning about problems and more technical modes of reasoning about the same things.

The need for a bridge here is informative for a range of more directly pedagogic interests. Many products are provided with a range of resources through which it is intended that users should acquire an understanding of how best to use those products and handle difficulties when they arise. There is also increasing diversity in these resources. No longer is it just a matter of working with the product manual. Instead users are often now bombarded with learning materials from CD-ROMs to product websites. However, it is still the case that these resources are most often scripted and designed from the perspective of a technical understanding of the products. Our studies indicate that to rely on just technical instruction with a glossary is very wide of the mark with regard to its actual efficacy in use. If a bridge is needed to allow for commonsense reasoning in troubleshooting a similar adaptability to commonsense reasoning is needed in these resources as well.

The message here for designers of learning resources for products is a clear one: there is a need to attend to how people will reason about those products if one is going to provide effective resources for learning about their operation. When learning how to use a product the acquisition of a technical vocabulary and perspective is an overhead few users will sign up for. Instead there is a need to provide product support resources that are immediately accessible from a commonsense point of view. In that there are already people whose job it is to make technical information about products accessible to lay users (for example, help desk trouble shooters) there already exists for learning material designers a ready resource to be tapped for understanding just how one might construct bridges from the technical to commonsense points of view. Ethnomethodology’s interest in how people reason through and make sense of their world can be used to tap that resource.

A Neo-Vygotskian Approach to Collaborative Learning

Giyoo Hatano

Individuals engaging in a collective activity can solve problems and acquire pieces of knowledge without difficulty that they seem to encounter when they engage in an essentially solitary activity. This successful and competent collaborative performance and learning is usually attributed to socio-cultural constraints operating in the activity: the individuals select an alternative from their behavioral and conceptual repertories that is in accordance with social and cultural constraints, and, thanks to these constraints, they can find effective procedures and apt interpretations promptly in most cases.

Although this notion of socio-cultural constraints in individual cognition is powerful, any analysis based on it must be individualistic. This is because individuals remain individuals in this formulation: the notion assumes that, though people influence others as well as are influenced, they never form a coalition, in other words, they do not construct collective understanding as a product of a series of negotiations.

A more adequate strategy for investigating the process of collaborative learning would be a two-level analysis of activity, that is, to conceptualize the target phenomenon of individual cognition in a socio-cultural context as a collective or intermental process, as well as to specify what occurs in the intramental process of each individual as reflecting this intermental process. Extending the Vygotskian conception of "the zone of proximal development," I propose to describe this process as (1) the production of something collective or shared among the participants in the intersection of their negotiable zones, and (2) the individual incorporation of this "something" for generating, elaborating and revising his/her knowledge. I will present a few exemplary studies of collaborative learning using the two-level analysis of collective activity.

Biosketch

Giyoo Hatano is a professor of psychology and learning sciences at the Human Development & Education Program of the University of the Air, where he moved in

April 2001 from Keio University. Most of his recent research has been concerned with conceptual development, expertise, and literacy/numeracy acquisition. He is an editorial board member of more than ten journals (including Cognition, Cognitive Development, Developmental Science, European Journal of Psychology of Education, Human Development, International Journal of Educational Research, International Journal of Mathematical Thinking and Learning, Journal of Learning Sciences, Journal of Mathematical Behavior, Learning and Instruction, and Mind, Culture and Activity). He was elected as a foreign associate of National Academy of Education (U.S.) in 1992, and given Award for Outstanding Contribution to Educational Psychology 1998 by International Association of Applied Psychology, Division of Educational, Instructional and School Psychology. He gave an invited address at the International Congress of Psychology, International Congress of Applied Psychology and the meeting of the International Society for the Study of Behavioral Development in recent years.

Tangible Bits: Designing the Seamless Interface between People, Bits, and Atoms

Hiroshi Ishii

Where the sea meets the land, life has blossomed into a myriad of unique forms in the turbulence of water, sand, and wind. At another seashore between the land of atoms and the sea of bits, we are now facing the challenge of reconciling our dual citizenships in the physical and digital worlds. Windows to the digital world are confined to flat square ubiquitous screens filled with pixels, or "painted bits." Unfortunately, one can not feel and confirm the virtual existence of this digital information through one's body.

Tangible Bits, our vision of Human Computer Interaction (HCI), seeks to realize seamless interfaces between humans, digital information, and the physical environment by giving physical form to digital information, making bits directly and collaboratively manipulable. The goal is to blur the boundary between our bodies and cyberspace and to turn the objects and architectural space into an collaborative interface.

In this talk, I will present a variety of tangible user interfaces the Tangible Media Group has designed and presented within the CHI, SIGGRAPH, UIST, CSCW, IDSA, ICSID, ICC, and Ars Electronica communities in the past several years.

For more information about Prof. Ishii and his research, please refer to:
http://web.media.mit.edu/~ishii/ and http://tangible.media.mit.edu/

PANELS

The Impact of International Collaborative Initiatives on CSCL Research

CHAIR

- Tak-Wai Chan, National Central University, Taiwan

PANELISTS

- Nicolas Balacheff, CNRS, France
- John Cherniavsky, National Science Foundation, USA
- Ulrich Hoppe, University of Duisburg, Germany
- Jeremy Roschelle, SRI International, USA

ABSTRACT

CSCL is a prominent theme within several recent, large Networks of Excellence and Research Centers:

- Kaleidoscope (sponsored by the European Union) involves 850 researchers and the largest special interest group focuses on CSCL (http://www.noe-kaleidoscope.org/). Kaleidoscope intends to develop instruments to stimulate and support collaborative research. Research is international by nature, and collaborative by necessity, it should be better supported by technology.
- The LIFE Center (sponsored by the US National Science Foundation)'s purpose is to understand and advance human learning through a simultaneous focus on implicit, informal, and formal learning (http://life-slc.org/). Its first "signature project" focuses on social interactivity, in all its meanings.
- An informal international network called G1:1 (see www.G1on1.org) is comprised of CSCL researchers interested in learning environments in which every learner is equipped with at least one computing device with wireless communication capability.

This panel will discuss the growing need for international cooperation in CSCL research, the tools, testbeds, demonstration sites, and best practices that enable successful research collaborations, and how the results of such collaborations may shape the direction of CSCL research in the next ten years.

Futures of Formal Postsecondary Education in a Net-infused World: The Next 10 Years

CHAIR

- Paul Kirschner, Educational Technology Expertise Center, Open Universiteit Nederland

PANELISTS

- Terry Anderson, Athabasca University
- Sharon Derry, University of Wisconsin, Madison
- Cindy Hmelo-Silver, Rutgers University
- Naomi Miyake, Chukyo University

ABSTRACT

Panelists from different disciplines and different continents give their views on the futures of formal postsecondary education in a net-infused world for the next 10 years. The goal of this panel is not only to present “expert” ideas, but also to solicit lively discussion both among the presenters themselves (debate) as well as the floor participants (plenary free-for-all). The goal is to explore future possibilities for successful formal postsecondary education worldwide in a net-infused world.

Even though we have come to understand the values and design principles for collaborative learning in higher education, we still see highly collaborative programs with paced courses and cohorts, somewhat antithetical to both a CSCL- and a community philosophy. Many higher education courses – often set up and made available by traditional institutions looking to solve perceived problems or trying to expand their market – come from a tradition of independent study with their specific paradigms, techniques and dogmas, so when the technology allows collaboration, it is regarded as a disruption. We need better understanding of topics and answers to questions like:

- Is good learning necessarily collaborative?
- How should issues like off-task behavior and privacy management be handled in networked courses (or do these issues really exist?)?
- What sort of pedagogical philosophy do we need other than constructivism (or is constructivism even the philosophy to use)?
- Can formal institutions survive learning opportunity abundance?
- How should we build community beyond the course: Can we create more spontaneous communities of learners that support learner-paced formal learning models?
- Can blending F2F and campus-based interaction be more beneficial than either separately?

Each panelist will address one or more of the issues, giving both pros and cons as (s)he has evidence from research. The audience is invited to take part. After this first round, the audience will be asked which issue(s) – maximally 2 – they would like to discuss in depth (via a hand count). The remaining time will be used for immediate deeper interaction on the issue(s).

Computer Supported Collaborative Learning for Teacher Learning and Professional Development

CHAIRS

- Mary Lamon, University of Toronto, Canada
- Hwawei Ko, National Central University, Taiwan

PANELISTS

- Therese Laferriere, Laval University, Canada
- Paul Resta, University of Texas at Austen, US

TEACHER PANELISTS

- Michelle Barber, US
- Eddy Lee, China,
- Maggie Prevenas, US
- Maura Ross, Canada
- Doris Wu, Taiwan

ABSTRACT

The Education for All 2015 target (UNESCO, 2000) is pushing teacher education and professional development to the forefront for developing and developed countries. To meet the goal of educating all students to be knowledge workers and to prepare them for complex roles in a technological world, teachers will need to participate in the design of challenging curricula using emerging devices, tools, media and virtual environments; and to adapt their teaching strategies and assessments to ensure that students learn how to work collaboratively to improve knowledge. Thus, there is an increasing worldwide focus on lifelong teacher learning driven by the increasing impact of technology, and an escalating pace of change in much of society.

In addition, the United Nations Educational, Scientific and Cultural Organization estimates that 15-35 million new teachers will be required to meet the goals of *Education for All*. In response to the need for more and better qualified teachers, UNESCO commissioned a new book ***Teacher Development in an E-Learning Age: A Policy and Planning Guide*** to inform decision-makers of key issues, strategies, and new approaches in the use of computer supported collaborative learning for teacher development.

After a brief introduction of lessons learned in preparing the book, we will explore the trends, issues, and challenges in the use of computer supported collaborative learning for teacher development from the perspectives of researchers and teachers. Our collective goal is to address a central challenge for CSCL: the researcher – practitioner divide inhibiting educational progress.

Ubiquitous Technology Support for CSCL

CHAIR

- Roy Pea, Stanford University, US

PANELISTS

- Pierre Dillenbourg, Swiss Federal Institute of Technology Lausanne, Switzerland
- Hiroaki Ogata, The University of Tokushima, Japan
- Mike Sharples, University of Birmingham, UK

ABSTRACT

Until recently, the desktop computer was the only computational technology for supporting learning and teaching. Today, there are various mobile devices with wireless communication capabilities such as notebooks, tablet PCs, palm or pocket PCs, and cellular phones. In the next decade, we shall see a growing number of students using portable computing devices equipped with wireless communication capabilities both inside and outside classrooms. At the same time, the era of ubiquitous computing is approaching with the emergence of wireless sensor networks. We anticipate that most tangible objects, places, and persons in our daily lives may become interlinked to form a pervasive web of information, communication, interaction and knowledge. The challenge for CSCL will be apply these technologies to creating communities for learning in context.

What distinguishes humankind from other species is our ability to create and use symbolic systems and tools. While most CSCL research has assumed that computers are used as tools for or mediators of communication or interaction, what happens to CSCL research if one can interact simultaneously and unobtrusively with multiple micro-sensor embedded objects reacting to external stimuli? Will there be a paradigm research shift in the next 10 years? This panel will try to identify some possibilities for how the 'person-to-daily-physical-objects' communication affordance may extend current CSCL research based on 'person-to-person via computers' communication.

CSCL in the Next 10 Years

CHAIR

- Dan Suthers, University of Hawai`i

PANELISTS

- Tak-Wai Chan, National Central University
- Pierre Dillenbourg, Swiss Federal Institute of Technology
- Friedrich Hesse, Knowledge Media Research Center, University of Tübingen
- Timothy Koschmann, Southern Illinois University
- Nancy Law, University of Hong Kong
- Roy Pea, Stanford University

ABSTRACT

The purpose of this panel is to gather and evaluate proposals for the agenda for CSCL research and practice in the next 10 years, and begin an ongoing community-wide discussion of that agenda. The panel is scheduled to follow plenary presentations of agenda-setting papers, and will itself be followed by a post-conference workshop ("Defining the Agenda," chaired by Gerry Stahl) in which participants will attempt to prioritize or integrate our multiple proposals into a common agenda. Therefore this panel is designed to bring before us a multitude of proposals and engage us in debates about them that will energize the following workshop.

The panelists are established CSCL researchers and practitioners who have been recruited to serve as "idea catchers" during the conference, watching for presentations or events that exemplify promising directions for future work in CSCL. In the panel itself, the panelists will be asked to summarize (in 4 minutes or less) their proposals for the next 10 years of CSCL, using one or more conference presentations or events as illustrations. For example, these proposals might claim that certain types of research questions should be prioritized, advocate for a methodological approach and its motivations, and/or suggest that the study of a particular application are will be fruitful. During the remainder of the panel, conference participants will be given the opportunity to challenge panelists, for example with

- arguments for the priority of one panelist's proposal over another's,
- arguments for the combination of two or more proposals into an integrated program of research,
- arguments for alternative proposals that have not yet been expressed.

Panelists will respond to these arguments. A record of the debate will be made using collaborative technology.

What is the Place of Computer Science Research in CSCL?

CHAIR

- Pierre Tchounikine, LIUM - Université of Le Mans (France)

PANELISTS

- Andreas Harrer, Collide - University Duisburg-Essen (Germany)
- Naomi Miyake, School of Computer and Cognitive Sciences, Chukyo University (Japan)
- Hiroaki Ogata, The University of Tokushima (Japan)
- Daniel D. Suthers, University of Hawaii at Manoa (USA)

ABSTRACT

CSCL is a pluridisciplinary domain. Computer science is one of the concerned disciplines and many researchers in CSCL have a background in computer science. Computer science is however both a technical and conceptual discipline and the role of computer science within CSCL research can be seen from different perspectives. As a consequence, what corresponds to computer-science engineering and technical issues and what corresponds to computer-science research issues is often unclear. Clarifying this question is an important issue for both the CSCL domain and the computer science researchers who work or intend to work in the CSCL domain.

The objective of the panel is to make the role of computer science research (as opposed to technical issues) in CSCL clearer.

TUTORIALS

Sequential Data Analysis

Leader: Gijsbert Erkens, Utrecht University, the Netherlands

Description: During the tutorial participants will be introduced in methods of sequential data analysis of interaction, especially lag-sequential analysis. In lag-sequential analysis the transition patterns between states (i.e. coded events) in a interaction protocol can be statistically tested on different intervals between the states (lags). In this way sequential patterns may be discovered. The tutorial offers hands-on experience with MEPA. MEPA (Multiple Episode Protocol Analysis) is a computer program for coding and analysis of interaction data like collaborative dialogues, email forums, electronic discussions, etc. Coded dialogue protocols will be available to practice. However, participants can bring their own data (in Excel format) to analyze.

Ethnographic Video Research in the Learning Sciences:
From Videotaping to Online Collaborative Interpretation

Leaders: Ricki Goldman and Alan Zemel

This tutorial provides participants with an intensive learning experience of using ethnographic video research in the learning sciences. We also introduce two new conceptual frames—*Video Design Ethnography* and the *Quisitive Research Method.* Theoretically, design experiments and design ethnographies emerge from the same educational roots in CSCL, but …

> … design ethnographies are situated within anthropological foundations. … Unlike traditional ethnographies, they … blend numerical coding tools with rich verbal description to reach conclusions—a mixed method … referred to as *quisitive research methods*. (Goldman, 20004, p. 149)

Our tutorial is scheduled for one day before the conference begins. Those enrolled in the tutorial will be invited to participate as "digital video (and still-image) ethnographers" throughout the conference. In other words, we will use the CSCL conference as a mini-site of ethnographic study.

Tutorial participants will focus on one challenge facing researchers using video: how to design a seamless process from the moment the camera is turned on to the moment researchers engage with online collaborative interpretation.

- Video or still cameras are not required, but participants are asked to bring a digital camera if possible.
- Participants will receive both written materials and access to online video data analysis software.

PART 1: MORNING SESSION

We open our session with a demonstration of the Orion software for online video interpretation and representation, http://orion.njit.edu, in relation to fundamental issues of video ethnography.

These issues include: naturalistic inquiry, narrative, *points of viewing* (POV), framing, *perspectivity technologies*, the authorial role of the ethnographer, rapport, resonance, video aesthetics, resonance, selection of data, recognition of thematic patterns, and online collaborative commensurability.

After this overview of the complex theoretical terrain of video research in CSCL, some participants videotape the breakout group activity—" Plan a Video Design Ethnography of the CSCL'05 Conference." Closing the morning session, we discuss the seeds of our collaborative design ethnography.

PART 2: AFTERNOON SESSION

In the afternoon, we use the notion of *representation* as a thinking tool to reflect on selected video footage from the morning session. In particular, we discuss how visual, textual, and spoken "data" are interconnected representational media—connected, yet remarkably different in how we making meaning of them.

Discussion in small groups focuses on representing video ethnographic data using online (and handheld) technologies. We also discuss, Quisitive Methods, a blending of qualitative and quantitative methods.

In closing, we review our day's work together revisiting the software, Orion, for use at CSCL'05.

Throughout the day's sessions, we refer to significant publications in the field of ethnographic video data in the learning sciences.

PART 3: OPTIONAL (no additional fees)

During the conference, participants are invited to videotape, select, and post video segments online using the software tool and the ethnographic conceptual framework of Design Ethnography.

References:

Goldman, R., Pea, R., Barron, B., and Derry, S. (under contract). *Video Research in the Learning Sciences*. Mahwah, NJ: LEA.

Goldman, R. (June, 2004). Video perspectivity meets wild and crazy teens: A design ethnography. *Cambridge Journal of Education 2* (34), London, England: Carfax Publishing (Taylor & Francis) pp. 147–169.

Goldman, R. (1998). Points of viewing children's thinking: A digital ethnographer's journey. Mahwah, NJ: LEA.With accompanying video scenarios at http://www.pointsofviewing.com.

Dr. Ricki Goldman, Professor of Information Systems at New Jersey Institute of Technology, has been conducting video ethnographic studies of children's thinking in computer-rich learning cultures since 1985. She is author and designer of *Points of Viewing Children's Thinking: A Digital Ethnographer's Journey* (LEA, 1998) and its accompanying website with video cases at http://www.pointsofviewing.com. She is also currently a co-editor of a collected volume to be published this year called *Video Research in the Learning Sciences*. Over the years, she has designed seven video analysis tools and research environments. One of these, WebConstellations, was awarded Canada's 1998 National Center of Excellence in Telelearning Technology Award. Her most recent tool for video research, Orion, be used in this tutorial for expanding community memory and for introducing participants to ethnographic methods of using video data.

CSCL: Overview and Foundations of the Field

Leader: Claire O'Malley

The first of the CSCL conferences took place 10 years ago, but the field of CSCL goes back much further than this. This tutorial provides participants with a historical review of the development of CSCL as a field, an overview of theoretical foundations and a speculative glimpse forward into where CSCL might go in the future.

The aim of the tutorial is to provide an introduction and overview of CSCL and a framework for thinking about different influences (disciplinary, theoretical, methodological, technical) that have shaped CSCL research over the past 10-20 years. The tutorial is aimed both at newcomers to the field, as well as those who already have some experience in CSCL research. It involves a mixture of tutor-led presentations and small group interactive sessions.

MORNING SESSION
This part will take a historical perspective on the field, reviewing the changes in technology and educational research which shaped collaborative learning and computer support for collaborative learning from the 1970s through to the start of this century. Along the way we will review some of the foundational educational theories which have guided research in CSCL, including sociocognitive as well as sociocultural perspectives of various kinds. We will also review technical developments which have influenced research in CSCL (e.g., the internet, mobile technologies). We will also consider disciplinary influences on methodological perspectives taken by researchers in CSCL.

AFTERNOON SESSION
The afternoon session involves considering a matrix of educational contexts (e.g., co-located versus distributed collaboration), technologies, theoretical and methodological issues as a framework for considering new research questions for the field. Participants will work in small groups to develop proposals for design experiments to address these issues, as a means of thinking about future directions for CSCL

Claire O'Malley is Professor of Learning Science and principal investigator in the Learning Sciences Research Institute, School of Psychology, University of Nottingham, UK. Claire ran the first international workshop on CSCL at Maratea, Italy, in 1989, sponsored by the NATO Science Committee, the proceedings of which were published by Springer in 1995. This tutorial is based in part on a series of overview tutorials on CSCL which she ran jointly with Tim Koschmann at INTERCHI'93 (Amsterdam, The Netherlands), HCI'93 (Loughborough, UK), East/West HCI'94 (St. Petersburg, Russia), CSCW'94 (Chapel Hill, NC, USA), and CSCL'95 (Bloomington, IN, USA). Claire has been on the programme committee of several of the CSCL conferences since 1995 and several recent conferences on mobile learning (MLearn, WMTE). Claire was also one of the founding board members of the International Society of the Learning Sciences and takes over as President of ISLS during the CSCL2005 conference.

WORKSHOPS

CSCL 2005 Workshops

Workshops Chair:

Gerry Stahl

College of Information Science &
Technology
Drexel University
Gerry.Stahl@drexel.edu

"COMPUTER-SUPPORTED SCRIPTING OF INTERACTION IN COLLABORATIVE LEARNING ENVIRONMENTS."

Organizers: Armin Weinberger, Frank Fischer, Päivi Häkkinen, Pierre Dillenbourg, Andreas Harrer.

Contact: Armin Weinberger <a.weinberger@iwm-kmrc.de> Room C02, Monday 9-1.

The goals of the workshop are to introduce the idea of computer-supported scripts and to discuss a framework of script components based on process-oriented educational approaches to collaborative learning. Furthermore, the workshop aims to provide advice to practitioners of CSCL and work out open questions when and how to apply computer-supported scripts in their respective CSCL environment.

(See more detailed description in following pages.)

"LANGUAGES FOR MODELING OF COLLABORATIVE LEARNING PROCESSES: FORMALIZATION, PRACTICAL USES AND TOOLS."

Contact: Andreas Harrer <harrer@collide.info> Room C02, Monday 1-5.

Models for Learning Processes and especially for collaborative processes are a focus of attention from different research areas recently: instructional designers, practitioners, psychologists, implementers of learning management systems, and implementers of collaborative systems all share a research interest gravitating towards a common understanding of learning processes and how to utilize these for (computer-supported) learning scenarios. The goal of this workshop is to discuss and explore the aspects of collaborative learning processes related to the contribution that computer science can provide to this interdisciplinary research area. Among these are the formalization of learning processes in a formal language, the tools needed to support non-technical users and the potential of process representations for computer supported collaborative learning.

"DUAL INTERACTION SPACES."

Contact: Pierre Dillenbourg <pierre.dillenbourg@epfl.ch> Room C02, Tuesday 9-5.

Collaborative environments include two main spaces of interaction:

(1) The discourse space can be a chat, a forum or an audio channel or simply voice when learners are collocated.

(2) The task space is where students interact with the task objects (a simulation window, a physical set of objects, …).

This distinction is shallow since the task space is obviously also a communication space (A's actions convey a message to B) and the discourse space is also a place where students manipulate verbally task concepts. Even more confusing are systems such as Belvedere, for instance, in which the task space mediates the construction of an argument, i.e. a discourse structure. However, at a very pragmatic level, these spaces are often physically dissociated, the interactions being mostly verbal on the task space and partly based on gestures in the task space. The former is often textual while the latter in often graphical. These two spaces can be mediated or not by the computer.

This workshop is concerned by situation 1, where both spaces are computerized, since it enables us to study in depth the articulation between activities occurring in each space. In most CSCL environments, these two spaces are either two different applications juxtaposed on the student screen or, at least, two visually distinct sub-area of the environment display. In both case, the computer introduces an artificial separation between the two spaces that can be questioned in several ways.

(See more detailed description in following pages.)

"FOSTERING LEARNING COMMUNITIES: THEORETIC APPROACHES, EMPIRICAL STUDIES AND COMPUTER SUPPORT."

Organizers: Markus Rohde, David Williamson Shaffer, Volker Wulf.

Contact: Markus Rohde <ma.rohde@t-online.de> Room A03, Tuesday 9-5.

Taking an interdisciplinary approach, we will focus on the intersections and relationships between educational research and computer science as applied within CSCL scenarios. Topics of the workshop will include socio-cultural and related theories of community learning, case studies and empirical research results, and design requirements for the technological support of learning communities.

(See more detailed description in following pages.)

"MICRO-ANALYTIC STUDIES OF INSTRUCTIONAL PRACTICE: A WORKING-SHOP."

Organizers: Timothy Koschmann, Aug Nishizaka.

Contact: Timothy Koschmann <tkoschmann@siumed.edu> Room A05, Tuesday 9-5.

This workshop will consist of a series of data sessions each designed to provide opportunities for those who do videoethnographic research to share samples of their data. Participants in the workshop will benefit both by uncovering new facets of their own data and through the rich opportunities the workshop will afford for honing their skills for looking and listening.

Following on a tradition begun at ICLS 2002 and continued at CSCL 2003, we propose a day of data sharing to take place during the CSCL '05 pre-conference workshops. The day will be broken into four ninty-minute sessions each devoted to the exploration of a single piece of data. The four samples of data will be selected in advance of the workshop and prepared for presentation.

Following the usual protocol for data sessions conducted in communication studies and microsociology, we will do repeated examinings of the data interspersed with phases of individual and group analytic work. Our approach will be explicitly microanalytic, for both practical and programmatic reasons. Because we will have only a limited time to devote to any one piece of data, we will only be able to carefully analyze relatively brief samples of interaction (2-3 minutes or less). Programmatically we are committed to documenting learning in careful detail, though this does not necessarily imply a specific frame of analysis (i.e., the data sessions will focus on brief isolated fragments but these may be part of longer episodes or components of more elaborate ensembles).

“E-PORTFOLIO.”

Contact: Benny Tai <yttai@hkusua.hku.hk> Room C01, Wednesday 9-12.

E-portfolio is a flexible teaching and learning tool. It can be used in the learning process of students at various stages. It can be a tool facilitating a student to learn through developing his/her research skills. It is also an alternative form of assessment looking not just at the final product at the end of a student's learning process but also a student's progress during the learning process. It can also be a collection of the records of a student's achievement which can be used in employment and other purposes. This workshop will discuss mainly the first two functions and there will be a demonstration of a newly developed web-based electronic portfolio system.

“TEN YEARS OF CSCL: ANALYSIS AND DESIGN OF THE COMMUNITY.”

Organizers: Christopher Hoadley, Martin Wessner, Andrea Kienle

Contact: Christopher Hoadley <tophe@psu.edu>, Martin Wessner <martin.wessner@ipsi.fraunhofer.de>, Andrea Kienle <Andrea.Kienle@udo.edu> Room A03, Wednesday 9-12.

In this workshop we look at the first ten years of the CSCL community, trace its development, and try to provide insights and recommendations to the community to shape its future.

The analysis of the community will be based on data about the CSCL community, including papers, references, authors, participants, and program committee members. The participants will think about interesting research questions and then work on selected research questions in small groups (4 participants plus one of the organizers in each group).

“DESIGN AND USE OF SMART TASKS IN COLLABORATIVE CLASSROOMS.”

Contact: Naomi Miyake <nmiyake@sccs.chukyo-u.ac.jp> Room A05, Wednesday 9-12.

This is a workshop on how we could come up with, and expand usage of, the smart tasks of collaborative classroom lectures. Good examples include the book-support project of Learning by Design, "how far does the light go?" from WISE, the Galapagos Finch of the LeTUS, and some of our examples of teaching cogsci and statistics.

“VISUALIZING TRAILS AS A MEANS FOR SUPPORTING REFLECTION.”

Organizers: Judith Schoonenboom, Marta Turcsanyi-Szabo, Canan Blake.

Contact: Judith Schoonenboom <J.I.Schoonenboom@uva.nl> Room C02, Wednesday 9-12.

Combining reflection and trails is becoming an important issue. The importance of reflection to the learning processes has been recognized for a long time. With the advent of digital learning environments, it becomes possible to record 'raw' trails of experience. If these are visualized to the learner, the possibilities for reflection on the experience are extended.

In this workshop we would like to discuss these questions together with other people who are involved in or have an interest in visualizing trails as a means for fostering reflection. At the same time, we hope to gather knowledge and experiences that we are not aware of. We would like to invite participants to take their own log files and perhaps existing visualizations with them, and that we work together on creating visualizations, or analyzing existing visualizations. The workshop will be built around case studies of visualizations, which are provided by both organizers and participants.

(See more detailed description in following pages.)

"DOING SCIENTIFIC INQUIRY THE WAY IT IS SUPPOSED TO BE: TEAM RESEARCH WITH EMERGING NASA E-EDUCATION ADVANCED LEARNING TECHNOLOGIES."

Organizers: Beaumie Kim, Steven McGee.

Contact: Beaumie Kim <BKim@cet.edu> Room C03, Wednesday 9-12.

The National Aeronautics and Space Administration (NASA) shares the goals of the Computer-Supported Collaborative Learning (CSCL) community in supporting student learning through technology. One of NASA's strategic objectives is to increase public access to NASA education resources via the establishment of e-Education as a principal learning support system. NASA characterizes e-Education as high-quality, content-rich, just-in-time, technology-mediated learning experiences that are customizable and can occur anywhere access is available. As one of the outcomes of expanding e-Education, NASA will develop four new advanced learning technologies by 2008. When completed, these technologies will be freely available to students, educations, and researchers as open source applications. The NASA-sponsored Classroom of the Future (COTF) has developed the Virtual Design Center (VDC) to leverage NASA's e-Education by supporting instructional designers to develop inquiry-based learning environments using NASA education resources. The VDC has formed an editorial board representing renowned professional organizations, including the International Society of the Learning Sciences (ISLS), and provides fellowship opportunities to the members of those organizations.

(See more detailed description in following pages.)

"CSCL IN THE NEXT DECADE: DEFINING THE AGENDA."

Contact: Gerry Stahl <Gerry.Stahl@drexel.edu> Room A05, Saturday 2-5.

This will be an informal opportunity to reflect on the ideas presented during the conference. The theme will be how to define a direction for research in CSCL for the next 10 years.

Computer-supported scripting of interaction in collaborative learning environments

Armin Weinberger and **Frank Fischer**
Knowledge Media Research Center Tübingen
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Andreas Harrer
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PROBLEM BACKGROUND

Collaborative learning is based on the idea that specific activities of learners in small groups, such as asking questions or constructing arguments facilitate individual knowledge acquisition. There are indications, however, that learners do not always engage in the relevant activities when learning together. Computer-supported scripts have been conceptualized by a group of European researchers within the joint research project MOSIL[1] as a specific kind of scaffolding that pre-structures socio-cognitive processes of computer-supported collaborative learning. According to MOSIL, scripts are didactic scenarios that structure collaborative learning activities in a number of phases. The scripts may define for each phase what task the students have to perform, the composition of the group, the way the task is distributed, the mode of interaction, and the timing of the phase. Computer-supported scripts are implemented into interfaces of CSCL environments and aim to facilitate specific interaction patterns that in turn facilitate individual knowledge acquisition. Scripts aim, for instance, to facilitate metacognitive, epistemic, argumentative, and social activities of collaborative learners.

So far, scripts have been designed within single studies that were specific to an experimental scenario. MOSIL has begun to integrate this research on computer-supported scripts in order to transfer the results of these studies to different contexts. The MOSIL work to integrate research is being continued within a European Research Team[2] on computer-supported scripting of interaction in collaborative learning environments. At the workshop, this team will present its results on computer-supported scripts.

GOALS

This workshop aims to discuss a framework of computer-supported scripts that facilitates the integration of the diverse computer-supported script studies. Based on a limited number of dimensions of the framework all kinds of scripts can be described. In the year 2004, MOSIL worked out some dimensions that indicate, for example, the social plane, the granularity, the coerciveness, and the target activities of scripts. With regard to the social plane, scripts may be directed towards individual or social activities. Scripts may suggest learners to engage in individual activities without reference to the learning partners, e.g., “Read through the learning material!” or “Check whether you have understood the problem!”. Typically, however, scripts provide structure to small group interaction, e.g. by suggesting “Explain the learning material in your own words to your learning partners!” or “Criticize your learning partner!”. Beyond small group interaction, scripts may also structure whole classrooms or schools, e.g. by prescribing to make small group products available to the whole classroom or to publish it on the World Wide Web. Scripts can be further differentiated with regard to their granularity and the timing of the script phases. For instance, scripts may provide highly detailed and frequent instructions on how collaborative learners should interact or only assign general roles to learners within extended time frames. Scripts may be also more or less coercive. Scripts may leave learners little choice but to follow the script prescriptions, e.g. by regulating access to different phases of the script, or make suggestions that learners may follow to a certain extent only, e.g. by prompting learners to engage in specific activities. Finally, scripts can be differentiated with regard to their target activities. Cognitive models of collaborative learning regard specific activities of collaborative learners, e.g., asking critical questions, as indicators of knowledge construction. Different kinds of scripts may focus on single kinds of activities. In this respect, scripts for critical questioning, for instance, may be differentiated from scripts that support the construction of arguments.

Some major families of scripts have been identified by MOSIL and its team leader Pierre Dillenbourg against the background of a limited number of dimensions. The Jigsaw family, for instance, provides learners with complementary information. Each learner acquires expertise in one sub-aspect of the task. In order to solve the task, the learners need to pool their knowledge. The conflict family aims to trigger socio-cognitive conflict in CSCL groups by providing them with conflicting evidence or asking them to play conflicting roles.

FUTURE WORK

Based on this framework, future work focuses on the translation or formalization of different script components in a modelling language in order to systematize script research, making scripts transferable from one CSCL environment to another, and to better understand what kind of collaborative learning activities work for what kind of tasks. Standards represented in a modelling language for collaborative learning processes may help scientists and practitioners to integrate different script studies and make theoretical and practical inferences. Script components for collaborative learning scenarios analyzed in one domain, may be transferred to other domains. Instead of re-inventing and designing scripts for one specific learning environment, a number of modular script components may be combined to form various scripted learning environments that arrange learning resources spatially and temporally for individual and collaborative learners. Research on grounds of the formalized script components can identify interaction patterns that are related to individual knowledge acquisition in collaborative learning environments. Having identified deficient interaction patterns, collaborative learners may be provided with specific script components in order to foster interaction patterns that relate to individual knowledge acquisition. The following step is to conceive learning environments that realize multiple formalized script components. The idea is to conceive script components that can be applied and reused across various learning environments, because the instructional design represented by the script components is independent of the learning tasks and resources. Within the structure of script components, various learning resources can be represented. Thus, the formalization aims to decouple the conceptualization of scripted collaborative learning environments from their realization.

ORGANIZATION OF THE WORKSHOP

The goals of the workshop are to introduce the idea of computer-supported scripts and to discuss a framework of script components based on process-oriented educational approaches to collaborative learning. Furthermore, the workshop aims to provide advice to practitioners of CSCL and work out open questions when and how to apply computer-supported scripts in their respective CSCL environment.

In the proposed workshop, different approaches to computer-supported scripting of interaction including central results of the European Research Team will be presented. First of all, we propose a framework for computer-supported scripts. This framework comprises multiple dimensions on which scripts can be allocated. We then aim to introduce a number of prototypical computer-supported scripts in an interactive event. Workshop participants within and outside the European Research Team are supposed to contribute computer-supported scripts that they apply in collaborative learning environments. The scripts will then be allocated on the framework dimensions. Against this background, the practical and theoretical value of the framework of computer-supported scripts will be discussed. Workshop participants present CSCL environments and discuss how different script components may be applied within these environments. We aim to visualize and discuss different standardized script components within one of these CSCL environments.

Related to the work of the European Research Team a complementary workshop in the technical track named "Languages for modelling of collaborative learning process – formalization, practical uses and tools" is being proposed. Both workshops present results on computer-supported scripting from different angles. This workshop presents a framework on computer-supported scripts to establish script standards. The workshop on the technical track complements this work by discussing approaches to translate this framework into a modelling language to technically formalize script components. In combination with the workshop on the technical track we provide approaches to conceptualize and realize computer-supported scripts in different kinds of CSCL environments.

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[1] MOSIL (Mobile Support for Integrated Learning) is a joint research activity funded by the European Union within the Network of Excellence named Kaleidoscope. Members of MOSIL are Ulrich Hoppe, Kay Hoeksema (Duisburg), Alain Derycke, Thomas Vantroys (Lille), Rune Baggetun, Weiqin Chen, Barbara Wasson (Bergen), Frank Fischer, Ingo Kollar, Karsten Stegmann, Armin Weinberger (Tübingen), Raija Hämäläinen, Päivi Häkkinen, Kati Mäkitalo (Jyväskylä), Felisa Verdejo, Beatriz Barros, Javier Velez (UNED), Sanna Järvelä, Jari Laru (Oulu), Walter Van de Velde (CampoRosso), Zeno Crivelli, Pierre Dillenbourg, Fabien Girardin, Patrick Jermann, (Lausanne), Angeliki Dimitricopoulou, George Fessakis (Agean).

[2] The European Research Team *Computer-Supported Scripting of Interaction in Collaborative Learning Environments* aims to integrate research of different European institutions and is funded within the Kaleidoscope network. Members of the European Research Team are the institutions Ecole Polytechnique Fédérale de Lausanne, Knowledge Media Research Center Tübingen, University of Duisburg-Essen, and University of Jyväskälä.

Dual Interaction Spaces

CSCL 2005 WORKSHOP

Pierre Dillenbourg[1] and CSCL SIG of Kaleidoscope, an European Network of excellence
(1) Ecole Polytechnique Fédérale de Lausanne, Switzerland

SCHEDULE: TUESDAY MAY 31ST, ROOM C02

09:00 Introduction (P. Dillenbourg, EPFL; Switzerland)
09:10 **Hypervideo structures as 'dynamic informations spaces'**. Carmen Zahn, Matthias Finke & Friedrich Hesse, Knowledge Media Research Center, Tuebingen, Germany
09:30 **Interaction analysis articulating action and dialogue in synchronous collaborative environments**. A.Dimitracopoulou, A. Petrou, G. Fessakis, Learning Technology and Educational Engineering Laboratory, University of the Aegean, Greece
09:50 Discussion and comparison of talks 1 & 2
10:30 Break
11:00 **Co-Lab: coordination and communication in a collaborative inquiry modelling environment**. Sylvia P. van Borkulo, Wouter R. van Joolingen, Ton de Jong, Department of Instructional Technology, University of Twente, The Netherlands
11:20 **Planning congruence in dual spaces** . Patrick Jermann, Pierre Dillenbourg, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
11:40 Discussion and comparison of talks 3 & 4
12:30 Lunch
14:00 **Interaction on task and social interaction in online discussions**: Effects of computer-supported collaboration scripts on self-explanation and effort towards shared understanding. Karsten Stegmann, Armin Weinberger, & Frank Fischer; Knowledge Media Research Center, Tuebingen, Germany
14:20 **The potential of computer-supported scripting for CSCL**. Joerg M. Haake, FernUni Hagen, Germany
14:40 Discussion and comparison of talks 5 & 6
15:10 Break
15:40 **Do CSCL argumentative environments help in knowledge construction in science?** Baruch Schwarz, The Hebrew Universit, Israël.
16:00 **Creating dual interaction spaces by simple means.** Judith Schoonenboom, University of Amsterdam & Ron Cörvers, Open University of the Netherlands, The Netherlands
16:30 Discussion and comparison of talks 7 & 8
17:00 End.

PROBLEM BACKGROUND

Collaborative environments include two main spaces of interaction:

- The discourse space can be a chat, a forum or an audio channel or simply voice when learners are collocated
- The task space is where students interact with the task objects (a simulation window, a physical set of objects, …)

This distinction is shallow since the task space is obviously also a communication space (A's actions convey a message to B) and the discourse space is also a place where students manipulate verbally task concepts. Even more confusing are systems such as Belvedere for instance in which the task space mediates the construction of an argument, i.e. a discourse structure. However, at a very pragmatic level, these spaces are often physically dissociated, the interactions being mostly verbal on the task space and partly based on gestures in the task space. The former is often textual while the latter in often graphical. These two spaces can be mediated or not by the computer:

		Communication Space	
		Computerized	Non-Computerized
Task space	Computerized	1. Two remote students play with a shared simulation using a chat box (e.g. Jermann 2005)	2. Two students located side-by-side argue within Belvedere .
	Not Computerized	3. This situation is less frequent, but could be for instance two students explore a city using SMS for coordination.	4. Simple face-to-face collaborative setting.

GOALS

This workshop is concerned by situation 1, where both spaces are computerized, since it enables us to study in depth the articulation between activities occurring in each space. In most CSCL environments, these two spaces are either two different applications juxtaposed on the student screen or, at least, to visually distinct sub-area of the environment display. In both case, the computer introduces an artificial separation between the two spaces that can be questioned in several ways:

- How do the students/the group distribute their actions over the two spaces?
- Is the mental representation of the collaborative task modified by the separation of the two spaces?
- Are their actions in both spaces tightly or loosely coupled?
- How to provide a direct link between task actions and communication utterances?
- How to manage the task/communication coupling in asynchronous environments?
- …

ABSTRACTS

Interaction on task and social interaction in online discussions: Effects of computer-supported collaboration scripts on self-explanation and effort towards shared understanding

Karsten Stegmann, Armin Weinberger, & Frank Fischer; Knowledge Media Research Center, Tuebingen, Germany

In a series of studies, we have examined a set of highly focused computer-supported collaboration scripts for online discussions in higher education. We have evaluated their effects on argumentation and knowledge acquisition in a problem-oriented learning environment. These collaboration scripts are dedicated to facilitate interaction with the task or improve social interaction. These collaborative processes activate specific individual cognitions, e.g., self-explanations and effort towards shared understanding, with the goal to foster individual knowledge acquisition on different dimensions of argumentative knowledge construction. In one subset of studies, we compared an epistemic and a social script and their interaction with regard to interaction with the task, social interaction, and individual knowledge acquisition. We found out, that the epistemic script was able to foster interaction with the task and the social script was able to improve social interaction. However, only the social script simultaneously facilitated individual knowledge acquisition. In a follow-up study, we tried to find the answer to the question, which individual cognitive processes, effort towards shared understanding and self-explanation, can explain effect of social script on the individual acquisition of knowledge. Results show that the script had no effect on the amount of self-explanations, but had a strong effect on efforts towards shared understanding. The amount of activities connected with the construction of shared understanding was higher in the group with social script than in the group without social script. Regarding outcomes of both studies**, the social script seems to be an appropriate articulated joint between interaction with the task and social interaction.** Like in the original study, the social script facilitated individual knowledge acquisition. In the replication study, however, the social script did not affect amount of self-explanations, which were hypothesized as crucial for the acquisition of knowledge. Rather, effort toward shared understanding can be regarded as the mediator of the effect of the social script on individual knowledge acquisition. Consequences of these outcomes will be discussed. Moreover, participants of the workshop will have the opportunity to explore several learning environments based on different types of scripts.

Interaction analysis articulating action and dialogue in synchronous collaborative environments

A.Dimitracopoulou, A. Petrou, G. Fessakis, Learning Technology and Educational Engineering Laboratory, University of the Aegean, Greece

Most of the action oriented collaborative systems, based on synchronous interaction, use various channel of communication, some of them allowing text based dialogue while others actions on the shared workspace. Designing a synchronous collaborative environment (e.g. ModellingSpace,), we distinguished two main areas of a needed articulation between dialogue based and action based interaction:

- Embedded communication tools: In informal and formal studies, students appear to prefer embedding their discussion directly in the shared workspace (as comments) rather than switching between action based workspace and chat (Guzdial 1997; Wojahn 1998; Suthers, 1999). Because the discourse always takes place in the context of the artefact presented or created in the workspace, embedded communication tools have the advantages of making easier to refer to parts of the artefact or to recover the portion of the discussion that is concerned with a given part. In order to allow currying on a discussion in the context of the visual artifact, we have designed appropriate Annotation tools (sticky notes), that allow **embedding comments directly on the display of the artefact under discussion** (Dimitracopoulou & Komis, 2004).
- Interaction analysis articulating action and dialogue: The articulation of action and dialogue in the frame of interaction analysis is an actual challenge, for the designers dealing with collaboration analysis; either it is addressed to students, or to teachers and/or researchers. It seems that a significant articulation is needed more for teachers and researchers than for students that were the actors of a collaborative process. Most of the interaction analysis tools or substantial indicators provide a kind of parallel quantitative comparison among dialogue messages and actions (e.g. Quantitative overview, Collaborative Activity Function) or even a sequential video based reproduction (e.g."Playback", Petrou & Dimitracopoulou, 2004 under review). However, in order to get sense of the collaborative process there is a need to: (i) identify the parts of the dialogue referring to each specific state of the artefact into the shared workspace (e.g. CORPET tool, Petrou & Dimitracopoulou, 2004, under review) and (ii) **apply a unified analysis and interpretation of both dialogue and actions** related to the collaborative process and product, in order to analyze and evaluate collaborative activities (Avouris, Dimitracopoulou, Komis, 2003). Our intervention to the present workshop will focus mostly on the requirements and consequences of the articulation of dual spaces to the collaboration analysis approaches.

Do CSCL argumentative environments help in knowledge construction in science?

Baruch Schwarz, The Hebrew Universit, Israël.

Although argumentation has been shown as a potentially important factor for construction of knowledge, argumentative moves are generally rare in interactions between students when engaged in tasks designed to lead to scientific knowledge (in a Vygotskian sense). CSCL learning environments have provided spaces for e-discussions ranging from chat zones, to knowledge based tools and discussion based tools. **The ontologies and the graphical characteristics of the tools generally mediate the elaboration of productive talk** when tackling issues for which the discussants have extensive prior knowledge and for which their motivation to engage is high (e.g., solving moral dilemmas or historical issue that are relevant to the reality of the discussants). In contrast, when it comes to scientific issues, we found that the use of e-discussion tools alone hardly lead to productive e-talk in scientific issues. While working with the DUNES environment – a graphical e-discussion tool, we found that discussions about scientific issues are extremely short, and not reasoned. When disagreement occurs, it is often not resolved even with the help of a teacher. In a pilot study, a group of junior-high school students used a simulation tool and the DUNES environment to solve problems in physics. The students participated in activities of progressive inquiry with the simulation tool and discussed their ideas with the DUNES environment. The students elaborated conflicting hypotheses or interpretations with the simulation tool and discussed them with the DUNES system. In this case, e-discussion appeared to be productive. I will try to explain why previous collaboration leads to productive argumentative activities and how both kinds of tools intermingle in the construction of scientific knowledge.

Hypervideo structures as 'dynamic informations spaces'

Carmen Zahn, Matthias Finke & Friedrich Hesse, Knowledge Media Research Center, Tuebingen, Germany

Computer supported collaboration tasks usually include an 'activity' level of co-construction as well as a 'communication' level of discussion and negotiation within the learning group. Accordingly, many CSCL environments support both task interactions and social interaction by integrating the respective tools and scaffolds within one technological platform. In our contribution we want to give an example of how advanced hypervideo technology can be utilized to support both video-based design activity and group discussions. The basic idea is conceptualizing hypervideo as a dynamic information space consisting of three main dimensions: First, concerning the externalization of knowledge, digital video is used to support meaningful collaboration that depends heavily on visual perceptions of concrete objects, actions or complex relations. This is necessary in fields of knowledge building, where topics or problems can hardly be communicated without using dynamic visual materials as a referential basis (e.g. in medicine, biology, physics, geography, industrial engineering, arts etc.). In particular, when knowledge is to be created within networked groups, where learners do not meet in the same place at the same time and, hence, cannot observe the same objects (or persons, actions, relations) in the same situation, video can support both individual and mutual understanding by providing a concrete referential anchor for collaborative activity and communication. Second, concerning collaboration, **dynamic links for annotating and adding supplement materials** are included in our concept. Instructional videos have been shown to be much more supportive of learning when learners are allowed to interact with video information. Moreover, collaboration can only be supported by video if learners have facilities at hand to jointly elaborate on their materials and express the ideas of the learning group or community in the form of a group product. This requirement includes that the links for implementing group processes are very closely associated with the video presentation itself, thus allowing learners to adapt external representations directly to the 'internal' socio-cognitive processes and stages of collaborative learning. Third, concerning communication, a discussion zone is provided, which is separate from the video presentation to allow learners to switch from a mode of (co-)construction to a mode of communication. The tool allows for asynchronous discussions among learners. Our current research questions include the problem of how hypervideo design tasks might be implemented in school-based education. We are particularly interested in possible scaffolds that focus on both supporting the *actions* of students designing hypervideos and supporting their *communication patterns*.

Planning congruence in dual spaces

Patrick Jermann, Pierre Dillenbourg, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

In two experimental studies,we tested the feasability and effectiveness of providing graphical feedback to a pair of students about their own collaborative interaction. The goal of the studies was to test how interaction regulation processes could be influenced by computational support. The first experiment tested a mirroring tool while the second experiment tested a metacognitive tool (Jermann, Soller & Muehlenbrock, 2001). Both tools provide a graphical representation of the number of words and problem-solving actions performed by the subjects during the interaction. The difference between these two types of tools is that metacognitive tools display a standard to judge the current state of interaction while mirroring tools simply reflect the current state of interaction.

The subjects were working in separate rooms on a shared traffic simulation for one hour. The subjects' goal was to reduce the waiting time of cars at intersections by changing the settings of the traffic lights. The subjects made changes to the traffic lights by using the task-related portion of the interface and communicated through a simple text-based chat in the communication-related portion of the interface. These two portions of the interface are the two spaces which are addressed in this workshop. Simply put, the task-related space allows subjects to "do" things, whereas the communication-related space allows them to "talk" about the things they do.

In a collaborative problem-solving task an important aspect of communication concerns planning actions. With regard to the dual spaces, this means that what happens in the space dedicated to communication should be closely related to what happens in the space dedicated to the task. We defined a dependent variable called "congruence" to measure the correspondence between plans and actions that are carried out. Plans refer to targets (which intersection to change among the 4 possible) and parameters (three parameters can be changed for a light: offset, proportion of green or length of phase). In our case, congruence varied from –7 (no changes made were planned) to +7 (targets and parameters that were changed also were mentioned in the plans).

The results from our second experiment show that the planning congruence is higher for successful pairs than for unsuccessful pairs. In other terms, successful pairs plan a larger proportion of their changes than unsuccessful pairs. Both the target and parameter attributes are discussed more often in successful pairs.

The provision of graphical feedback in the second experiment led to an increase of participation in dialogue. This increase was associated with a better quality of plans and a better congruence of implementation. Put another way, these results indicate that pairs who got feedback do less unplanned changes than the pairs in the Control condition. This important finding points out that the metacognitive tool that we tested fostered a more reflexive and a more explicit problem-solving approach. More sophisticated plans might have a positive effect on learning as do elaborated explanations (Webb, 1989).

Co-Lab: coordination and communication in a collaborative inquiry modelling environment

Sylvia P. van Borkulo, Wouter R. van Joolingen, Ton de Jong, Department of Instructional Technology, University of Twente, The Netherlands

Co-Lab is an online learning environment for collaborative scientific discovery learning. Co-Lab offers learners a shared working environment consisting of four “rooms”, dedicated to four subtasks of collaborative inquiry. In the hall, students are provided with a *mission* (a research question or other inquiry task) and background information. In the laboratory they can gather data using experiments that are available on line in the form of simulations or remote laboratories. In the meeting room they collectively plan and monitor their work. In the theory room, finally, learners construct a *model* of the phenomenon they are investigating. A computer model is an executable external representation students can use to explain and predict the behaviour of the complex phenomena they are studying. The four-room structure is augmented with a chat box as well as a navigator to move between rooms and locate other learners, and a shared repository to store objects such as models and measurement results and move these objects between rooms.

Being a complex, shared working environment, Co-Lab confronts learners with coordination problems. Learners need to keep track of lots of information (data collected, background information provided as hypertext, models made) and discuss this information with their co-learners. These coordination issues lead to specific design decisions in the environment, as well as to specific research questions in Co-Lab evaluation studies. The division of the shared workspace into four rooms was a consequence of the complexity of the task and the information to be managed. The rooms hold the information needed for partial tasks of the inquiry processes, and only information that is selected by the learners will be moved to the repository to be used in other rooms. The task environment serves to manage information, but generating and storing information is also a communicative act, as in Co-Lab all information is shared. When learners, for instance, create a model, the step-by-step modelling process is visible for all learners. This resulted in the design decision that only one learner is working on tasks that are non-reversible, i.e. make permanent changes in the environment, like running an experiment or editing a model. Using a token-based mechanism learners can pass on control over the rooms that host these tools. This ensures that always it is known who is performing a task, and that work in the environment reflects the ideas of the person in control, acknowledging the communicative role of the environment.

In order to assess the communicative role of the environment, one Co-Lab evaluation study investigated the role of on-line chat, work in the shared environment and face-to-face talk. This study among forty pre-university students investigated differences between a group working with Co-Lab using on-line chat as compared to a group using Co-Lab augmented with face-to-face communication. Indicators of task performance were quality of the constructed computer model and quality of the modelling process. It was found that students in the face-to-face condition who frequently specified quantities in their model built models of lower quality. Students in the chat condition revealed a reversed result: students who often specified quantities in their model built a model of higher quality (Sins, 2004). This indicates that the communicative function of the task environment changes as a result of the availability of a higher quality communication: processes that are considered non-productive from a task perspective can become useful regarded from a communicative perspective.

The potential of computer-supported scripting for CSCL

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In previous work on shared workspace systems, three main aspects of collaboration have been distinguished: communication, coordination and cooperation (i.e. manipulation of shared artefacts). Obviously, communication is a prerequisite of the other two. One could argue that a communication medium alone may constitute the social space in a CSCL environment (e.g., chat, e-mail, newsgroups, MOO). Tools for coordination and cooperation may constitute the task-related space (e.g., planning tools, and shared editors). The relation between both spaces could be categorized into two classes:

- Relations from social into task-related space: This includes referencing (such as deictic, verbal or graphical pointers from communication acts to shared artefacts (plans or products)). In our work on collaboration scripts (learning protocols) we have shown that the inclusion of **references from phrases to the artefact** (e.g. other phrases or learning material) actually increases learning performance in distributed learning teams. Pointers to relevant communication include references from shared artefacts or shared actions to the communication acts/phrases created at that time. Examples are pointers from artefacts to communication logs (e.g. chat messages at the time when the object was changed
- Relations from task-related into social space: This includes roles and pointers to relevant communication. Roles define expectations and possible actions within a learning discourse. Thus, if the coordination part of the task-space defines possible communication actions, this relation may be used to structure communication. Examples include both, collaboration scripts that change the possible actions according to the current user's role, as well as the use of sentence openers (more implicit control) or automatic prompting of users to create explanations (e.g. comments describing the purpose of versions in a shared version control system).

Creating dual interaction space by simple means

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Much research on dual interaction spaces is concerned with developing increasingly sophisticated tools and scripts. We argue that it is also important to point out to those involved in CSCL that dual spaces can be created using very simple means, and that thinking in terms of dual spaces is a step forwards. We have implemented very simple forms of dual collaborative spaces within discussion forums, and our experience is that this works well. Our basic idea is to create different 'anchor points' on the screen; **each anchor point is associated with a different task of the scrip**t, and the task is clearly visible to the student. Students can fulfil the task, or provide their answer to the task by clicking on the anchor point. The most simple form is using different pre-fabricated messages in a discussion forum; each pre-fabricated message constitutes one anchor point. In our study, we used this simple form. This set-up has several characteristics related to collaborative spaces and scripts:

- by associating each anchor points with a different task or phase of the script, automatically a distinction is made between different collaborative spaces. In our study, we used one anchor point for the input of prior knowledge, and one for discussion, thereby creating a dual collaborative space.
- by using anchor points, the different phases of a script are presented to the learners in space, rather than in time. This puts the user in control, which diminishes some risks of scripting. Students can look around in a next phase, if they want to; they can discuss freely, if a discussion anchor point is provided. As long as separate contributions, separate results of different tasks are attached to the right anchor point, this is not a problem. To put it in a different way: dual collaborative spaces can act as a means to turn scripts from time-bounded into space-bounded, thereby empowering the user.
- contributing by 'replying' to the right anchor point, is very easy compared to filling in metadata with the contribution itself, thus lowering cognitive load.

FOSTERING LEARNING COMMUNITIES

Theoretic Approaches, Empirical Studies, and Computer Support

Markus Rohde, David Williamson Shaffer, Volker Wulf

Workshop Theme

Processes of collaborative learning are highly dynamic, socially complex, and emergent. With regard to community-oriented educational settings, the traditional role of teachers, tutors, and trainers change basically, new didactical approaches and pedagogical competences are necessary. The technological support of community learning needs an integrated socio-technical perspective, taking socio-cultural processes as well as technical infrastructures into account. The workshop aims at overcoming the traditional perspective on individual and group learning, focussing on community-based practice, shared histories of learning, community-building (and collective identity-building), and commonly-gained experiences.

Taking an interdisciplinary approach, we will focus on the intersections and relationships between educational research and computer science as applied within CSCL scenarios. Topics of the workshop will include socio-cultural and related theories of community learning, case studies and empirical research results, and design requirements for the technological support of learning communities.

Position Paper Topics

Relevant position paper topics include, but are not limited to:

- Contributions to theories of community-based learning and reflection on existing theories
- Didactical concepts and pedagogical approaches for community learning
- New challenges and roles of teachers, tutors, and trainers in community learning
- Communities of practice in educational settings
- Ethnography and case studies of diverse communities
- Evaluation methods of community-oriented educational settings in school and university
- Support for community building and the negotiation of shared meaning
- Technical support and infrastructures for learning communities
- Support for mobile learning, e-learning, and blended learning for communities

This workshop is a follow up to the Workshop “Community-Based Learning” held at the Sixth International Conference of the Learning Sciences (ICLS 2004) in June 2004 in Los Angeles, Cal. Results of this former workshop will be published in a Special Issue of ACM SIG Group Bulletin in Spring 2005. The workshop will pick-up some of the achieved results but shall be open for all interested participants.

Workshop Organization

Selection of Participants

The workshop is intended to bring together, for a whole day, a maximum of 20 participants. The participants will be selected on the basis of submitted position papers of 3-4 pages. The selection will be done so as to ensure the presence of diverse perspectives and to foster discussion. The position paper should present theoretical work, and empirical studies with regard to the relevance of the authors’ background to the workshop.

Schedule for the Workshop

Morning: Short presentations of position papers by participants (about 10 minutes, depending upon number).

Late morning and early afternoon: Most of the afternoon will be spent in smaller groups, each of them working on different aspects of learning communities. Then the groups will prepare draft explanations/materials for presentation to the larger group

Late Afternoon: Discussion and “wrap-up” based on the small groups’ results. Plans for further cooperation.

Plan for dissemination

The workshop organizers plan to write up the results of the workshop in a joint paper. According to the quality of the position paper submissions and the results of the workshop, we foresee the publication of an edited book or journal special issue on the topic of the workshop. We will develop public web pages dedicated to the workshop.

Workshop Organizers

Markus Rohde has studied psychology and sociology at the University of Bonn and is one of the founders of the International Institute for Socio-Informatics (IISI). At the time being he is working as a research associate at Institute for Information Systems at the University of Siegen. Moreover he is editor of the political science journal on New Social Movements. Since 1991 his research focuses on the design of network systems, on virtual organizations, and on "organization and technology development". Since 1994 he is working as a consultant for medium-sized enterprises and for nonprofit-organizations. From 1998 until 2001 he has been CEO of AGENDA CONSULT GmbH. His main research interests are CSCW/CSCL, HCI, organization development, non-governmental organizations and (new) social movements.

David Williamson Shaffer is a former teacher, curriculum developer, teacher-trainer, and school technology specialist. He has taught grades 4-12 in the United States and abroad, including two years working with the Asian Development Bank and US Peace Corps in Nepal. Dr. Shaffer's M.S. and Ph.D. are from the Media Laboratory at the Massachusetts Institute of Technology, where his work focused on the development and evaluation of technology-supported learning environments. After completing his doctoral studies, Dr. Shaffer taught and conducted research at the Technology and Education Program at the Harvard Graduate School of Education. He developed curricula and online tools that help students understand the impact of technology on society, and created technology-based learning systems for new medical devices and procedures. Dr. Shaffer's research interests are in how computational media change the way people think and learn.

Volker Wulf has studied computer science and business administration at the RWTH Aachen and the University of Paris VI and got a PhD at the Computer Science Department of the University of Dortmund and a Habilitation at the University of Hamburg. Currently he is Associate Professor of Information Systems at the University of Siegen and heads a research group at Fraunhofer-FIT. His research interests include Computer Supported Cooperative Learning, Knowledge Management, Computer Supported Cooperative Work, and Human Computer Interaction. He was Conference Co-Chair of ECSCW 2001, Communities & Technologies 2003 and the German conference D-CSCL 2000.

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Microanalytic Studies of Instructional Practice: A Working-Shop

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Abstract. Following upon a tradition begun at ICLS 2002 and continued at CSCL 2003, this workshop will provide for a day of data sharing at CSCL '05. Social theorists and sociologists have described the profound problems involved in producing literal descriptions of contingent practices. This workshop will explore ways of analyzing instructional practices drawing on the traditions of ethnomethodology and conversation analysis. Four samples of data will be selected in advance of the workshop and prepared for presentation. Following the usual protocol for data sessions conducted in communication studies and microsociology, we will do repeated examinings of the data interspersed with phases of individual and group analytic work

Keywords: Video analysis, Conversation Analysis, Ethnomethodology

Following upon a tradition begun at ICLS 2002 and continued at CSCL 2003, this workshop will provide for a day of data sharing at CSCL '05. The stated goal of educational research has been and continues to be one of producing improvements in instructional practice. Instruction, however, is carried out through interaction and interaction is by its nature contingently organized—it is assembled by multiple parties in the moment to address the relevancies of that moment. If our interest is in reforming practice, how do we actually go about studying and describing a contingent practice? Social theorists and sociologists have described the profound problems involved in producing 'literal' descriptions of contingent practices. As Livingston (1987) pointed out, "a documented structure or regularity of practical action is never exact"; "[i]t is always, and only, adequate for the purposes at hand" (p 19). There is, as a result, no way of describing precisely and completely how the instructional interaction is to be carried out. Furthermore, there is also the problem of indexicality. As Wilson (1970) discussed:

> Each action in the course of interaction, then, is an indexical particular that is understood by the participants in terms of the place of the action in the context of what has gone before and what they see as the future course of the interaction. Moreover, this context itself is seen for what it is through the same actions, it is used to interpret. That is, on any particular occasion in the course of the interaction, the actions that the participants see each other performing are seen as such in terms of the meaning of the context, and the context in turn is understood to be what it is through these same actions. Further, what the situation on any particular occasion is understood to have been may be revised subsequently in the light of later events. Consequently, what the situation "really was" and what the actors "really did" on a particular occasion are continually open to redefinition. (p. 68-69).

Wilson concluded that social interaction itself is an interpretive process and must be studied as such. He argued, therefore, for a reconstruction of sociological inquiry. Given that instructional interaction is, by definition, a form of social interaction, his argument based on indexicality applies with equal force to those of us interested in studying the practical details of instruction. These problems of fundamental incompleteness of description and indexicality call for new approaches to studying and describing instructional practices, particularly the practices through which participants make sense of their immediate circumstances. This workshop is devoted to developing rigorous and detailed analytic techniques for carrying out just such forms of inquiry.

Our interests in common sense reasoning and practical sense making have a natural connection to a tradition of research within sociology known as Ethnomethodology (EM). EM is centrally concerned with the procedures ("methods") participants ("members") competently use to render their own actions and those of others as sensible (Garfinkel, 1967; Heritage, 1984). Garfinkel (1967) referred to the "documentary method of interpretation"[1] as the method by which participants treat some particularity as standing in for or serving as the "documentary evidence" of some underlying pattern or category. Stated differently, the documentary method is *the* method through which meaning is produced and recovered. The question is how is this actually done?

Ethnomethodological research focusing on meaning making within talk-in-interaction is conducted under the title of "Conversation Analysis" (CA). This title refers both to a body of literature and a specific set of analytic techniques. [2] Two analytic approaches have been developed, both of which can be traced back to the field's founder, Harvey Sacks. In his dissertation, Sacks (1972) analyzed the ways in which speakers employed categories of social identity as resources in interaction. In subsequent research, Sacks focused on the sequential organization (c.f., Sacks, Schegloff, & Jefferson, 1974) and projected action (c.f., Sacks, 1995, LC2:188-199) of turns at talk. Historically, the latter approach has been much more heavily represented in the literature, though there continues to be interest in membership categorization devices (c.f., Hester & Eglin, 1997). It has been argued (Watson, 1997) that these two approaches are not mutually exclusive and that they can be productively employed together. There is an established literature that applies these approaches to the study of instructional interaction (c.f., Ford, 1999; Koshik, 2002; Lerner, 1995; Macbeth, 1990; McHoul & Watson, 1984).

Schegloff (1996) specified that an "empirical account of an action" must contain three elements: (1) "a formulation of what action or actions are being accomplished," (2) "a grounding of this formulation in the 'reality' of the participants," and (3) "an explication of how a particular practice, i.e. an utterance or conduct, can yield a particular, recognizable action" (as quoted in Have, 1999, p. 103). The first involves identifying and documenting something within the interaction as performing some kind of action, or, in Schegloff's terms, "formulating" it as an action. To 'ground the formulation' is to demonstrate within the recorded materials that the participants oriented to it as a certain form of action. For example, to demonstrate that an utterance served as a query, it would not be sufficient to simply show that it had the syntactic structure of a question. It would also need to be demonstrated that it did the work of a query in the way that it shaped subsequent interaction. Finally, but most importantly, the account must explain *how* the action does what it does or stated in a slightly different way, how the action provides for its own recognisability as an instance of whatever category of action it might represent. Because of our orientation to meaning-making practices, this is an essential feature of our analysis.

Four samples of data will be selected in advance of the workshop and prepared for presentation. Following the usual protocol for data sessions conducted in communication studies and microsociology, we will do repeated examinings of the data interspersed with phases of individual and group analytic work. Our approach will be explicitly microanalytic, for both practical and programmatic reasons. Because we will have only a limited time to devote to any one piece of data, we will only be able to carefully analyze relatively brief samples of interaction (2-3 minutes or less). Programmatically we are committed to documenting learning in careful detail, though this does not necessarily imply a specific frame of analysis (i.e., the data sessions will focus on brief isolated fragments but these may be part of longer episodes or components of more elaborate ensembles). The goal is to give an account of the action, addressing the three features enumerated by Schegloff.

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[1] Garfinkel credited the expression to Mannheim. Mannheim (1968) postulated different levels of meaning (objective, expressive, documentary) as attributes of a produced object. He was concerned specifically with how these meanings could be appreciated across different cultures and historical periods. Garfinkel's treatment of the documentary method was applied to all interpretive work including the interpretation of social action (e.g., talk, gesture, facial expression) as it is performed.

[2] For an introduction to CA methods, consult ten Have (1999) or Hutchby and Woolfitt (1998).

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Assessment by Electronic Portfolio

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Abstract:

Portfolio for educational purpose is a collection of work that a learner has selected and collected to show growth and change over time. It also contains the learner's reflection on the individual piece of work.

An electronic portfolio by using electronic technologies allows the portfolio developer to collect and organize portfolio artifacts in many media types (audio, video, graphics, text). Many electronic portfolios are now database driven, web-based and the artifacts can be hyperlinked. This allows the portfolio to be more durable and accessible.

An electronic portfolio can be used as an alternative form of assessment in addition to its other functions like enhancing student learning or being a record of student achievement.

Electronic portfolio allows the student to include multiple examples of work done within a range of time which could be a better representation of the student's work. It also provides opportunities for the student to reflect on his/her learning in the process of building the portfolio. These characteristics of electronic portfolio enable assessment to be focused not only on the product but also the process of learning.

This paper will examine the experiences of using an electronic portfolio system (OpenW) developed by the author and in the assessment in various courses including general education courses, core courses in a discipline and inter-disciplinary courses. Different assessment objectives, strategies, grading principles and relationship with other assessment methods are developed to suit the needs of different courses. Students' comments on their experiences will also be analyzed.

Workshop on visualizing trails as a means for supporting reflection

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Abstract. This workshop is about visualizing trails that learners leave behind as they work their way through a digital learning environment. We will consider the ways in which these visualizations can be used as a means for fostering reflection. In the workshop we will work collaboratively on analyzing these visualizations, and discuss a number of questions on visualizing trails and reflection. The objectives of this workshop are to gather existing knowledge and collaboratively create part of the answers to these questions.

Workshop track: CSCL Technology / CSCL Methodology

WHAT ARE TRAILS?

A recent development in education is the use of learning objects. Learning objects are cohesive pieces of learning material. These pieces of learning material are usually stored in a repository, so that teachers and learners can search the repository for learning objects of their interest, and make them available to others within an electronic learning environment. Learners engage with LOs in the form of trails - or time-ordered sequences of LOs. Examples of learning trails are (i) school-child navigating through course materials, (ii) a student navigating through the literature on a subject, or (iii) a visitor navigating through a museum.

In addition to these prefabricated learning objects, we also consider 'learning objects' created by learners themselves. These are small objects that learners create in the course of their learning process, which become part of the learning environment. Examples include messages in discussions, or results of tests. Similarly to trails through prefabricated learning objects, trails can be formed in discussions as well.

BACKGROUND

This workshop proposal originates in the workshop on trails during the Kaleidoscope CSCL 2004 symposium. The most important outcome of that workshop was that trails can be useful to fostering reflection, and that they can do so in two ways. Firstly, trails capture the history of the learner, and can thus be used to reflect on what the learner has done so far. Secondly, and related to this, reflection on what one has done should normally be followed by reflecting on what one could do next. Displaying both the trail and objects that have not been visited yet but might be of interest, can help the learner in making this decision.

In the workshop the emphasis was not on systems that oblige the student to follow one specific trail. We focused on ways in which trails can be used to empower learners, to support them in thinking what they have done and considering what they should do next. Very often, this type of reflection involves collaborative learning of diverse forms, e.g. trails may have been created collaboratively - this applies by definition to discussion trails; trails can function as an example for other learners of an interesting route that they might follow too; learners may use their personal trail, to tell their story to other learners; and learners can reflect on a particular trail collectively.

If trails are used this way, then it becomes crucial that the trails are visualized in a way that is easy to read for the learner. Thus, within the TRAILS project, the Kaleidoscope symposium shifted the attention to the visualization of trails. After the symposium, a deliverable was written within TRAILS which considers the visualization of trails within two user studies.

WORKSHOP QUESTIONS

Combining reflection and trails is becoming an important issue. The importance of reflection to the learning processes has been recognized for a long time. Kolb (1984) related reflection to experiential learning. With the advent of digital learning environments, it becomes possible to record 'raw' trails of experience. If these are visualized to the learner, the possibilities for reflection on the experience are extended.

The visualization of trails raises several questions, some of which were discussed in the deliverable:

- For what types of reflection are visualizations useful
- What types of collaboration can be involved in reflecting on trails?
- Which ways to visualizing trails are better than others in which situation and why?
- Which are relevant metadata that should be added to the trail to provide a sensible visualization?
- What is the role of the personal profile in addition to and relation to metadata?
- How can metadata be created or extracted from existing log files?
- How can visualizations be created from log files + metadata?

WORKSHOP AIMS

In this workshop we would like to discuss these questions together with other people who are involved in or have an interest in visualizing trails as a means for fostering reflection. At the same time, we hope to gather knowledge and experiences that we are not aware of. We would like to invite participants to take their own log files and perhaps existing visualizations with them, and that we work together on creating visualizations, or analyzing existing visualizations. The workshop will be built around case studies of visualizations, which are provided by both organizers and participants.

The main objective of the workshop is to provide substantial answers to these questions that will at least lead to some adjustments of our original work. Further, the workshop is intended to provide input to a EU-STREP project on this topic that we are currently preparing (if the project proposal is accepted).

WORKSHOP PROGRAMME

I. Plenary part

1. presentation by participants of their log file and/or visualization
2. collection of further questions and problems

II. Working in groups

Each group has a number of log files and/or visualizations to be discussed. Depending on the number of log files that are available, all groups may use the same set, or they may use different sets. If there are enough participants that possess the different types of expertise, four groups will be formed, that will try to answer the questions that have been formulated above and questions that were asked at the first part of the workshop. The four groups and their questions are:

a) Group on reflection and collaboration
- For what types of reflection are visualizations useful?
- What types of collaboration can be involved in reflecting on trails?

b) Group on visualizing
- Which ways to visualizing trails are better than others in which situation and why?

c) Group on metadata
- Which are relevant metadata that should be added to the trail to provide a sensible visualization?
- What is the role of the personal profile in addition to and relation to metadata?

d) Group on technical issues
- How can metadata be created or extracted from existing log files?
- How can visualizations be created from log files + metadata?

III. Reports by the groups and drawing conclusions

Detailed information on the workshop will be sent to participants several weeks before, and participants will be asked to take their own visualizations / log files with them.

Doing Scientific Inquiry the Way It Is Supposed to Be: Team Research with Emerging NASA e-Education Advanced Learning Technologies

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Abstract. NASA scientists are developing four advanced learning technology tools. In 2008 NASA will make these tools freely available to instructional designers and developers, expanding the capabilities of instructional learning environments. NASA's learning technologies teams designed partial scenarios for inquiry-based classroom activities incorporating these tools and NASA resources in support of K-12 national standards in science, math, or technology. Workshop participants preview the capabilities of the tools and complete NASA scenarios using the Virtual Design Center.

Keywords: learning technology, inquiry-based learning, team research, open source application

INTRODUCTION

The National Aeronautics and Space Administration (NASA) shares the goals of the Computer-Supported Collaborative Learning (CSCL) community in supporting student learning through technology. One of NASA's strategic objectives is to increase public access to NASA education resources via the establishment of e-Education as a principal learning support system. NASA characterizes e-Education as high-quality, content-rich, just-in-time, technology-mediated learning experiences that are customizable and can occur anywhere access is available. As one of the outcomes of expanding e-Education, NASA will develop four new advanced learning technologies by 2008. When completed, these technologies will be freely available to students, educations, and researchers as open source applications. The NASA-sponsored Classroom of the Future (COTF) has developed the Virtual Design Center (VDC) to leverage NASA's e-Education by supporting instructional designers to develop inquiry-based learning environments using NASA education resources. The VDC has formed an editorial board representing renowned professional organizations, including the International Society of the Learning Sciences (ISLS), and provides fellowship opportunities to the members of those organizations.

NASA Learning Technologies Projects

The four NASA Learning Technologies programs are Information Accessibility Lab, Animated Earth, What's the Difference, and Virtual Lab. Information Accessibility Lab allows the visually impaired to interpret graphical information. The program can parse formulas to provide a textual description of the graph resulting from standard formulas. In addition, the program uses sounds of varying pitch to characterize the graph itself. Animated Earth is a 3D Earth data viewer that facilitates access to images stored on distributed servers over the Internet. What's the Difference will provide an interface to support comparative analysis of a variety of data represented in different media formats. A comparative analysis of planets can occur with numerical data, images, or animations. Virtual Lab provides an interface to data from various instruments that are significant to NASA research. A virtual electron microscope allows students to engage in the same materials analysis that members of the Columbia accident investigation board used to understand the cause of the crash.

NASA e-Education and CSCL in the next 10 years

The VDC provides online workshops, which help designers to draft a scenario for a technology-enhanced, inquiry-based activity according to research-supported best practices of teaching and learning and in alignment with NASA science and national standards. The VDC promotes authentic, ill-structured scientific investigations in which team research is emphasized as a best practice of teaching and learning through inquiry. Two of the main characteristics of performing scientific inquiry are working in the context of collaboration and using advanced technology, such as computerized visualizations using satellite data. One of the overlapping items in both NASA e-Education and the CSCL community research agenda for the next 10 years could be how to provide seamless computer support for authentic team research experience when learners are engaged in scientific inquiry using advanced learning technologies.

Workshop Goals

The goals of this workshop are to:

- Build partnerships between the CSCL community and researchers of NASA learning technologies and the Virtual Design Center.
- Expand NASA e-Education by improving its interactivity of digital content materials in connection with CSCL theory, pedagogy, and technology.
- Generate scholarly discussions about how advanced learning technologies should be used for authentic learning problems considering how experts perform their inquiry and how to address this specificity within the CSCL community.

WORKSHOP PLAN

In this workshop the COTF facilitators will (1) provide hands-on experience with early prototypes of these new NASA learning technologies, (2) introduce participants to the Virtual Design Center, (3) share their projects that could support inquiry-based learning, and (4) experience the brief version of the VDC workshop.

Participation

Participants are expected to think about how the workshop is relevant to their work and share any CSCL project (including advanced learning technology with a network component). The CSCL tools should be appropriate for supporting inquiry-based learning or the tools should have advanced technology that aligns with NASA science and technology and have potential to advance a collaborative component for NASA e-Education. The shared projects will be reviewed by the COTF VDC researchers and used as exemplary learning technologies that support inquiry in the VDC workshops (http://vdc.cet.edu).

Schedule

First Hour

5 minutes: Workshop overview.

15 minutes: Overview of NASA educational research agenda and introduction of the ISLS/VDC fellowship opportunity.

10 minutes: Introduction to the NASA advanced technology applications.

20 minutes: Introduction to the COTF Virtual Design Center.

10 minutes: Dividing up teams. There will be stations for each program. The participants will form teams of four (at least one person with CSCL system or networked advanced learning technology) to work on one of the learning technologies.

Second Hour

Each team will develop a design scenario incorporating design principles from the Virtual Design Center. The participants will be provided with a partial design scenario, which includes a student investigation question that would be answered using the technology. The scenario will also include student conceptions of the question, links to national standards, and data about student performance on assessments related to the key concepts. Participants will flesh out the investigation support structure, especially team research structures, using CSCL tools. Participants can also propose an alternative scenario with participant-presented advanced technologies.

Third Hour

10 to15-minute presentation and discussion for each team.

European CSCL Research Landscape: A selection of Recently Completed Theses

CSCL 2005 WORKSHOP ; ROOM A05

Pierre Dillenbourg[1] and CSCL SIG of Kaleidoscope, an European Network of excellence

(1) Ecole Polytechnique Fédérale de Lausanne, Switzerland

GOALS

The European research on learning technology benefits from the support of a large so-called "Network of Excellence", which is a new form of funding set up by the European Union. Our network's name is KALEIDOSCOPE. This workshop is set-up by the Kaleidoscope Special Interest Group on CSCL , led by Barbara Wasson. Our point was to provide the international CSCL community with a snapshot of European research. Instead of presenting a panel on this issue, we propose to provide a fair picture of the European research landscape by presenting the work of those who completed their PhD thesis on CSCL in 2004 or early 2005. The set of questions addressed in these theses reflects the main trend of research in our community.

By associating closely this event with the doctoral consortium, we also want to give a chance to current PhD students to share experience with those who can provide them with recommendation based on their still fresh souvenirs.

SCHEDULE (ROOM A05)

13:00	Introduction
13:15	Jan-Willem Strijbos, Open University Of The Netherlands & Leiden University
13:40	Nicole Rummel, Freiburg University, Germany
14:00	Discussion
14:15	Patrick Jermann, Ecole Polytechnique Federale De Lausanne (Epfl),Switzerland.
14:30	Pablo Reyes, University of Le Mans , France
14:35	Discussion
15:00	Break
15:30	Frode Guribye, Department of Information Science & Media Studies, University Of Bergen
15:45	Polyxeni Papaioannou, University Of Athens, Greece
16:00	Jonas Ivarsson, Department Of Education, Göteborg University. Sweden.
16:15	Discussion
16:30	Global discussion: lessons frm our PhD

CONTENTS

1. The effect of roles on CSCL

Jan-Willem Strijbos, Open University of the Netherlands & Leiden University

The Open University of the Netherlands offers distance education. Many students experience this type of study, i.e. mostly at home, as lonely. Although Information and Communication Technology (ICT) can foster collaboration between students that are separated both in time and space (asynchronous), one of the disadvantages is that students, consciously or when forced by their social context, often do not respond to e-mail or messages in a discussion forum. A lack of response is often experienced as unpleasant and affects communication in a negative way. Participation to the collaborative process can be stimulated with, for example computer software or didactical models. In this dissertation the last category was applied and more specifically the use of functional roles. Thus, the emphasis was put on the progress of the learning process and less on the learning result.

Functional roles Functional roles were introduced to establish the two most important conditions for collaborative learning: individual responsibility and positive interdependence. Each role constitutes an individual responsibility for each student. In addition, since all roles are equally important for the collaboration there is positive interdependence between the students. Functional roles that were implemented in this thesis were: project planner (responsible for deadlines en agreements), communicator (responsible for communication with a teacher), editors (responsible for a shared report) and data collector (responsible for collecting information sources). Two studies have been conducted to investigate the effect of roles on the collaborative process in a project-based learning environment.

Research design. At the start of each study a questionnaire was administered to collect personal characteristics, such as achievement motivation, an active or passive attitude in a group and the degree of experience with ICT. Afterwards the students were distributed across groups and assigned to one of two conditions: half of the groups were offered functional roles, the other half was not. During a single face-to-face meeting students were offered the opportunity to meet with each other, but all communication after this meeting was by e-mail in groups of predominantly four students. All groups were required to collaboratively write a policy advice for a fictitious local council on how this council could respond to the reactions of pressure groups regarding the reorganisation of local administration. After the group assignment an evaluation questionnaire was administered in which, for example, they were asked about their satisfaction with the collaborative process and whether they thought that a good working strategy was pursued. In both studies the personal characteristics did not appear to correlate with the results obtained with the evaluation questionnaires, and these were not involved in further analyses.

Study 1. The first study involved five groups with roles and five groups without roles. There was no difference regarding the learning result, as expressed by a group grade. Student satisfaction was better expressed by the degree of ‘perceived group efficiency’ (PGE) and groups with roles appeared to be more aware of this, whether it was high of low. In their e-mail communication role groups made more coordinative (who does what) and ‘task content’ statements than their counterparts in nonrole groups. Students in role groups also acted more consistently according to roles, but spontaneous role behaviour in nonrole groups was occasionally visible. In both conditions dropout was observed, but the number of students that failed to finish the course was higher in nonrole groups. During the study it became apparent that several preconditions could be controlled, which would assist a more evenly matched comparison of both research conditions. These preconditions also appeared to be suited to decrease the dropout. In addition the idea of replication (repeating the study) was raised, which is rather the norm than an exception in social psychology but rarely applied in educational research.

Study 2. In comparison to study 1 four preconditions were changed in study 2. A communication discipline was issued to ensure communication at regular intervals. In addition, the students were asked to indicate in advance how much study time they had available for the group assignment and collaboration. Thirdly, differences in study pace were considered. Finally, students’ preference for a practice assignment was taken into account. The functional roles were not changed. The second study involved seven groups with roles and six groups without roles. Again no difference was found regarding the learning result. However, PGE was revealed again and this time it appeared to be higher in the role condition as compared with the nonrole condition. The increase in coordinative statements, as well as the finding that students in role groups act more consistently according to roles, were both replicated. Compared to study 1 there was now no difference in the degree of dropout.

Conclusions. Three important conclusions can be deduced from these results:

- Functional roles have a positive effect on the degree of PGE and the amount of coordinative communication. However, the degree of PGE depends on the extent to which preconditions are controlled. In an uncontrolled environment the functional role increase the awareness of PGE, whereas in a controlled environment the level of PGE is also increased.
- Secondly, it has become apparent that there is a lot to be gained in methodological respect. This thesis reveals that the analysis of PGE (multilevel modelling) and e-mail communication (quantitative content analysis) can be significantly improved.
- Thirdly, it is apparent that the Open University of the Nederland – more generally distance education institutes – need to reconsider the tension between individual flexibility and the imperative interdependency in collaborative learning.

In closing, this dissertation has revealed that functional roles during project-based computer-supported collaborative learning have a positive effect on both participation and collaboration.

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2. Computer Support for Interaction Regulation in Collaborative Problem-Solving

Patrick Jermann, Ecole polytechnique fédérale de Lausanne (EPFL),Switzerland.

This thesis presents a framework for supporting interaction regulation through computational means. Regulation of collaborative problem-solving includes aspects related to the task as well as to the interaction itself. Task related aspects consist of establishing a strategy, planning actions and evaluating progress. Interaction regulation on the other hand refers to the organization of collaboration through communication rules as well as division of labor. These rules and strategies might be established at the outset of the collective activity, but they also need to be monitored and adapted as the interaction evolves. On a moment to moment time scale, regulating collaborative interaction consists of deciding “who does what” in addition to “what to do”.

We chose to describe these regulation processes as a negative feedback loop, a concept borrowed from control theory. Following this metaphor, interaction regulation is a four step process that starts with the collection of raw data about the participants’ behavior (e.g. verbal contributions, mouse clicks, messages). In the second step, raw data is aggregated into a set of psychologically and pedagogically meaningful indicators that constitute the current state of interaction (e.g. symmetry of participation, quality of knowledge sharing). In the third step, the current state is compared to a representation of a desired state (standard) of interaction. Then, if there is a discrepancy between these two states of interaction, remedial actions are proposed in the fourth step (e.g. encourage participation or ask participants to clarify their explanations).

Computers may offer support for any or all of these four steps. Support for the first two steps might be provided by mirroring tools, which assist learners and teachers in the collection of data by providing them with graphical feedback about their interaction. Support for the second and third step might be provided by metacognitive tools, which assist learners’ or tutors’ diagnosis of the interaction through visualizations which also contain a normative aspect that represents the standards of productive interaction. Support for the fourth step might be provided by guiding systems, which propose remedial actions based on a computational assessment of the situation.

Our experimental studies show that a representation of the desired state of interaction is critical for regulation. A mirroring tool did not substantively affect the behavior of subjects while a metacognitive tool led to increased participation in dialogue, including more precise planning. Subjects were able to use the standard provided by the metacognitive tool to judge the quality of their current interaction and to take remedial actions. Mirroring tools might still be effective means to provide feedback to a group of problem-solvers, given that the standards to judge interaction are defined through instructions or are part of the subjects’ mental model of productive interaction.

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3. Improving Computer-Mediated Collaboration. Development and EmpiricalEvaluation of Two Instructional Support Methods

Nicole Rummel, Freiburg University, Germany.

Effective collaboration of spatially distributed people in computer-mediated settings is a precondition for success in many new learning and working contexts, but it is hard to achieve. Two *instructional approaches* were developed to improve collaboration in such settings by promoting people's capabilities to collaborate in a fruitful way and furthering their understanding of what characterizes good collaboration: (1) In a "model condition" people were provided with an elaborated worked-out example of a good collaboration. (2) In a "script condition" the collaborating partners were provided with a script guiding them step by step through their collaboration on a first task. The main hypothesis was that the instruction provided by the model and the script would convey strategies necessary for a good and effective computer-mediated collaboration to the people. To test this hypothesis an experimental design was implemented that provided clearly separated phases for the instructional treatments (learning phase) and for applying and testing the acquired skills (application phase). During the application phase the partners collaborated freely on the second task; the quality of the collaborative process, the joint work product, and the results of an individual posttest on knowledge about collaboration were analyzed.

An *experimental study* was conducted that compared the two instructional conditions (model and script) with a third condition in which the partners collaborated freely (without instruction) during both phases, and a fourth (control) condition limited to the application phase. The computer-mediated scenario consisted of a desktop-videoconferencing environment including audio- and video-connection, personal text-editors and a shared text-editor. The collaborative task was the interdisciplinary solution of psychiatric cases with combined psychological and physical pathology. Dyads of advanced medical and psychology students were asked to jointly diagnose the patients described in the cases and to develop a suitable therapy plan making use of their complementary expertise. The study yielded positive effects of both the model and the script condition on process and outcome of the second collaboration in the application phase, and on the knowledge posttest.

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4. Infrastructures for learning – ethnographic inquiries into the social and technical conditions of education and training

Frode Guribye, Department of information science and media studies, University of Bergen

The dissertation focuses on the notion of infrastructures for learning through a set of empirical studies and explores how this notion can be applied to understand the technical and social conditions of activities that are aimed at learning (education and training). Drawing on Star & Ruhleder's (1996) conceptualisation of infrastructure as ecological and relational I examine both some of the theoretical and empirical underpinnings of the notion infrastructures for learning and some methodological challenges related to studying such infrastructures. In order to investigate infrastructures for learning, ethnographic inquiries have been made into three different settings in which technology was introduced to support activities aimed at learning.

- The first case looks at an intervention in an educational setting where students were presented with a new pedagogical model (collaborative learning) and a set of computerised tools to support their collaboration. The study focuses on the realisation of the infrastructural tools and the pedagogical model in relation to the students' work. I identified three interactional processes that constitute the students' efforts in relation to the infrastructure for learning: understanding the conditions of collaboration, coordinating collaborative efforts and commenting on products and events.

- In the second case study I analyse how a collaborative tool (an online discussion forum) was introduced into an inter-organisational network for supporting informal learning between the members of a subject group that already had certain arrangements to support their work/learning. The system was not successfully adopted into the existing infrastructure for learning, and this is analysed in relation to the participation structures and the participants' knowledge interests.

- In the last case I studied a large corporation that introduced a Learning Management System and a set of online tutorials to deliver training to more than 6000 employees that were moving into a new headquarter. The study focuses on the organisation of the training activities and identifies three different rationalities that were critical to the introduction and use of the new infrastructure for learning: a pedagogical rationality, a logistic rationality and a control rationality. The final discussion elaborates on how the technical and social arrangements in the different situations that have been put under empirical scrutiny are constituted as infrastructures for learning in relation to organised practices.

The discussion further highlights the relation between infrastructures for learning and pedagogical models. I also explore how the notion of infrastructures for learning can be used to capture the networked dimension of activities aimed at learning. Finally, the inherent tension between design and use of technologies for learning is discussed. I address how the notion of infrastructures for learning can be used as normative framework that encourages a focus on technologies as part of a set of social and technical arrangements when introducing technologies to support learning practices.

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5. Structural awareness in mediated conversations for collaborative learning environments

Pablo Reyes, University of Le Mans , France

This thesis takes place on the Computer Supported Collaborative Learning domain. This field is centred on the design of learning environments that makes possible the support of collaboration in a group. In this context, this work principally aimed to create new technologies of communication for Virtual learning communities (VLCs). Particularly, our issue of research is to analyze learning conversations taking place in VLCs in order to give mechanism to support and facilitate the emergence of these interactions among the users of Forum-type tools (FTTs).

We have identified in FTTs several anomalies that can discourage the emergence of learning conversations taking place in FTTs: “interactional incoherence”, “convergence incoherence”, “turn-taking incoherence” and group perception incoherence”. We try to “fix up” the FTTs to obtain better and perfectible environments for group communications Thus, we propose a peer-to-peer support approach that tries to overcome these incoherencies that we will call the structural awareness approach.

It puts emphasis on revealing the structural properties of a group to its members in order to promote better collaborative interactions. This support has been implemented on a FTT called Mailgroup. Mailgroup has been tested twice in different contexts, obtaining a first feedback of its pertinence according to our objectives. The results indicate that the work is properly oriented, but also that it is necessary to make further researches.

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6. “Students’ interactive communicative collaboration by distance ” : case study of oral and written communication

Polyxeni Papaioannou, University of Athens, Greece

The current paper discusses the students’ interactive communicative collaboration by distance. It is a study of two school cases which communicated by distance using video conference for oral communication and computer conference for written communication. The collaborative activities of the students were compared with the ones in physical presence collaboration and by distance. First, the paper attempts to present the method of collaborative learning supported by the use of interactive communicative tools. Next, the research objectives, the sample and the methodology of the research, are presented. Finally, the paper discusses the results and conclusions of the research.

The research data collected from the applied model of collaborative learning, (PHYS. PRES.+VIDEO+EMAIL), were analyzed taking three distinct perspectives. First, the cognitive perspective, second the skills obtained perspective and third the socialization perspective.

The first perspective brought forward the issue that the students exchange knowledge and provide help to their distance school mates. The activities compared in physical presence and telepresence collaboration seem to aim the same objective, (structuring, exchanging ideas and organizing tasks although in different environment, time and type of activity. However, the collaboration through video conference proved more effective. Although time allowed was 10 minutes for each group, the decisions taken were definite for the final product of the work and contributed to the evaluation, corrections and students’ confidence for the process of the work. (PHYS. PRES.=VIDEO)

Second, telepresence provided students with social communication skills, decision taking, self confidence and interdependence necessary to cope with future tasks. Also, it is worth mentioning how fast students were adapted to the video conference communication environment though they were never met.

(PHYS. PRES.<VIDEO)

The results of the research showed that the written communication by distance, in this specific model, was not considered seriously connected to the students interaction tasks. This because telepresense resolved most of the students problems so that email to be used only for the exchange of material.
(PHYS. PRES.+VIDEO>EMAIL)

Finally the results showed that the age of the students, (14 years old), their character, the groups' roles, the teachers' role and technical support influence the practical application and diffusion of the model.

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7. Renderings and Reasoning. Studying artefacts in human knowing.

Jonas Ivarsson, Department of Education, Göteborg University. Sweden.

The thesis addresses the issue of how the nature of collaboration and learning change as new representational technologies enter as mediational means. The point of departure for this work is the current development of digital technologies. Following this development in our communicative infrastructure, many far-reaching claims about the promises of multimedia learning have been, and are still, made. For instance, in research on multimedia and interactive learning environments one will typically find claims to the effect that modern technologies offer radically new and innovative forms of presenting and communicating information. These instructional technologies are sometimes claimed to be interactive, to have real-time features, to offer rich animations in a multimodal environment and so forth. Such descriptions, however, risk oversimplifying and concealing much of the variation that characterise the use of technologies.

Accordingly, one aim of this thesis is to go beyond the employment of general categories and abstract analytical concepts when discussing the relation between technologies and learning. Through four separate studies, practical actions and practical reasoning performed in technology-mediated learning environments are scrutinized. The outcomes of the empirical investigations are illustrations of some of the aspects that can go unnoticed if handling these matters in the abstract.

As a theoretical contribution in the longstanding debate on human knowing, the research further illustrates how human reasoning is dependent on tools. One general observation is that when people are familiar with a particular tool (e.g. maps), they can accomplish sophisticated modes of reasoning that they seem unable to perform without such support in external devices. At a methodological level, the results point to the gains of investigating the interactions between people, and between people and technologies. Some concrete aspects of the interaction with explicit pedagogical consequences are attended to. In one analysis, it is shown how the use of a visually driven learning environment can become an interactive puzzle that keeps the students in a local and non-conceptual world. The results suggest that the mastery of conceptual knowledge that the students develop is tied to local features of the situation that they operate in. A different analysis shows how two instructional technologies – which have been described in similar terms – afforded different courses of action. It is argued that this difference is of crucial importance for what experiences the students had and, hence, for what they learned.

INTERACTIVE EVENTS

Synchronous CSCL with Platine Environment

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Abstract: The development of high bandwidth Internet access allows bringing videoconferencing and synchronous communications to the users. This is a chance for distant collaborative learning activities. It becomes now possible to gather a group of distributed users and provide them an environment for exchanging information. In order to get full potential of synchronous interactions, communications should be structured and easy to set up. Contrary to traditional videoconferencing systems, synchronous CSCL environments do not only provide audio and video communications but they support the collaboration at a higher level. This interactive event shares the experience of Tokushima University (Raymond et al., 2004) and presents the benefits and challenges of synchronous CSCL. Participants will be able to test and use the "Platine" environment developed by the LAAS-CNRS (Baudin, Drira, Villemur & Tazi, 2004). The Platine environment is used for e-learning experiment in the Lab@Future European project (LabFuture, 2005). This environment proposes both communication tools (videoconference, chat, whiteboard and application sharing) and administrative tools to be able to define sessions, rights and control over the use of tools. This event describes how to create and configure a session. Then it presents how to join a session and use the different tools of the environment. This event is a chance for participants to experience the use of a synchronous distant learning environment. This event presents some of the problems encountered in the management of distributed users and the technical influence of network. It is a first step to define how educational staff can take advantage of synchronous CSCL for their educational activities.

Keywords: Synchronous CSCL, videoconferencing, distance learning

DESCRIPTION OF THE EVENT

The event is divided in four parts. The first part introduces synchronous collaboration concepts to allow uninitiated participants to keep up with the rest of the event. The second part introduces the synchronous collaborative learning environment called "Platine" and developed by the LAAS-CNRS laboratory in France. The different tools and the functional architecture are presented as a prerequisite to the manipulation of the environment by the participants of the event. The third part invites participants to use the environment. This manipulation is followed by a discussion with the participants in order to get their impressions about the Platine environment, to discuss about the different possibilities to integrate such environment in their curriculum and to share their vision on synchronous CSCL.

PRESENTATION OF SYNCHRONOUS CSCL

Different approaches of synchronous CSCL are seen nowadays. Synchronous communications are used for informal communication in Instant Messenging Software; they can also be used as a complementary tool for an asynchronous web-based learning system. Videoconferencing is mainly used as a way to communicate with distant sites or as an opportunity to generate interaction. Cultural exchanges and class activities involving videoconferencing are numerous. Several strategies are developed for the use of synchronous communications. This interactive event present a use of synchronous CSCL for distance learning as it is one of the most difficult scenarios to support. Users are distributed in different locations and they can only interact with the tools. The synchronous CSCL environment should support the collaboration and the social nature of the activity. This requirements deal with a broad range of fields such as Human Computer Interaction (HCI), network infrastructure and pedagogical aspects. Several environments are available to support synchronous activities (VRVS, 2004; NetMeeting, 2004). However, they do not always satisfy requirements of distance learning activities. Some limitations are found relative to the preparation of activities, joining an activity, awareness of the environment, the support of hierarchy among participants.

PRESENTATION OF THE PLATINE ENVIRONMENT

Two phases are defined within a session, respectively an *asynchronous* phase and a *synchronous* phase. When a session is created, it enters an asynchronous phase that is continuously active until the administrator deletes the session. In the asynchronous phase, the registered users are authorized to access independently the e-learning content of an experiment and to perform independently experiment specific applications. A session is created, configured and deleted by an administrator. The *administrator* is also responsible to start and end a synchronous phase. Once a synchronous phase is running, it is the responsibility of each user to explicitly join/leave this synchronous phase.

Besides the administrator role which is associated with the single user in charge of the management of the session (creation/deletion, configuration of the session), four additional user roles have been defined, which are respectively: *teacher*, *student*, *observer* and *expert*. Thus, a user, when registering in a session, authenticates him/herself with a specific role. This role determines the rights that the user will have for using the collaboration and communication tools available in the session. It is possible to associate one or several user with the capability to modify the rights on the tools during the synchronous phase.

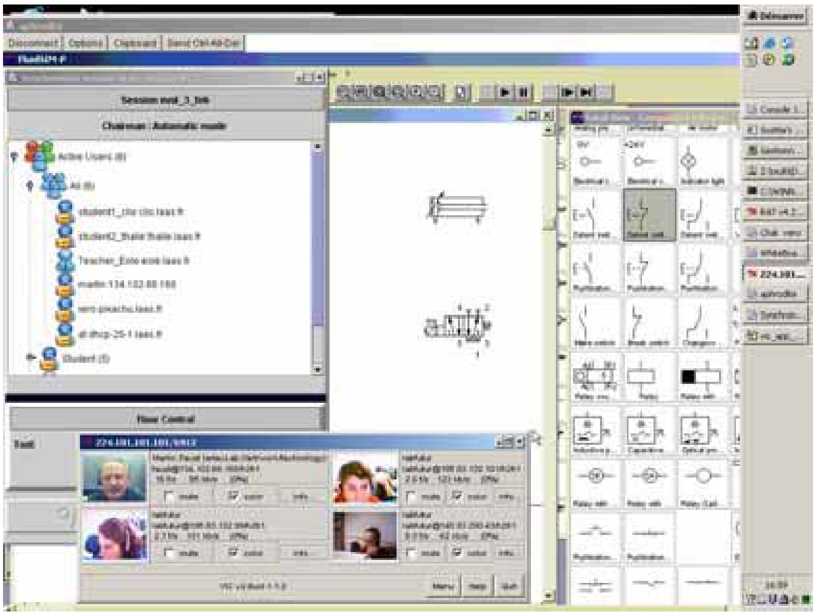

Figure 1: Screenshot of the Platine Environment

Traditional tools

The Platine environment provides tools that can be found in most synchronous CSCL environments (Fig.1):

a) Informal communication among users: These services allow users to communicate directly with each other while the collaborative activity takes place.
   - Multipoint video/audio conferencing: the Platine environment is provided with such a tool but other tools may be integrated and used instead.
   - Chat

b) Document sharing: These services allow users to concurrently look at the same documents and possibly to edit them in a controlled way.
   - Whiteboard: The PLATINE whiteboard allow to share the graphical document and to put annotation on them. A marker with the user's name can identify the author of the annotation.
   - Video streamer

c) Multi-user applications
   - Application sharing: This tool can be used to share applications stored on a server during a session (Server view). All the users see the execution of the application. Each user can also own an instance of the shared application, with his/her own data (User view). In both cases, the client side of the application-sharing tool represents a remote view of the shared application. Through the client interface, users can request and, if accepted, accomplish the remote control of the shared application.

Improved Tools

Being written in Java, the PLATINE environment is open and portable on both Windows and Linux platforms.

d) Session preparation: This tool provides administrators with an interface for creating and configuring a collaborative e-learning session. The configuration of a session includes the definition of several parameters, organization and technical parameters.

e) Session Registration: This tool provides an access point to the user.

f) Session synchronous phase management: This tool allows the administrator to open the synchronous phase and to start the tools servers available for the session.

g) Synchronous Session State display: This tool provides the users with information concerning the state of the session: user registered and their profile, tools used in the session and their users. It offers also a mean for a chairman to manage both users and tools during the synchronous phase: for example show or hide the whiteboard window for all users or for a selected user during the session.

INTERACTIVE USE OF THE ENVIRONMENT

Participants play the role of professors and students in a distance-learning scenario. One participant can create a synchronous session and define the profiles used in this session and the tools available. Then, he/she can start the synchronous phase of this session and other participants can join it. All the participants do a serial of small exercises with the tools of the environment. The roles are changed for all the participants to experiment the different roles. The global organization of the experiment is presented in Fig.2.

Participants can join the event with their own computer or they can watch the event on a screen as passive users. The software requirements and a user guide are accessible from the environment homepage (Platine, 2005). Participants are welcome to test the environment prior the event and during the CSCL conference by accessing the homepage.

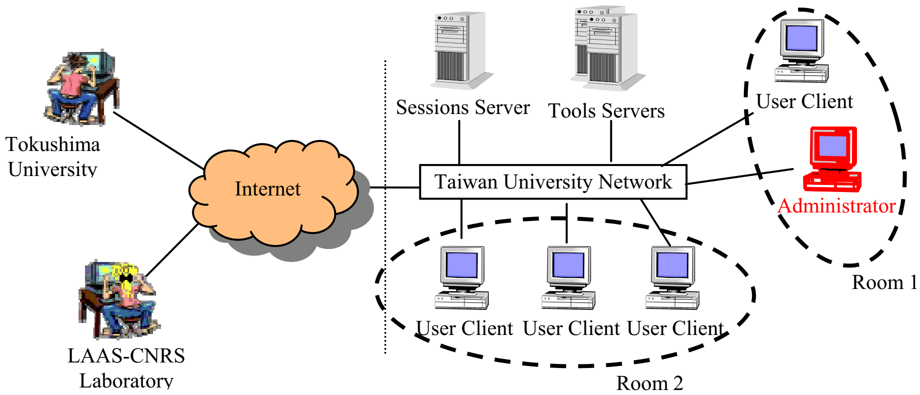

Figure 2: Architecture of the network

DISCUSSION

The organizers and the participants discuss about the experiment and define how they could use the environment in their curriculum. It is a chance for the organizers to know how to improve the environment and a chance for the participants to ask for improvements of the environment.

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BSUL: Basic Support for ubiquitous Learning

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Abstract. In this interactive event we would like to present the BSUL (Basic Support for Ubiquitous Learning) environment for supporting classroom activities with mobile computing devices. We have identified different routine activities that can be supported with web based IT in order to improve the teaching/learning experience and promote the cooperative and constructive creation of knowledge. These activities include: material distribution, students' response taking, report submission and formation of learning groups. The teacher logins through a laptop computer and the students through a PDA (personal digital assistant) for accessing the environment web site and making use of the proposed tools. As a usage example we will present a small survey with our response tool, and according to the participants answers separate the participants in groups for discussing about the "Heat Island Problem", a current global warming issue. We will ask our participants to fill in the conclusions of their discussion in our report submission tool, and present their results to the rest of the audience. If possible, we will also like to ask our participants to collect information on the topic from outside the conference room, such as voice and/or video recordings from other people.

Keywords: ubiquitous learning, learner modeling, support for classroom activities.

INTRODUCTION

Nowadays, with the rapid development of more useful mobile computing devices with wireless Internet access (Sharples, 2003), it is not adventurous to say that during the next years it will be common for students to bring one of these devices into the classroom, as an embedded tool that supports his/her learning process, the same way a pencil, a ruler or a calculator does (Ogata, 2004). In our ongoing research we have been involved in the creation of a classroom with embedded mobile technologies and web–based tools for supporting different tasks in this classroom. We would like to discover which learning patterns are the best scenarios to give ubiquitous computing support and the proper method to promote academic activities, both inside the classroom and outside the classroom during field tasks. For our purposes we implemented an ubiquitous learning environment called BSUL, which supports different redundant activities like attendance taking, material distribution, students' response taking, report submission, formation of learning groups according to the learner models, data gathering, etc.

According to Hoppe (2003), there are some goals that must be achieved to successfully support the teaching/learning process inside the classroom with mobile devices:

- All users need to have access to knowledge resources in many formats and from diverse information sources;
- Ensure that the developed technology do not interfere with the natural flow of the learning process, but facilitates and promotes it;
- The system should not be the basis of the educational scenario, but only a background tool, similar to the common use of paper and pencil;
- Exploit the learning process digital results (notes, learning material, etc.) by replicating, distributing and reusing it.

Currently we are in the evaluation process of the usability and performance of our environment, and we would like to present one of our supported interaction pattern that involves the creation of learning groups, and promotes the discussion and collaborative creation and acquisition of knowledge on the topic of "Heat islands problem", a contemporary global warming issue. Some of our participants may be acquainted with the subject and can contribute with their own knowledge, while others may discover the causes, consequences and possible solutions for this serious concern.

INTERACTIVE EVENT

Objective

The main objective of this event from the participants' standpoint is to interactively take part of the research and development we are conducting, and from ours to obtain their comments and feedback. We hope hat by this means, both the participants and organizers could benefit from each other's ideas and experience.

Description

During the first part of the event, the participants will be given a PDA for the event purposes, then listen to a presentation about the environment, the means of interaction with it and the objectives of the event. Next, the participants will answer a small survey on the subject of "Heat Islands Problem", intended to gather information about the participants and create learning groups according to their answers and profile. Subsequently, one of the organizers will give a quick lecture on the same subject and the participants can download the electronic materials from the environment server into their mobile device. These materials include different resources from the Internet in Microsoft Word, Adobe Acrobat, and/or JPG image, file formats. Afterwards, the participants will discuss within their respective group and collect external information by interviewing other people outside the event place. The participants will submit a report with the results of the discussion, and one member of each group should present the results to the rest of the audience. (Fig. 1)

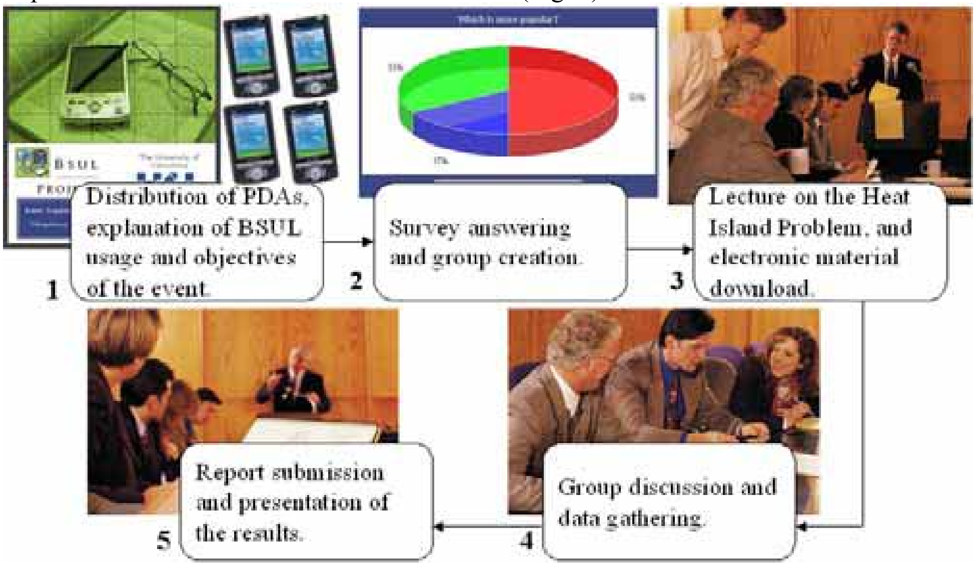

Fig. 1 Event activities

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Connecting Collaborative Communities of Learners

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Abstract. This interactive event aims at providing participants with insight into diverse educational networks in primary and secondary education, in which international CSCL is put central, collaborations between networks, the activities and projects involved, and the culturally diverse ecologies in which actors are situated. The networks' structure and its activities are represented using concept maps. Real interaction with educators in different parts of the world is facilitated, using a.o. Active Worlds.

Keywords: international CSCL, school networks, concept maps, Active Worlds.

INTRODUCTION

Computer Supported Collaborative Learning (CSCL) aims at enhancing collaborative processes in educational contexts. The ability to create intersubjectivity among learners and among teachers' teams even at a distance is increasingly considered as a fundamental aspect in innovating learning processes, especially when a socio-cultural vision of learning is embraced (Talamo and Fasulo, 2002; Ligorio, Talamo and Pontecorvo, in press). Educational network organisations, in which CSCL is put central for learners' and educators' activities within primary and secondary education, exist since the late eighties of the last century (Sligte, 1989). One of the early initiatives was the European Schools Project (ESP). Within the European Union school networking activities only arrived on the official policy agenda by 1998. As a consequence 'Comenius 3' networks were co-financed by the European Commission. One of them was the European Collaborative Learning (ECOLE) network. In 2003 the World Summit on the Information Society (WSIS) started on the occasion of which the Global Schoolnetworks Alliance (GSN-A) was brought into life, in which both ESP and ECOLE participate (Sligte and Talamo, 2003), as well as the Pilipinas SchoolNet. In 2005 collaborations between these three Asian and European networks started, co-funded by the European Commission. In addition to learning from and with each other, research is part of the evolving activities between educators and learners. This research can be characterized as reflective action research, aiming at producing (educational, intercultural and organisational) glue between the highly diverse parts of the loosely coupled networks (Ligorio, Talamo and Simons, 2003). This research builds on frameworks developed in European research and technology development projects, like Innovative Technology for Collaborative Learning and Knowledge Building (ITCOLE), (Emans and Sligte, 2003, Lakkala et al, 2001, Ligorio et al. 2001, Talamo and Ligorio, 2003 a and b).

AIMS

This interactive event aims at providing CSCL2005-participants with insight into these networks, the activities and projects involved, and the culturally diverse ecologies in which actors are situated. Participants (also diverse in backgrounds) will be able to see all information, represented orderly in a collapsible concept map, and linked to information on web sites. They can add their own questions and/or information to the concept map. Through the concept map, participants will be able to send questions by email to people involved in a particular project. This permanent presentation is supplemented by a few short events: a few presentations of projects involved, a chat session with people from the network organisations. The organisers aim for including another representation of the collaborative networking activities and their outcomes: collaboratively building with participants a world within Active Worlds. Results of the Interactive Event will be presented at the closing event of the WSIS, Tunisia, November 2005.

LEARNING OPPORTUNITIES

Regarding educational network organisations in which CSCL is put central for learners' and educators' activities within K-12, the participants will:

- gain insight into a few large network organisations and their history: ESP, ECOLE, GSN-A and the collaboration between European and Philippine networks;
- get acquainted with the ways in which collaboration takes shape within these networks;
- learn about the cultural and linguistic opportunities and constraints of transnational collaborative learning, while being able to pose questions synchronously and asynchronously;
- get acquainted with a number of projects that have been implemented within these networks, both recent and older projects;
- get answers to the questions that they pose to people involved in these networks;
- get introduced to new ways of doing research into these complex, diverse and dynamic social systems.

DESCRIPTION OF THE INTERACTIVE EVENT

The event consists of a permanently available digital interactive presentation, combined with a number of short events.

Ongoing interactive presentations

A participant can sit behind one of the 2-3 computers that are available at the stand. As a first step, the participant can get an overview of the network organisations, their history, and the projects involved. On the screen, a collapsible concept map is visible, which shows the network organisations, their history and the projects involved. The concepts in the concept map bear names of topics and projects, such as 'the eighties', 'structure of the ECOLE network', 'the Teentour project on Olympic sports'. All topics and projects are presented orderly in branches that can be collapsed or expanded. These maps are made in a concept map or mind map program, like Inspiration or FreeMind. During breaks in the conference main program, the organizers will be present at the stand, answering participants' questions, guiding them in exploring the concept map, and encouraging them to provide their own input to the concept map.

If the participant is interested in a particular project, he/she can read the information in some of the concept nodes, or he/she can click on specific nodes to access information on the web, e.g. information on a particular project. Information will be available on some older projects as well. In that case, there will not be a link to a website, but there will be links to texts written on a particular project.

In addition the participant can click on a number of email addresses in the concept map, which are attached to some of the projects. The questions that are sent by participants will be answered quickly, within a few hours, depending on global time differences. Those involved with these network organisations and the projects are available for answering these emails during the conference.

Finally, the participants will have the possibility to provide input by themselves. Participants will be able to put their comments and additions to the concept map. The organizers of the interactive event will take care that the concept map remains well-ordered. In addition to expanding the concept map, a 3-dimensional world will be built with Active Worlds. Actors all over the world are connected to the World and will add to it during the CSCL-conference.

Short events

In addition to the possibility of engaging in this permanent presentation, participants will have the possibility to join a number of short events.

At a number of occasions, one of the organizers of the interactive event will give a short introduction (around 10 minutes) into one topic or one of the projects. The aim of these introductions is to persuade participants to look at the concept map, to ask questions either to people involved in the projects or write them down in the concept map, and to supplement the concept map.

At a number of occasions, synchronic communication will be possible with persons who have been involved with the organisation of one of the networks or with one of the projects. These also will be short sessions of around 10 minutes, in which participants can ask their questions. This will be done using a chat program. The answers will be saved and incorporated into the concept map.

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Collaboratories – a perspective for multilingual collaboration

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Abstract. Two European Union projects with associated research focus have laid the basis for a rich portal providing infrastructure for collaborative work: games, creative tools, networking microworlds on different themes for children of different age groups. One of the research questions aimed to investigate: with whom, how and what kinds of knowledge could children with multilingual backgrounds learn at a distance and how best can they be supported. The event describes the main features of the projects, allows tasting the issues arising in such circumstances through practical attempts of iconic communication and gives place for analysis and discussion of value of such collaboration.

Keywords: picture communication, multilingual, self-expression

INTRODUCTION

Two European Union projects with associated research focus have laid the basis for a rich portal providing infrastructure for collaborative work and investigations of analyzing trails of activities and collaboration.

Collaboratories, or for short "Colabs" is a two year Socrates Minerva project that is to provide infrastructure for collaborative work providing answers for guiding research questions: with whom, how and what kinds of knowledge should children learn at a distance and how best can they be supported in this learning; and to develop learning tools that can be transferable into several domains. (http://matchsz.inf.elte.hu/colabs/)

"Kaleidoscope" Network of Excellence FP6 project aims to integrate existing research to develop new concepts and methodologies from a multidisciplinary and cross-cultural perspective that includes novel computational solutions to "Technology Enhanced Learning" environments that are adaptive, knowledgeable, cognitively sensitive, pervasive, multi-modal and personalized. (http://www-kaleidoscope.imag.fr/pub)

MULTILINGUAL PERSPECTIVE OF THE PROJECT

We used Imagine™ as authoring tool, which takes learners to the leading edge of what is possible with digital technologies. Imagine™ (http://www.logo.com/) is an open and flexible learning environment and authoring tool with complex tools for painting, animating, web authoring, creating multimedia, using speech input/output as well as Logo programming. All partners produced a localized version using their own mother tongue version as script language.

A major challenge of ICT and ODL in the 21st. century is to find ways to support children in building and testing models collaboratively across European cultures and beyond, where they will not just talk to each other across the net, or simply share information but be engaged in long term planning, construction and debugging. Communication plays an important role in collaboration, thus the elements, ways, methods, and forms have to be mastered in order to facilitate self expression. The need for new multicultural, multilingual and multimodal approaches to computing, learning and communication is crucial. We researched a model of e-learning platform and produced active web materials that provoke children, teachers, tutors and parents to act collaboratively on a networked learning environment.

THE COLABS PORTAL

The Colabs portal is developed using modified modules of PhP-Nuke (www.PhPNuke.org), based on the needs (functionality, services, authentication, multilingual support, …etc.) and possibilities required by the project. (See description in Workshop at Eurologo within paper "Collaboratories".)

The site is configured to hold activities – guided through activity maps - and functionalities in several languages, thus the user can choose to use the language well understood. There are of course different levels for exchanging ideas.

Levels of communication and exchange

- **Basic communication level -** based on a common written language: The *Brainstorming* area provides some microworlds that raise topics to exchange ideas on, write composition about, give ideas and comments for improvements of projects. Children use Internet translators to figure out messages in different languages.
- **Picture communication level -** through iconic language: *Word wide encyclopedia* area provides a starter set of words in different languages explained using pictures or animations. There is a predefined standard in the definitions since nouns are explained by using colored pictures, adjectives by black and white abstract pictorial symbols, verbs by animations and prepositions by using black and white symbolic expressions. The collection of words is chosen in order to give a starting set to express an introductory on oneself using international understandable symbolism. The symbols can be further extended by children within the same predefined standard and also used within I want to tell you authoring microworld, which allows the production of international "text" that can be published as Internet pages.
- **Expression level -** based on products created using given tools: The *Creative tools* area, where users can express themselves using the tools in various modalities and exchange their works with others to comment. All tools are designed in a standard way, to allow transfer of creations through the Clipboard and ease users by providing nearly the same functionality.
- **Add-on level -** based on extension or modification of special features: New tool elements can be downloaded from the server, or a bit more advanced users can create such element and send them to the forum to share with others. These allow change of special functions in which case the tools region changes to contain different elements to experiment with.
- **Authoring level -** based on communication through Imagine scrip: The *Exchange games* area, which provides educational games, which can be easily modified to change content, topic or subject and thus provide a frame for developing further games on different domains.
- **Networking level -** connecting users synchronously: Most of the Creative tools could also be used in a collaborative way on-line functioning as a white-board, allowing children to exchange functional elements and express themselves collaboratively.

ASSOCIATED RESEARCH

Data produced while using the Colabs portal: trails in activity maps, messages, e-mails, forum contributions and full conversation with the chat tool are logged. Analysis of log files is under way. Further developments aim at realizing the following maps:

- *Individual Knowledge Map:* Individual map of each user shows the visited nodes, number of hits and time spent there, logs of paths taken during their visit.
- *Activity Map:* AM is constructed from individual logs. It shows all visited LOs, how many times they have been visited, how the microworlds were evaluated (by votes of users), who visited them, what works were uploaded, what discussions arose concerning each activity.

A specific research questions arises apart from the global research questions formulated by the separate projects concerning multilingual activities:

- What kinds of activities are possible on an international level?
- What kinds of collaborations could emerge between participants on an international level?
- What kind of support is needed for international activities to arise?

ENVISAGED ACTIVITY AT WORKSHOP

The workshop describes the main features of the projects, allows tasting the issues arising in such circumstances through practical attempts of iconic communication and gives place for analysis and discussion of value of such collaboration. The following activities will take place:

Introductory workshop

Presentations of activities of the two projects described, looking at types of activities and associated collaboration that can be traced by looking inside the portal containing existing traces of work from projects launched at the beginning of the year. Participants get log-in accounts and discover Colabs portal, get to know tools and their use and assignment for the asynchronous event throughout the conference:

- *“Telling you in pictures”:* Composition of a popular story or event using picture icons and also in written English. Only iconic interpretation is published for others to figure out. Anyone can continue story likewise.
- *“Re-interpretation”:* Production of piece of art or digital picture with some kind of meaning to be published. Participants have to re-interpret meaning by leaving about 1/3 of the original work untouched and giving it an alternative meaning for publishing.

Participants will be provided with PCs or can use their own laptops.

Asynchronous part

Participants who have log-in to Colabs portal can access the portal any time during the conference and can create their own contributions for upload to server, write comments and work on with other contributions collaboratively.

Final presentation part

Submitted contributions will be presented and discussion will take place on various difficulties and analysis of collaborations.

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Open source virtual learning environments
– experiences from the VO@NET project

VO@NET

CSCL 2005 INTERACTIVE EVENT

OVERVIEW

The open source movement has gained more and more attention in the last couple of years. For educational institutions and various purposes a range of open source virtual learning environments have emerged and evolved into capable systems with rather unique possibilities; for example the possibility of reshaping the system and adapting it to the local pedagogical practice. The interactive event on open source virtual learning environments will present a number of open source virtual learning environments and analytical models to assess these from a CSCL-standpoint in relation to the participants' own organizations/institutions. Participants will be involved in hands-on experiences with the open source systems, dialogues and sharing of experiences with participants from the EU-funded VO@NET project[1] (Virtual Open Access Network for Education and Training - Enhancing Interconnectivity between European and Asian Universities), who have participated in and constructed e-learning courses in an open source virtual learning environment. The VO@NET project aims to establish a virtual network to advance information exchange, increase communications, improve networking and develop joint courses and curricula through the introduction of new technologies to existing networks in Asia and Europe. The project targets higher education students and academics within the areas of environment and development at universities in Malaysia, Thailand, Spain and Denmark. During the VO@NET project a number of successful online courses have been created in a complex, intercultural collaborative environment. With emphasis on the collaborative aspects, the design of these courses and the significance of the open source virtual learning environment will be discussed. Furthermore the event participants will have the chance to try out and experiment with the VO@NET courses. Finally, participants will be involved in the elaboration of the analytical models for both evaluating the sustainability and viability of open source virtual learning environments and identifying the suitability of the pedagogical design of the learning environment in relation to their own local pedagogical practice.

EVENT OBJECTIVES

The interactive event on open source virtual learning environments will give participants;

- An introduction to and hands-on experience with various open source virtual learning environments and a chance to engage with the actual VO@NET e-courses
- An introduction to analytical models to assess the feasibility of adopting an open source virtual learning environment for courses seen from a CSCL-perspective – especially in relation to the participants own organization/institution, covering topics like;
  - What are the benefits and drawbacks when using open source as platform for a virtual learning environment?
  - What institutional and pedagogical criteria for making an informed decision in relation to identifying and choosing a productive open source learning environment are important to assess?
- A chance to engage in dialogues and sharing of experiences with teachers and students from the EU-funded VO@NET project, who have participated in and constructed courses in an open source virtual learning environments
- A chance to engage in dialogues on course design in open source virtual learning environments
- A chance to elaborate the analytical models in regard to their own local pedagogical practice
- Access to a repository of materials and information on the field of open source virtual learning environments

[1] For further information on the VO@NET project please see: http://www.voanet.dk

EVENT DESCRIPTION

The interactive event on open source virtual learning environments will take point of departure in an analytical model for evaluating the sustainability and viability of an open source virtual learning environment and for identifying the suitability of the pedagogical design of the learning environment in relation to the local pedagogical practice. The introduction will be followed by a hands-on session where event participants will get a chance to try out and experiment with e-courses developed for the VO@NET project and a number of open source virtual learning environments. The session will include dialogues and sharing of experiences with the teachers and students from the VO@NET project and will allow for conference participants to give constructive critique of course designs or the open source virtual learning environments chosen for the courses.

The presentation of the analytical model and the hands-on session will give the participants an overview of open source virtual learning environments, as to contextualise the subsequent discussions. Secondly it will be the starting point in the discussions on pedagogical design in open source virtual learning environments. From this it is envisioned that a mutually enhanced knowledge on the applicability of incorporating open source virtual learning environments in both event organisers' and participants' organisations and other projects will emerge. Hence, the focus of the event is dual:

- *Open source* virtual learning environments
- *Pedagogical/didactical design* and construction of e-learning courses in such environments

The subsequent joint discussion will explore the implications of using open source virtual learning environments on the pedagogical/didactical design as participants from the VO@NET project share their experiences with using an open source virtual learning environment as their course platform. Emphasis will be on the collaborative aspects and how to design for collaborative learning and knowledge sharing when using open source virtual learning environments. Organizers and event participants will address the following issues on basis of the proposed analytical models:

- Will the use of open source systems have special implications for pedagogical/didactical design?
- What implications might open source systems have on the sustainability and viability of the e-learning platform?
- How to design for collaboration – barriers and possibilities?
- Are design challenges different for collaborative learning and knowledge sharing when using open source virtual learning environments?

EVENT PROGRAMME

Schedule	Content
0,0 - 0,5 hours	Introduction to analytical models for evaluating the sustainability and viability of an open source virtual learning environment and for identifying the suitability of the pedagogical design of the learning environment in relation to the local pedagogical practice
0,5 - 2,5 hours	Hands-on session where event participants will get a chance to try out and experiment with e-courses developed for the VO@NET project and a number of open source virtual learning environments. The session will include dialogues and further sharing of experiences with the teachers and students from the VO@NET project.
2,5 - 4 hours	Joint discussion among organizers and event participants on event themes: - *Open source* virtual learning environments - *Pedagogical/didactical design* and construction of e-learning courses in such environments The discussion will address the following issues: - Will the use of open source systems have special implications for pedagogical/didactical design? - What implications might open source systems have on the sustainability and viability of the e-learning platform? - How to design for collaboration – barriers and possibilities? - Are design challenges different for collaborative learning and knowledge sharing when using open source virtual learning environments?

INTENDED AUDIENCE

Researchers, policy makers and practitioners interested in Open Source, Virtual Learning Environments and e-course design

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‘Say it out loud in writing’: A dialectical inquiry into the potentials and pitfalls of computer supported argumentative discussions

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Abstract. The objective of the interactive event is to demonstrate potentials and pitfalls of computer support for argumentative discussions. The emphasis is on one specific kind of computer support, i.e. shared workspace systems. The participants get acquainted with the Digalo tool that has been implemented and evaluated in a large number of real life classroom experiments. We introduce two pedagogical methods for supporting argumentative discussions. Through a process a dialectical inquiry the participants identify and discuss ‘conflicting’ assumptions behind the two pedagogical methods and the consequences of their application in educational practice.

Keywords: Shared workspaces, Argumentation, Representational tools, Secondary school

INTRODUCTION

The objective of the interactive event is to demonstrate *potentials and pitfalls of computer support for argumentative discussions*. The participants in the event will get acquainted with two pedagogical methods or scenarios for supporting argumentative discussions. A pedagogical method is a general approach that guides the activities of a group of learners towards the achievement of certain learning goals. It consists of a basic set of goals, values, beliefs and assumptions about collaborative learning that become actualized in practical models and guidelines. Both methods use the same tool – the Digalo – that has been developed by the DUNES project team. Two of the DUNES partners – Utrecht University and the Hebrew University of Jerusalem – will share their experiences with Digalo supported argumentative discussions.

Throughout the DUNES project, the partners were confronted with several choices with regard to design and implementation of the tool. Although the partners used the same tool, they slightly differed with respect to the application of the tool within actual classroom settings. These differences can be traced back to the educational systems of both countries and to divergent research orientations. It resulted in a number of pedagogical methods, of which two will be addressed in the interactive event.

The interactive event is organized in the form of a ‘dialectical inquiry’. The philosophy behind dialectical inquiry is that a deeper understanding can be achieved when different – and sometimes conflicting –assumptions and consequences are subject of discussion. We believe that the complexity of CSCL requires such a discussion between researchers, designers and practitioners. Often, the assumptions behind CSCL research are not made explicit, which hampers the development of new and useful insights into the theory and practice. A discussion that is based on constructive conflict may lead such new insights and a more thorough understanding.

During the interactive event, the participants identify and discuss the assumptions behind the two pedagogical methods and the consequences of their application in educational practice. The interactive event proceeds in three phases:

- **‘Thesis’:** One of the partners presents his/her pedagogical method for supporting argumentative discussion. First, the partner gives a short presentation about the method and its underlying assumptions and consequences. Secondly, some participants take part in a short Digalo supported argumentative discussion, while other participants act as observers. Thirdly, participants share their experiences during a short group discussion.
- **‘Antithesis’:** Similar to the format used in the previous phase, the other partner introduces his/her method. The partner starts with a short presentation after which the participants take part in a short Digalo session that is based on the method introduced. This phase also ends with a short group discussion.

- **‘Synthesis’:** During the synthesis phase the two partners offer an overview of their research findings. The present a micro-analysis of Digalo mediated interactions and their consequences for collaboration and learning. The synthesis phase ends with a discussion in which the participants address some ‘conflicting’ assumptions. Some of these assumptions refer to the tool – e.g. notation system – while others refer to other aspects of the learning environment, e.g. the role of the teacher.

DIGALO MEDIATED ARGUMENTATIVE DISCUSSIONS

In the remaining part of this paper, we briefly discuss some of the topics that will be addressed in the interactive event.

Shared workspace systems

The Digalo can be characterized as a *shared workspace system* based on a concept-mapping interface that spatially represents textual contributions and their interrelationships (figure 1). The Digalo is designed to support argumentative discussions in the classroom. Besides discussing face-to-face, students can also discuss in the shared workspace of the Digalo. When the students interact in the shared workspace, they put forward their contributions by selecting a specific type of contribution from a pre-defined notation system. The Digalo also offers the students the possibility to link contributions visually by drawing a line between them. The notation system can be configured so that it closely fits a specific kind of discussion, for example an argumentative discussion.

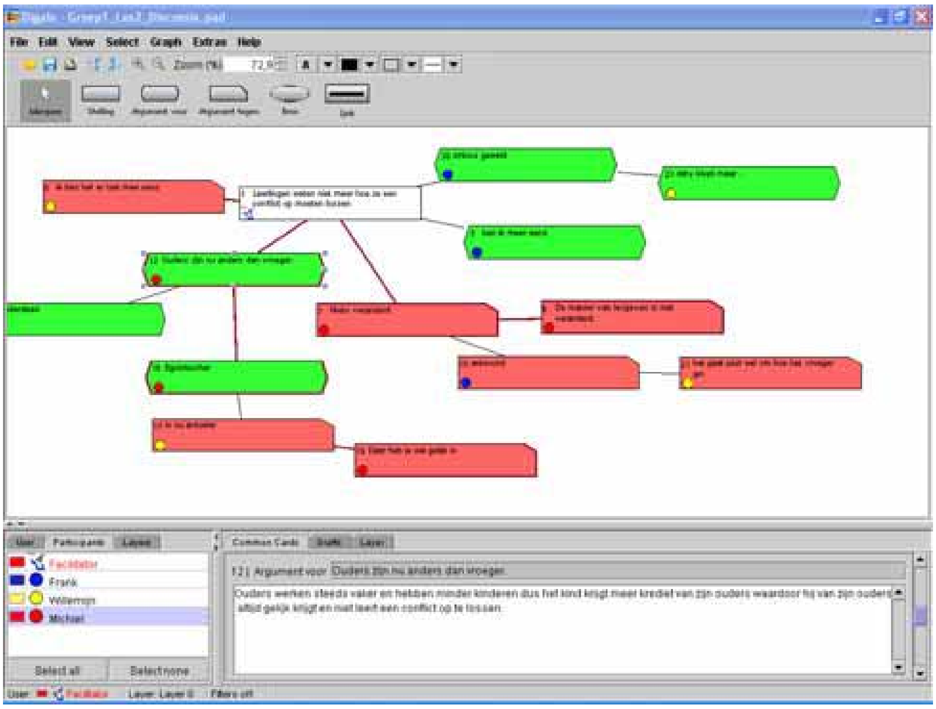

Figure 1: The Digalo user interface

The Digalo can be compared and contrasted with on-line technologies. These on-line technologies support collaboration between students who are dispersed in time and/or place. In the latter case, networked computing seems to have a direct added value. However, in regular – secondary – school practice, most collaborative learning takes place between students who meet face-to-face. One of the challenges of the DUNES project was to provide these students with the appropriate support for their collaborative activities.

Argumentation in the digalo

Argumentation is the social practice of reasoning systematically about an idea, believe, action or theory. The Digalo aims to support this kind reasoning. It provides the students with an ‘ontology’ that differentiates on particular aspects of an argumentative discussion. The concept of ontology is used to ‘prescribe’ how an argumentative discussion should proceed in the classroom. The ontology of the Digalo is, for example, visible in its notation system. That notation system consists of several descriptive labels to characterize textual contributions.

The notation system of the Digalo was configurable. Both partners used a number of different notation systems and examined how the process of reasoning proceeded within the group of students. In some case, the notation system was configured in such a way that it closely matched the normative models for argumentation defined by argumentation theorists. For example, students could choose between contribution types as claim, argument in favor, argument against or ground. It was assumed that such a notation system should encourage students to reason from a specific standpoint. In other cases, the students were offered a notation system that encouraged them to elaborate on each others ideas by asking questions and giving comments. During the interactive event, the participants will explore and discuss these contrasting situations. Besides the labels, the partners also varied the number of contribution types. Research indicates that all these aspects influence the process of argumentation.

Adaptive structures

The Digalo environment may facilitate the co-construction of knowledge by structuring the interactions between students. Such a structure is always both constraining and enabling. It promotes the occurrence of certain actions while it inhibits the occurrence of other actions. However, in itself, the structural features of the Digalo tool do not provide much insight about their effects on students' discourse. Students' appropriation of these features in practice determines their effect on learning. The technology may take on new forms through a process of appropriation. Both partners studied the process of appropriation. For example, research indicates that students do not use the contribution types 'correctly'. The process of appropriation seems to be a key for understanding knowledge sharing and the co-construction of knowledge.

Behind every tool stands a method

The introduction of Digalo in the classroom is by no means a guarantee that argumentation will occur. Other aspects of the learning environment are of importance too, like the type of task assigned to the students, the teacher or prior knowledge and skills of the students. These aspects –as well as the configuration of the tool – affect whether or not any, and what kind of argumentative practice will occur when students work with the Digalo. To guide the students through their argumentative practice, each partner developed their own method for Digalo supported argumentative discussions. Comparing these two methods and their practical consequences is the central issue that will be addressed during the interactive event.

OUTLOOK

The Digalo offers students an environment that enables them to put forward, organize and relate their knowledge. The Digalo seems well promising for enabling knowledge sharing and the co-construction of knowledge. During the DUNES project, we found out that this to be true in some situations. However, in other situations our findings did not answer our expectations. It was only through an ongoing discussion that we came to a deeper understanding and were able to identify the potentials and pitfalls of our approach towards computer supported collaborative learning. The objective of the interactive event is to reflect on this discussion and – with the aid of the participants – to bring that discussion a bit further.

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STUDENT COMMUNITY

Evaluating Think-Peer-Share (TPS): a hybrid instructional model combining on-line mutual evaluation and peer instruction with interactive response systems

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Abstract. The purpose of this evaluative study was to determine the effectiveness of a hybrid instructional model, called Think-Peer-Share (TPS) that combines the important features of traditional classroom instruction (classroom, instructor, textbook) with those of computer-mediated learning (learning by performing rather than listening, frequent assessment and feedback). In combination, the model is distinguished from either distance or traditional instruction, and can be employed in traditional classrooms with interactive response systems (IRS). Both the TPS model and the traditional approach will be used to teach a 6-week general physic course, the objective of which was to improve students' academic performance of concept knowledge and problem solving skills, as measured by grade point averages(GPAs). Results of using the two approaches and comparing them with one another and to a matched control group experiencing neither yielded an overall significant difference as well as significant differences between each condition. The expected results are that students taught using TPS achieved the highest GPAs, relative to past performance, while those not taught achieved the lowest, with conventionally taught students in between. The hybridity of the TPS model provides students both structure and opportunity for involvement in the learning process.

Keywords: Computer-mediated instruction, Pedagogical issues, Higher education

INTRODUCTION

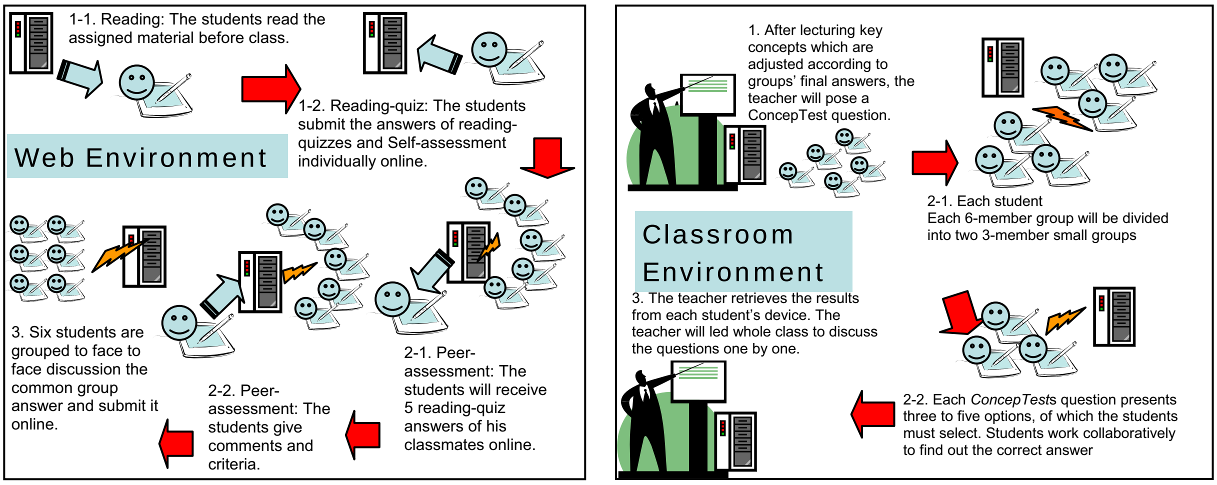
The critical element in technology-enhanced instruction is the nature of the instructional model, in particular, the extent to which it incorporates the unique advantages of the technology rather than simply mirroring that of conventionally taught courses. The instructional model that was the subject of this evaluation study is called Think-Peer-Share (TPS). This model for teaching a general physic course is a form of ''hybrid''. It combines important features of traditional classroom instruction (i.e. required attendance, a printed textbook, presence of an instructor) and those unique to computer-based instruction (i.e. class time spent doing computer-mediated activities rather than listening to lectures, a large number of performance activities rather than just two or three exams). These features are blended together throughout the entire period of instruction.

In these days, lecturing remains the primary instructional method in higher education, but not always acceptable. A pedagogical model, named Peer Instruction (Mazur, 1997&2002), is adopted in TPS model. Peer Instruction is an interactive pedagogical model that asks students to think and discuss with each other in class, and it could helps students better understand what have been taught in class. This pedagogical model involves students in the classroom context. But interaction between the teacher and students is limited because organizational and time constraints associated with the communication in class. Therefore, TPS model proposes an approach to support and extend Peer Instruction to fit individual lecture styles easier by using IRS. EduClickII is adapted in the model. This approach is implemented and tried out in a university general physics course.

Pre-class reading plays an important role when students attending discussion in class. In previous study, students need guidance when they read textbooks and assigned materials before class, and wish to have teammates' discussion. While technology has played a major role in distance education, its role in campus-based instruction has been minor by comparison. There is no reason why on-line learning should not become more mainstream in campus courses, not merely as an occasional alternative for convenience purposes, but as an integral part of the instructional design. Therefore, mutual evaluation has been designed to support students on pre-class reading assignments. The TPS model represents a way that this can be accomplished, and the effectiveness of this model will be tested in this study.

THINK-PEER-SHARE (TPS): AN ACTIVE AND COLLABORATIVE PEDAGOGICAL METHOD

The TPS pedagogical method and systems are proposed to apply in pre-class (Figure 1(a)) and in-class (Figure 1(b)) learning environment.



(a) Pre-class (b) In-class

Figure 1. Think-Peer-Share learning flow

There are three pre-class phases. Students all work on a web-base system to transfer data between each other and the teacher. First, all students have to read assigned materials and commit individual answers of several related open-end questions with grading themselves according to a criterion (Table 1) on-line. Second, after students commit individual answers, students will be arranged in groups of six. Each student could see other five students' answers without names, and anonymously grade their answers according to the same self-assessment criterion on-line. Third, after mutual assessment, students would be told who are in the same group. Students could always form as a study group and discuss assigned questions and grades with each other. Each group has to commit group answers on-line. And the teacher will comment and correct these groups' final answers.

Table 1. Scoring Rubric to Evaluate Student s Prior Knowledge

Score	Level description
1	Does not know how to answer the Reading Quiz question.
2	Try to answer the Reading Quiz question but show minimal accurate prior knowledge to assist in answering. Does not use any information from the text or lecture notes to answer the question. May reveal misconceptions about concepts. (Incorrect answer)
3	Show some prior knowledge and may use terminology to answer the Reading Quiz question. Does not use appropriate information from the text or lecture notes to answer the question. (May be partially correct but still incomplete).
4	Answer the Reading Quiz question correctly and completely. Incorporate information from the text or class notes into the answer. May look for answer outside the class (web, etc).

At the pre-class phase, students access the assignment on web-based system. Students can use his Desktop computer, Tablet PC or notebook in any place such as dormitory, classroom, home or library to access the web server to complete these assignments before class. And at the in-class phase, students use their mobile device such as Tablet PC or PDA to process the mobile collaborative learning activity through the wireless network to access the activity server in classroom. The students can work face-to-face in group without mobility restrictions, and take advantage of the information supplied by the net. It is of critical importance to transfer information effectively from the handheld network to the social network.

There are also three in-class phases. First, the teacher will lecture key concepts which are adjusted according to groups' final answers of pre-class phases. Second, each 6-member group will be divided into two 3-member small groups. Each student with a handheld computer should answer a set of multiple-choice ConcepTest questions collaboratively. Each group could answer in their own pace. Each ConcepTest question presents three to five options, of which the students must select. Given that the goal of the phase is to ask students formulate their own answer, the group is not allowed to advance to the next question without answering the current question correctly. If the question is not answered correctly, the application "marks" and disables the alternative that has been incorrectly selected. The students are then obliged to select a new alternative from the remaining ones. In the event of several errors, the only remaining enabled choice will be the correct answer. While answering the questions, the members of each group should debate and then come to an agreement on the alternative that their group will select. If the members do not agree on an answer, and enter different responses on their individual handhelds computers, the application requests that they come to an agreement and returns to the same multiple-choice question (Figure).

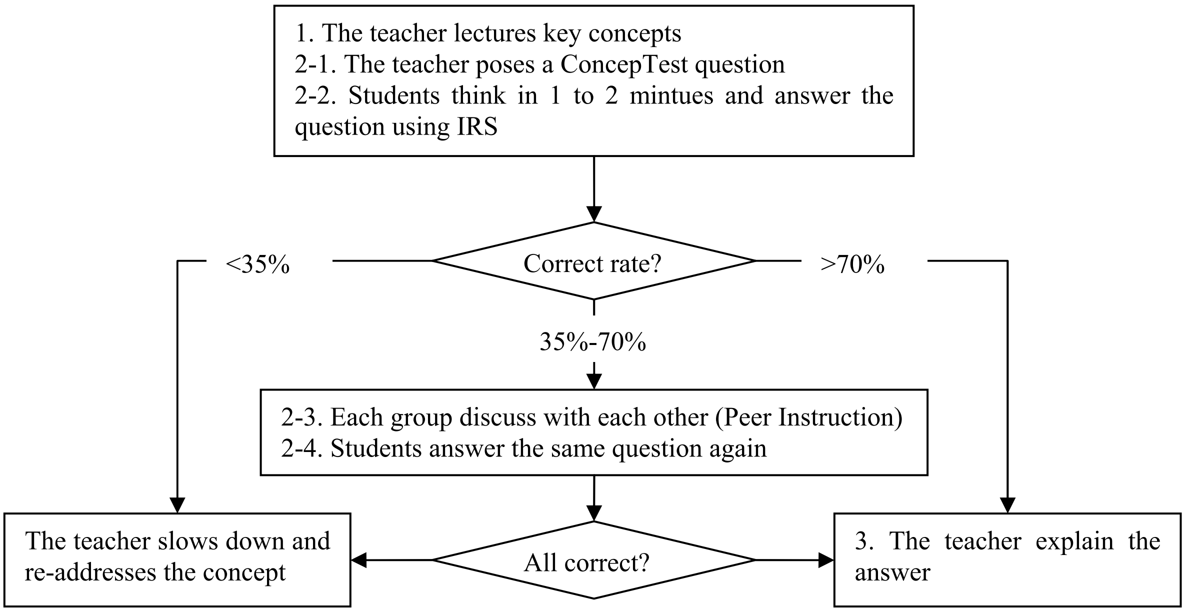


Figure2. The second in-class phase

This phase encourages discussion both within the group of students and with the teacher, with the goal of understanding differences and errors committed while responding to the questions. In addition, students have various resources available to them while they attempt to answer the questions, including notebooks, educational textbooks, and guidance of the teacher. As such, the activity encourages them to modify their existing knowledge schemes and acquire new ones. At the period of in-class phases, the teacher's device wirelessly retrieves the students' results. With this data, reports can be generated to show the teacher the achievement of the students with respect to each question and subject area. These results provide a rapid and trustworthy analysis of the students' knowledge level with respect to the materials presented in class and allow the teacher to take the necessary measures to reinforce the students' weakest subject areas. At third phase, the teacher will led whole class to discuss the questions one by one.

The final in-class phase is that teacher led whole class to discuss these questions. Generally a brief explanation suffices because nearly all students are persuaded of the correct answer in the group discussion.

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The application of augmented reality in chemistry education- A case study of the Protein Magic Book

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Abstract. Augmented reality (AR) is a developing technology, which generates three-dimensional (3-D) animations, and provides an interactive interface allowing users to work in the real world and handle animated 3-D objects at the same time. The purpose of this study is to discover the strengths and weaknesses of AR application in chemistry education, and the Protein Magic Book will be the case. High school students will learn protein concepts in the following scenarios: lecture only, individual learning with the Protein Magic Book, and collaborative learning with the Protein Magic Book. Through this study, it is expected to explore how students interact with the Protein Magic Book in different settings, and how they interpret representations and content, thus providing suggestions in improving the Protein Magic Book to facilitate chemistry learning.

Keywords: Augmented reality, chemistry education, interface design, collaborative learning

INTRODUCTION

Chemistry education is characterized by using representations or visual tools to transform chemistry knowledge and concepts from abstract to concrete forms since molecules or atoms are not able to be seen with our naked eyes (Justi & Gilbert, 2002). In order to help students learn chemistry concepts, in the past decade, advanced technologies are involved in the development of chemical representations as well as the vehicles to create learning strategies to facilitate chemistry learning. The purpose of this study is to discover the strengths and weaknesses of the Protein Magic Book, which introduces protein structures by applying augmented reality (AR) to the content. This study will focus on two questions: (1) how do students interact with the Protein Magic Book in different learning settings? (2) how do students interpret the representations and content of the Protein Magic Book?

LITERATURE REVIEW

AR as a new technology possesses some special features in providing visual representations. Unlike virtual reality (VR), which creates a totally immersive virtual environment, augmented reality (AR) is an interactive interface with which people can work in the real world and handle animated 3-D objects at the same time (Feiner, 2002; Shelton & Hedley, 2002; Fjeld, Juchli & Voegtli, 2003). The system which will be used in this study was created by the Human Interface Technology Laboratory (HIT lab) at the University of Washington. The process to generate the 3-D objects requires a laptop, a webcam, and specific markers (see Figure 1 and 2). The webcam registers the marker, and transforms the marker image into the software. The animated 3-D objects are then shown on the screen.

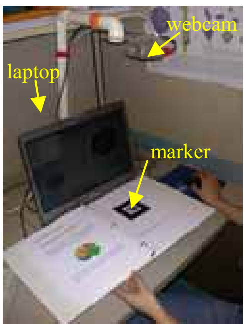

Figure 1 AR system (1)

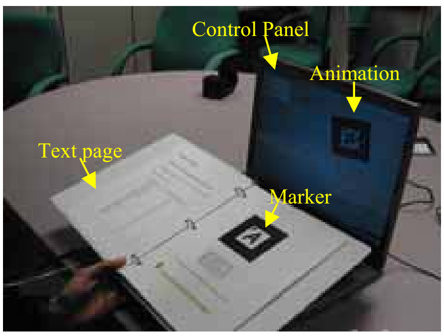

Figure 2 AR system (2)

AR is a medium to render images and images which is helpful to enhance learning. What features does AR have to help conceptual learning? As a new technology, firstly, AR draws people's attention on it. Drawing students' attention is an important factor in instruction (Gagne, Briggs & Wager, 1992). Second, it is a trend to use technology to create a constructivist environment to enhance learning (Dede, 1995). AR offers an alternative way to see the chemistry world and allows students to interact with the system, and discover knowledge by themselves. In addition, AR not only creates visual images, but also conveys the spatial cues directly to users (Shelton & Hedley, 2004). In other words, by using AR, users can obtain a sense of spatial feeling and visualization. AR has potential to be applied to the knowledge domain of spatial concepts. Another feature of AR that enhances learning is that AR allows users to interact with the system by using their body, especially the hands, and provides "sensorimotor feedback" directly (Shelton & Hedley, 2004). Winn (2003) argued that physical action plays a great role in cognition embeddedness. The neuroscience research also indicated that the linking movement and thinking is unavoidable because both of them activate the same area, cerebellum, in the brain (Logie, 1996; Jenson, 1998). Therefore, the direct manipulation of AR can supplement the deficiency of mouse-based computer-generated animation because mouse manipulation is an indirect physical manipulation (Shelton & Hedley, 2004) and thus make AR itself as a "real thing". Lastly, Billinghurst, Kato and Poupyrev (2001) indicated that AR might be able to enhance collaborative learning in three aspects. First, as a physical object, users can read the book together. Second, as an AR object, users can see animated objects from their own viewpoint. Third, as a virtual place, users can interact with AR and manipulate the animations. Since AR is a new technology in collaborative learning environment, this study will examine how to integrate AR into collaborative learning.

Advanced technologies are involved in the development of chemistry representations. An example is eChem, a computer-based visualizing tool developed at the University of Michigan (Wu, Krajcik, & Soloway, 2001). eChem allows students to build molecular models and view different representations. The study of eChem showed that this tool improved students' understanding of molecules and it could help students create mental images. In 2002, Schank and Kozma created a computer-based chemistry learning system, ChemSense, to help students connect what they observe from macroscopic and nanoscopic representations about Solubility and Soap. They found this tool improved students' understanding of geometry-related aspects by using animation representation. However, from teachers' perspective, they noted that it was difficult for students to transfer their prior understanding to this computer- based environment. They suggested that guides are needed to help students familiarize themselves with this new learning environment. Regarding the application of AR in chemistry education, one example of using AR in chemistry education is Augmented Chemistry. Fjeld, Juchli and Voegtli (2003) constructed an augmented reality environment, called Augmented Chemistry (AC), to help students learn molecular models by using a rear-projection screen with audio support. They found that AC made chemistry learning more interactive and the use of sound supported learning. Nevertheless, the mirror image reversal of images from the projection sometimes confused students' perception and this system did not provide the 1st person but the 3rd person perspective to observe the chemistry phenomena.

These studies show that assisted technology enhanced chemistry learning. However, except for Fjeld, Juchli and Voegtli's work, the technology that the other three examples used are computer-based simulation system. Therefore, AR as a new technology in chemistry education, it needs to be examined to know whether it can be applied to this knowledge domain.

RESEARCH DESIGN

This study will be conducted in a high school AP chemistry class in Seattle area. The chemistry teacher will give a traditional lecture of protein structures first. Following the lecture, students will be randomly assigned to three groups: lecture only, individual learning with the Protein Magic Book, and collaborative learning with the Protein Magic Book. Students who work with the Protein Magic Book will have some learning activities based on the content design of the Protein Magic Book. After these learning activities, three groups of students will be required to take some tasks in order to assess their learning performance. Then interviews will be held to inquire students' thoughts, feelings, and opinions in interacting with the Protein Magic Book and the learning setting. When students interact with the Protein Magic Book in both settings, they are encouraged to "think-aloud". That is, to vocalize what they are thinking, feeling and ideas popping up in their mind. These processes will be videotaped and the researcher will observe and take field notes in the entire process.

Both quantitative and qualitative methods will be used in this study. Students' task performances will be rated and be analyzed by conducting statistical methods. As to the qualitative perspective, this study tries to find out "the meaning people have constructed" (Merriam, 1998) and what is "the underlying structure of the phenomena" (Lancy, 1993) when they interact with the Protein Magic Book in order to discover students' learning process and cognitive strategies they will use. The data collected in this study will be their task performance, interviews, notes which students take in the learning activities, dialogues among students in the collaborative setting, and semi-structured questionnaires regarding to their personal background, feelings and feedback about this study. The videotapes will be transcribed as a base for future analysis.

SIGNIFICANCE OF THIS STUDY

Technology can help people learn only when it is manipulated well to fit the subject domain and the instructional design. This study tries to find out whether AR facilitate students' ability to learn the protein structures, and investigate what learning strategies is helpful in implementing AR. It is expected that the result of this study can provide guidance to AR designers to improve the interface design and the content design as well. In addition, from this study, AR can be examined to determine if it is an alternative tool to be used in chemistry education in the future, and inform chemistry teachers how to use it more effectively, thus facilitate chemistry learning.

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Teaching Problem Solving Skills through CSCL in Secondary Physics Education

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Abstract. Although CSCL (Computer-Supported Collaborative Learning) is believed to be an innovative and promising tool for teaching problem-solving skill, relatively little research has been carried out on what kind of prerequisites contributing to an effective CSCL problem-solving teaching, and how to structure it. 11 instructional principles are drawn from the theoretical framework which is constructed in a gradually advanced manner, including an analysis of key elements for problem-solving learning, and that for computer-based problem-solving learning and for computer-supported collaborative problem-solving learning as well. Based on that, two instructional models are proposed, namely, *Learning from commenting or conflicting* and *Learning from Combining*. The long-term research goal is to probe a systematic way to structure student's collaborative learning in CSCL environment in physics education.

Keywords: problem-solving teaching, collaborative learning, physics education, prerequisites for CSCL

1. INTRODUCTION

The past ten years have seen many attempts to teach problem-solving skills through Computer-Supported Collaborative Learning (CSCL). It has been evidenced that computer-supported collaborative learning does not always work properly (de Corte, Verschaffel, et al., 2003). Student's acquisition of problem-solving skill is based on a series of prerequisites. Most CSCL programs fixate upon one or serveral key factors while left others out. There is a need to probe what are the prerequisites for an effective computer-supported collaborative problem-solving learning and how to structure students' collaborative work in a judicious way.

There are a lot of research work concerning developing strategies of problem solving in science education. Getting students to adopt a definite problem-solving strategy, which includes conducting qualitative analyses of problems, results in better problem solving (Meloney, D.P. 1994). Five episodes of solving mathematical problems designed by Schoenfeld (1992) in secondary education are equally applicable in physics, and is deemed as the most overarching strategy. In particular, the last step, Control of the Answer (Verify), demonstrates students' *critical thinking* ability. But it is always forgotten or neglected by students in practice.

There are many attempts to enhance learner's problem solving skills through computer-based technologies. However, therein some problematic aspects are worth noticing. Above all, many students cannot use computer instructions in a wise way. Some *basic knowledge* of using e-learning seems essential. Students' meta-cognition and *self-regulating abilities* also take the control of the learning process. Not all students can sit in front of the computer throughout all the process until the final solution (Clark, R.C. & Mayer, R.E., 2003).

CSCL provides learners a platform which facilitates pooling ideas, accessing information and documents, and feedbacking problem-solving activities. According to Koschmann T. et al (1996), technological innovations in education should be theory-based rather than technology-driven. Then, 6 key elements for problem-based learning are proposed. Multiplicity requires *individual accountability*. Activeness calls upon learner's *prior knowledge*. Accommodation and Adaptation indicates that the *group composition* is important. Authenticity says problems should be featured with *contextual richness*. Articulation asks for abilitiy of *articulation*. Termlessness requires learner's *critical thinking* as well.

To sum up, successful learning problem-solving skill through CSCL depend on these mentioned prerequisites.

2. PRINCIPLES FOR PROBLEM-SOLVING TEACHING THROUGH CSCL:

In a network-based environment, it is assumed that structured collaborative learning is more effective than unsystematic one regarding students' learning outcomes. Based on the prerequisites mentioned above, instructional principles can be summarised on four dimensions as illustrated in Figure 1:

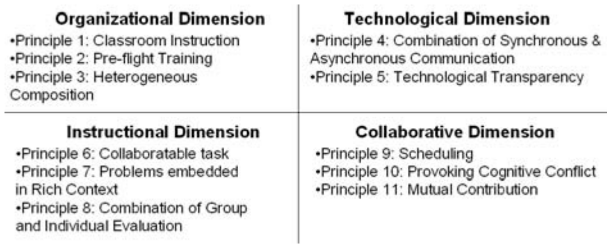

Figure 1: Principles for designing Problem-Solving teaching through CSCL

Since prior knowledge in the related domains (physics and mathematics) is one of the key factors for both problem-solving learning and collaborative learning, *classroom instruction* cannot be crossed out even in CSCL environment; To avoid some students' being left behind at the outset, it is necessary to provide *pre-flight training* for them prior to the application of CSCL; *Heterogeneous composition* means students will be grouped heterogeneously based on their free choice and computer/teacher's intervention, and will be regrouped when task changes so that they can access to truly multiple viewpoints; and have a common interest to the greatest extent. Synchronous communicative tools facilitate learners to exchange information in real time via online meetings and virtual classrooms, while asynchronous tools are featured by keeping learners informative independent of time. So *combination of synchronous & asynchronous communication* can overcome the difficulties spawned from physical distance; *Technological transparency* indicates that the electronic learning environement shouldn't be designed very profoundly which may frustrate the learners and stifle their interest in using it. Some tasks are too straightforward and can be solved by the learner alone, and collaboration is superfluous. Some tasks are too open and are not suitable to apply in secondary school education. Therefore, moderately-structured problems which are considered as *collaborable tasks* should be accentuated in secondary physics education, while ill-structured problems are adopted at a low proportion; Problem-solving education should aim at providing students with *problems embedded in rich context* so that they are capable of transferring the acquired skills to new situations particularly over a period of time when they have been removed from the learning environment. Besides, asking students to paragraph the physics problems taps the idea of improving their ability of abstract expression and articulation. The final evaluation should be based on both the group outcome and the individual performance of the sub-task which the individual learner is responsible for, therefore, *combination of group and individual evaluation* is favored. *Scheduling* indicates a predefined regular meeting can keep the group activities always on the right track towards the final target; Based on the project "Reason!Able" conducted by van Gelder, T. (2001), students' ability of critical thinking can be improved by focusing on reasoning and augmentation, thus, instruction should *provoke cognitive conflicts*; It is possible to minimise the risk of having a lazy group member by chopping a task into several sub-tasks and each group member takes one. Such mutual contribution to problem solving taps the idea of individual accountability.

These eleven principles are developed on the basis of analysis of learning theories. Principles in organizational, technological and instructional dimensions and principle of scheduling serve the basic framework for designing CSCL, which can be viewed as a 'must' for an effective CSCL problem-solving teaching. Principle 10 and 11 in collaborative dimension are those variables we can use to promote problem-solving teaching. Two models are developed from principle 10 and 11 respectively.

3. MODELS FOR PROBLEM-SOLVING TEACHING THROUGH CSCL

3.1 Model 1: Learn from Conflicting or Commenting

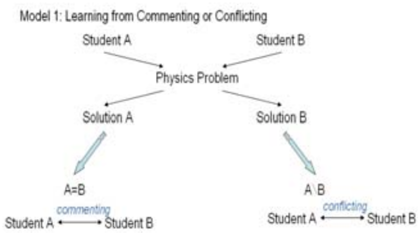

Figure 2: Model1—Learning from Commenting or Conflicting

As illustrated in Figure 2, students will first solve the problem independently. But their solution will not be scored right or wrong directly. Instead, they are asked to compare own solution to one of their peer learners. If both answers are the same, they will be asked to comment on partner's solving process. If the answers are different, they will be asked to find relevant knowledge to defend own solution. The collaborative work can be asynchronous or synchronous upon their decision. This model highlights student's critical thinking skill, and helps teacher check whether the solution of student is memory-based mechanical or understanding-based conscious.

3.2 Model 2: Learn from Combining

Figure 3 shows that students first analyze the problem together and try to chop it into several chunks. Each student assumes one sub-task, which means he/she should accomplish one part of the task independently. To avoid a blind allocating, teacher/computer provides timely cues. Within a given period, they present sub-solution. Then they collaborate for the final solution. Their communication may be synchronous or asynchronous. It is advisable for the teacher to feedback the final solution and to give a general comment on the group work in the forum. An individual evaluation for each learner's sub-task will be sent to each according learner via emails.

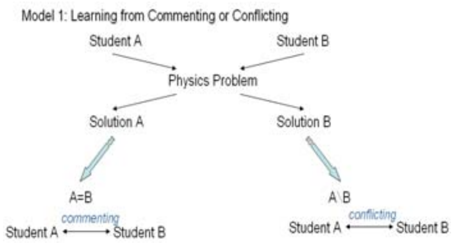

Figure 3: Model2—Learning from Combining

4. FUTURE STUDY

We will test whether a model can be implemented in class and students learn to work with according to plan in three different classes on the subject of forces (physics). Temporary conclusions will be drawn on the use and effectiveness of each model to promote collaborative problem-solving in physics education. A variety of instruments—a problem-solving test, logfiles, classroom observations using video registration, and interviews with pupils and teachers—will be used to collect quantitative and qualitative data before and after the intervention.

6. SUMMARY

These two models arise from a theoretical framework consisting eleven instructional principles which are drawn from a comprehensive analysis of prerequisties for problem-solving learning through CSCL. Thereby, they are expected to undertake theory-based approach to the design of CSCL tools.

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Incorporating Indexicality And Contingency Into the Design Of Collaborative Environments

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Abstract. Facilitating human interaction via computer mediation has different challenges than facilitating human-computer interaction. The use of current HCI design methodologies should be evaluated in the context of these differences. This paper presents data from a study of artifact-mediated collaboration in an interactionally-limited environment, and proposes a research plan to identify the design challenges unique to computer environments for collaborative activity.

Keywords: Computer Science, Human-Computer Interaction, Architectures, Intersubjectivity

MOTIVATION

Current HCI techniques such as Scenario-based Design (Rosson, Carroll, Cerra, & Hill, 2001) and Usage-Centered Design (Constantine & Lockwood, 1999) are frequently applied with great success to the task of designing application software. An examination of the language used in these techniques reveals their foundations in the cognitive-science model of plan-based activity. "Essential use cases" and "typical scenarios" are useful ways to typify the kind of structured, task-based behavior that generally constitutes an individual's activities in a work environment. On the other hand, examination of social interaction through the lenses of situated action and ethnomethodology reveals communication and collaboration to be emergent phenomena. Shared understanding comes from an intentional, ongoing process that relies primarily on locally-managed, situated activities (Suchman, 1987).

The application of current HCI design techniques to the creation of collaborative software faces challenges in creating effective representations of the emergent, social mechanisms of human interaction. HCI and situated action theories take fundamentally different views on the nature of action. Ethnomethodology examines the mechanisms that produce intentional action as an emergent quality, while HCI design treats actions as practical steps taken to achieve a larger goal. Ethnological techniques have been used in the service of UI design, but the two disciplines require largely disparate skills, making it difficult to find practitioners who are equally capable in both fields. The current best practice has ethnologists studying situated activity and communicating their results to software designers (Button, 2003). Unfortunately, the acts of transmission and interpretation dilute the value of the initial direct observation.

Effectively incorporating ethnomethodological findings to software that supports collaborative activity will require revisiting some assumptions underlying UI development. In a single-user application, the interface functions as a metaphorical proxy to the facilities of the software and hardware. It presents a representation of the current state of its data and provides tools for manipulating it. From a software design perspective, it is tempting to extend this model to describe multi-user applications in terms of multiple individuals whose interaction is mediated through a shared, external data structure. This implicitly defines group interaction as the sum of individual actions that change the shared data structure and which become inputs to the activities of the other participants. These actions may be arbitrarily complex involving cognitive, interpersonal, and social identity issues, but the defining aspect of this design is the mediational and representational nature of the artifact.

The first challenge to this view of group interaction comes from the fact that people interact with the world in an approximate fashion. Utterances are rarely specific, complete explications of thought, but, instead, contain only what seems adequate for the communicative purpose. Similarly, people only require external representations of their interactions to be "good enough". This approximate externalization of cognition produces an impoverished input to this group interaction model. Furthermore, when even this minimal information is communicated via a shared data structure, in undergoes multiple translations. Contributions, and their representations, are constrained by the limitations and biases implicit in the application's data architecture and representational forms. In addition to the perceptions and interpretations of the group members, the application structures impose interpretations defined by a programmer who is, most likely, uninvolved with the interaction.

What we recognize as situated action is the method that has emerged from human beings' long practice at intersubjective meaning-making. We have a highly developed ability to negotiate and maintain extremely complex and contingently-defined, shared understandings. Attempting to create an external computer model that replicates these shared understandings effectively amounts to creating a machine intelligence. A more tractable approach will be to leverage the human facility for meaning-making. This approach requires us to recognize that this human facility relies heavily on its being embedded in a complex social and interactional world, and less on concretely-defined external representations. Rather than isolating the members of a collaborative group and requiring them to communicate through a fixed-structure, representational artifact, we should try to create environments that actively facilitate the social interactions in which people are already proficient at creating shared understanding.

GUIDANCE FROM PREVIOUS WORK

In a recent study (Dwyer & Suthers, submitted), we examined the strategies and methods that people use to collaborate through shared written representations. We looked for mechanisms that remained invariant over different discussion content, representational tools, and study participants. The study had pairs of college students sit on opposite sides of a table over which a screen was suspended such that the participants could not see each other's faces. They were provided with a variety of office supplies (pens, sticky notes, labels, different sizes and colors or paper, etc.) and asked to come to joint conclusions about several open-ended questions on complex topics such as environmental resource management, emergency planning, and the appropriate relationship between science and religion. In addition to not being able to see each other's faces they were asked to remain silent while they worked on each question. Our goal was to create an environment that provided as much flexibility as possible in the representational tools, but incorporated the kinds of social and interactional limitations that are typical on-line. The participants interactions were videotaped and later reviewed to look for patterns of behavior, or "member's methods" (Koschmann et al., 2004) for communicating.

Six pairs participated in the study, and, despite all the variations we incorporated into each session, we observed several notable practices that were consistent across the pairs. These practices offer some contrasts with conventional UI design, and will provide guidance for software development in the next phase of this research.

The most striking and consistent observation was that despite being given many different writing tools and materials, every pair constrained themselves to a very limited repertoire of communicative mechanisms. The participants tended to use one or two types of materials (e.g. 3x5 cards, sheets of paper, Post-It™ notes), and made use of a remarkably limited set of gestures, deixis, and drawn symbols. However, the participants effectively used this limited set of tools to discuss complex and open-ended questions by allowing each tool to serve multiple communicative functions. The meaning of each action was highly context-sensitive, and yet the study partner consistently and correctly interpreted these actions. This stands in contrast to the generally accepted wisdom that UI elements are most effective when they perform a single, consistent function. Our study indicates that in this particular environment, collaborators preferred to utilize a small set of tools for multiple, context-sensitive actions.

Despite spending very little time organizing their contributions, the participants demonstrated a viable working knowledge of their discussion and conclusions. The whole structure of the discussion, including information management, was more opportunistic than premeditated. Topics were addressed as they were introduced, and contributions made use of arbitrary available resource (e.g. physical proximity, drawn arrows, attaching Post-Its™) to indicate relatedness. Our observation is that information develops meaning and purpose in the interaction of those using it. The interactions we observed allowed for a fluid and negotiated knowledge organization—information was only managed to the degree that it aided the interaction. Software that reinforces the reuse of emergent notational and organizational mechanisms could potentially be more helpful than software that supports explicit category definition and application. Information ownership had a similarly fluid nature. Access to artifact elements was socially mediated and progressive—ownership and permissions were not absolute, nor were they explicitly assigned. This has implications for how mechanisms for document sharing might be made more transparent.

From the experimenter's position as an outside observer, it became obvious that the shared understanding being created was only partially represented in the physical medium, and much of that was in an ad hoc shorthand that was only understood by the participants. In interviews after each discussion, the participants often had a hard time accounting for the motivations behind their actions. Their behaviors were rooted in response, impulse, and the continuous feedback they received from their partner. When we consider software implementation of these processes, we must admit that there are significant challenges in explicating a formal data model for processes that are not externally observable and of which even the participants are mostly unaware. What were observable and consistent were the physical mechanisms used to move the interaction forward. While a mechanism's meaning and purpose was contingent on its context and history, the types of physical manipulations observed present a tractable structure for designing a similarly functional on-line environment.

The study also indicated areas in which an on-line environment might exceed the face-to-face environment by supporting and amplifying behaviors that are limited by the physicality of face-to-face interactions. In the course of their discussions, the participants demonstrated an ability to manage multiple, simultaneous threads of discussion and easily negotiated switching context from one to the other. This was generally limited to two threads, but the limiting factor seemed to be keeping track of the physical location of each thread on the table. Studies in text chat have found that people can manage multiple, interwoven discussion threads (O'Neill &

Martin, 2003). One feature of an on-line environment could be to take over this state management so as to allow more complex user involvement.

The physical size of the table limited the amount of information that could be simultaneously available, and the writing materials could only occupy a single location at a time, curtailing the representation of complex linkages that might occur. Several participants spent time making unsuccessful searches through previous contributions. It seems almost trite to comment on the computer's facilities for archival and search. However, recognizing the primacy of maintaining the users' engagement in their interaction, the challenge becomes making these archival and search facilities frictionless and transparent in the context of the users' collaboration.

NEXT STEPS

In his proposal for a future agenda for CSCL, Suthers calls for the adoption of a hybrid methodology for analyzing CSCL research (Suthers, submitted). The next phase of my research will involve an exploration of UI design paradigms motivated by both quantitative and qualitative evaluation. The primary goal is to understand how different designs affect the entire context of the interaction. This context includes social, interactional, and historical components, and is broad enough to be essentially unquantifiable. An understanding of the context will have to rely on narrative analysis or other qualitative methodologies. However, this understanding should be grounded in the quantitative data that can be gathered.

My first task will be to collect empirical data on collaborative practices of a real world research group. This data will include video recordings of face-to-face interactions as well as physically and electronically recorded artifacts. Analysis will focus on the ways in which identifiable issues and topics propagate through the group and how this is reflected in the records. Collectively, this will provide a quantitative measure of the mechanisms that are actually used in the group's functioning. Supplementary data will come from interviews with the group members to determine their perceptions of the group processes and the ways in which software tools impact those processes. The hope is that this will situate the empirical data in a social and historical context.

The main work of the research will be to involve the group in the design of software to support their work. Through discussions on software features and interface, I hope to derive a set of "pre-functional" (a term suggested by Suthers) tools for collaboration. Rather than being tied to specific practices, these tools would provide flexible functions that could be appropriated for multiple tasks. The intended outcome is a software tool that provides these tools to facilitate emergent interaction, and which is grounded in the real-world practices of the research group.

CONCLUSION

Creating collaborative environments differs from creating applications for individual users. Some of the issues, questions, and challenges inherent in creating collaborative environments imply the need for a fundamentally different paradigm for their design. Human-computer interface design has the challenge of making the machine accessible to the human. In the context of collaborative environments, however, the challenge is in making the humans accessible to each other. There are indications from ethnomethodological research that there may be a general design plan that is applicable to environments for many different types of collaboration. Discovering this plan will require the application of both qualitative and quantitative analysis of the nature of interaction context and how it is affected by design choices.

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Knowing Others: Understanding Interpersonal Impression Formation Among Learners in Technology-Mediated Communities of Practice

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Abstract. The use of technology in educational settings, especially for communication and interaction, is almost ubiquitous. For my dissertation, I propose to study how learners in technology-mediated educational settings learn about each other in order to learn from each other. Interpersonal knowledge about participants in a community of practice is essential for knowledge sharing and learning to take place and technology-mediation fundamentally changes how people learn about each other. Drawing on literature from social psychology, learning sciences, and computer-mediated communication, I propose to investigate how people form impressions of each other in technology-mediated settings using a qualitative field study of a geographically distributed learning setting. The significant contribution of my research for education is in explicating a key and fundamental aspect of technology – how it mediates and transforms educational settings, especially its effect on how learners' learn about each other. This research is critical since a better theoretical understanding of social aspects of technology-mediation is key for designing effective computer-supported learning environments.

Keywords: distributed learning environments, impression formation, qualitative research

INTRODUCTION

The use of technology is on the rise in society and so is our concern about its use, access and adoption. I argue that technology has changed the very nature of education and learning by mediating how people interact and learn from each other, i.e. by changing our practices. Therefore, for my dissertation I propose to investigate how participants in a technology-mediated learning community, specifically in a work setting, learn about each other and develop interpersonal knowledge, a precursor for workers to learn from each other in any community of practice. Specifically, I plan to look at how learners learn about each other to be able to describe, predict, and explain each other's actions. To study how learners come to learn about each other I use the theoretical constructs of <u>impression formation</u> and <u>impression accuracy</u> derived from social psychology literature. I propose to study learners who are <u>geographically distributed,</u> which is a natural setting for the use of technology among participants, using a qualitative field study.

KNOWING OTHERS IN A COMMUNITY OF PRACTICE

Research tells us that it is critical for participants in a learning community to know about each other since interpersonal knowledge determines how participants interact and communicate, and consequently, how and what they learn from each other (Borgatti & Cross, 2003). In the learning literature, the concept of situated learning and community of practice (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; Wenger, 1998) are both premised on the assumption that participants, especially newcomers, would glean knowledge about the practices of the community and, more importantly, knowledge about the participants in the community from their environment. Therefore, knowing who is an expert is critical for a community of learners to evolve since novices move from peripheral to central membership by learning from experts. Unfortunately, our present understanding of the social aspects of learning is still based primarily on studies and research on traditional, primarily face-to-face, educational settings (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991). There is now enough evidence that use of communication technology changes the nature of interaction among people, as compared to face-to-face interaction, and therefore, it has the potential to change how people learn about each other (Etzioni & Etzioni, 1999).

IMPRESSION FORMATION

We learn about others by forming impressions of them. For my study, I draw primarily on Fiske and Neuberg's (Fiske, Lin, & Neuberg, 1999; Fiske & Neuberg, 1990) continuum model of impression formation. Their model, which has found strong empirical support for over a decade, suggests that the process of impression formation depends on how motivated we are to form impressions and how much information we have about a target. Moreover, the impressions we form lie on a continuum of impressions, based on a category at the one end, to impressions that are fully individuated on the other. They suggest that lack of information in situations where people are interdependent and are motivated to form impressions results in inaccurate impressions.

THE ROLE OF TECHNOLOGY

I argue that technology mediates how we form impressions of others by influencing motivation and information, the moderators of impression formation, as suggested by Fiske and Neuberg (1990). Moreover, although technology would affect the impression formation process and lead to inaccurate impressions, impression accuracy can be moderated by increasing the motivation learners have for forming impressions and the information learners have about each other. Figure 1 shows the process model of how impression formation would take place in technology-mediated settings; the main moderators of the process; and how they affect the outcome of impression accuracy.

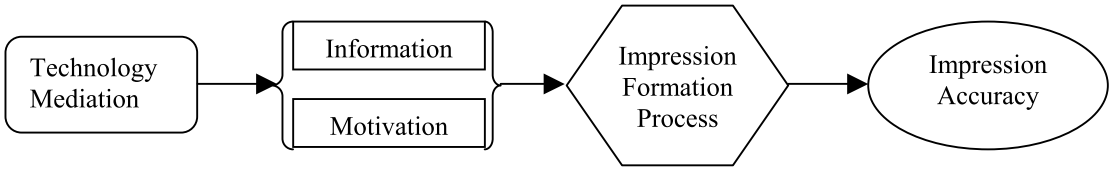

Fig 1: Process model of impression formation in technology mediation settings

Although CMC studies (Walther, 1993; Hancock & Dunham, 2001) suggest that information plays an important part in impression formation, none of the studies look at the *process* of how impressions form. Moreover, CMC studies presuppose that there is no interaction among learners other than through computers and they fail to take into account mixed scenarios where technology and face-to-face interaction co-exist. I argue that (a) in a technology-mediated setting learners will often form categorical impressions of each other, and (b) will have less interpersonal knowledge about other learners thereby giving rise to impression inaccuracy. On the positive side, I suggest that we can increase accuracy by increasing motivation to form impressions and sharing of interpersonal information among learners.

RESEARCH QUESTIONS

By bringing together perspectives on learning, impression formation, and technology-mediation, I hope to answer three questions that remain unanswered:

1. How do coworkers in a technology-mediated environment learn about each other and is this process different for face-to-face as compared to distributed learners?
2. What is role of technology, if any, in how and what learners in technology-mediated environments learn about each other? Do different communication media affect how and what impressions are formed?
3. What is the nature of impressions formed and how accurate are these impressions?

PROPOSED RESEARCH

Setting and Sample

To study technology mediation in a community of practice, I propose to study a geographically distributed community of practice which not only provides a natural setting to observe technology mediation, since distance makes it imperative that learners use technology to communicate, but also provide an opportunity to study a learning environment that is becoming more and more common across the world (Hinds & Kiesler, 2002). I propose to study a workplace setting since it places the learner in a real world context, which means that it will be easy to draw inferences about motivation and information and will give me a diverse set of technologies. The total number of participants in the study will be 35-40 and I will study around 10 participants in-depth. I will recruit participants who are new to the organization or to a team.

Method

I propose a 5 month long qualitative field study consisting of observations and interviews. Data collection will also be supported by surveys in the field. Most research on impression formation thus far has been limited to lab settings which have several associated weaknesses: they are devoid of context; they are not longitudinal and therefore are good for capturing first impressions only; participants and target never meet face-to-face and interact, therefore most lab studies capture only mediated impressions; there is no history or anticipation of future interaction among participants; and lab studies haven't looked at situations where participants interact face-to-face as well as use technology. I am using a qualitative field study, as I believe the benefits of this approach far outweigh the potential risks, and I stand to gain a lot more and make a greater contribution through a field study.

Data Collection Process

Data will be collected longitudinally and table 1 gives the details of the methods and the kind of evidence generated through each method. Observations and interviews will take place at each of the distributed locations.

Method	Research Question	Sample Size	Time Points	Evidence
In-Depth Interviews	How and why do learners form impressions?	35-40	Twice over a three month interval	Examples of individual level processes and experiences, data on relationships among learners
Observations	What is the context in which learners learn? What tools do they use? What kinds of interactions do they have?	10-15	For a week starting right after the first interview	Example of technology use, frequency of interaction, context of interaction
Frequent Short Interviews	How do impressions change with time and what kinds of interactions are responsible for that?	10-15	At the start of the observation and continuing for six weeks after that	Information on interaction among learners and an account of impressions, use of technology
Survey	Are there some common elements of impressions? What are the impressions at two time points?	35-40	Twice over a three month interval	A base point and an end point, capture common and different characteristics within the sample, capture nature of impressions

Table 1: Data Collection Methods and Nature of Data

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Collaborative Learning with Hypermedia

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Abstract. The goal of this proposal is to investigate how alternative conceptual representations underlying hypermedia affect students' collaborative learning about complex systems. Through comparing discourse of two dyads learning with two versions of hypermedia, a pilot case study indicates that the conceptual representation embodied by the hypermedia influences students' collaborative activities and knowledge co-construction. This proposed study would replicate previous methods by using a larger sample to allow stronger inferences about the effects of alternative conceptual representations. The two versions of hypermedia will be used in the study with one version highlighting the structural and the second version the functional-behavioral aspects of the human respiratory system. A mixed qualitative and quantitative method will be applied in this study.

Keywords: Knowledge co-construction, conceptual representation, hypermedia

INTRODUCTION

Previous study indicates that concrete external representations have a profound impact on individual learning. For example, research that examines the role of representations on transfer suggests that diagrammatic and conceptual representations have different effects (Novick & Hmelo, 1994). However, little research has explored the role of *conceptual* representations on collaborative learning. A pilot case study (Liu, Hmelo-Silver, & Marathe, in press) explored the effects on collaborative learning processes via an in-depth analysis of two dyads' discourse when they collaboratively worked on two different versions of hypermedia. This comparative study demonstrated that when students learned from a function-oriented hypermedia, which highlighted the functional-behavioral aspects of the human respiratory system, they engaged in more constructive processing as well as discussing those aspects of the system that are typically difficult to understand. The purpose of this proposed study is to investigate whether results from the pilot study can be extended to a larger sample. In addition, quantitative methods will be used to test whether more indicators of knowledge co-construction occur in dyads using a function-oriented hypermedia than in those using a structure-oriented version.

RESEARCH QUESTIONS

To investigate the role of effective conceptual representations underlying hypermedia, the proposed study will mainly focus on three research questions: (1) Are there differences in learning outcomes after using two different versions of hypermedia? (2) What different patterns will occur in dyads' discourse in the two conditions? (3) Will the patterns in the function condition promote collaborative knowledge co-construction?

CONCEPTUAL FRAMEWORK

Peer Interactions Leading to Collaborative Conceptual Change

Collaborative learning brings about constructive processing (Chi, Siler, Jeong, Yamaguchi, & Hausman, 2001). Roschelle (1996) argues that convergent conceptual change in collaborative learning is achieved through cycles of displaying, confirming, and repairing shared understandings via communicative exchanges. Interactions in collaborative learning might facilitate students' understanding by helping them realize that the new information does not fit into their existing conceptual schema (learning disequilibrium). To resolve the disequilibrium, learners might integrate old and new knowledge, which is the essence of conceptual change.

Computer as Representational Tools

Computers play an important role as representational aids for learning (Kozma, 2000). Computer-based instructional systems mediate learning through nonlinear and vivid representations. For instance, visual representations such as animations allow a dynamic display of complex phenomena and visualization of invisible aspects of systems (e.g., Hegarty, Narayanan, & Freitas, 2002). In addition, computers can also embody the conceptual representations that experts use to understand a domain (Pea, 1993). The Structure-behavior-function (SBF) representation is a way to represent complex causal systems.

Using SBF Theory as a Conceptual Representation in Hypermedia

The SBF representation provides an effective way for reasoning about complex systems (Goel et al., 1996; Hmelo-Silver & Pfeffer, 2004). Expert-novice studies have demonstrated that novices tend to focus on structures (i.e. elements of a complex system) and have little understanding of the functional and behavioral aspects (i.e. roles and mechanisms of an element; Hmelo-Silver & Pfeffer, 2004). In contrast, expert understanding involves integrated representation of structures, behaviors and functions. This suggests that, via making function and behaviors salient, the SBF representation might lead to better understanding of the causal relations in complex systems.

Based on SBF theory, two versions of the hypermedia system that will be used in this proposed study were developed: a function-centered version and a structure-centered version. The function-centered hypermedia conceptualizes an expert mental model which underscores interrelated functionally oriented representations within a complex system. On the other hand, like traditional textbooks, a structure-centered hypermedia focuses on the elements of a complex system and does not make the relationships and mechanisms of the system salient. Hmelo-Silver (2004) compared these two versions and looked at the effects on individual learning. Students in the function-centered condition had better understanding of non-salient structures, functions, and behaviors of the human respiratory system, such as cellular respiration, than students in the structure-centered condition. Although this study showed that a conceptual representation made a difference in what students learn, it did not show how they learned.

METHOD

Participants

40 participants will be enrolled from the educational psychology subject pool at a large public university and randomly grouped into twenty dyads. These twenty dyads will be randomly assigned to two experimental conditions respectively: the function condition (F-condition), in which students will use the function-centered hypermedia, and the structure condition (S-condition), in which students will use the structure-centered version. Each participant will receive course credits for participating in the study.

Procedure

I will run the study with each dyad in the same laboratory on separate days. All the sessions will be videotaped. A java program embedded in hypermedia will keep a log of each dyad's navigation, thus providing information on the sequence as well as the length of explorations of screens. Dyads in both conditions will use their version of hypermedia to learn about a complex system, the human respiratory system. All the procedures will be otherwise exactly the same for both conditions.

Initially, all participants will be asked to take a pretest on the human respiratory system. Then, I will instruct the participants to try to understand the content as well as to link the content to their prior knowledge. They will be instructed to try to understand the parts of the system, how these parts work, the function of the system, and how the system works as a whole. The dyads will also be informed that they need to explore the hypermedia system for approximately 40 minutes, and that they would be asked to take a posttest after using it. The process of exploring hypermedia will be both video- and audio-taped. After using the system, all participants will complete a posttest on their conceptual understanding of the human respiratory system. All participants will also complete a questionnaire on their attitude towards using the software and the collaborative learning activities.

Coding and Analysis

In the proposed study, I will use the coding scheme developed based on a pilot study (Liu et al, in press). The focus will be on capturing emerging patterns in the negotiation segments that occurred in the dyads' collaborative interactions and comparing the discourse of dyads in two conditions. The tapes will be transcribed verbatim blind to condition.

The transcriptions will be coded in three passes. Figure 1 shows the three-pass coding procedures. The data obtained from the Java program will be used to divide the conversation into episodes marked by switches in screens. Screens on a specific topic, such as cellular respiration, lungs, transporting, movement of air into the body, will be isolated as one episode. In the second pass, each episode isolated from the first pass will be coded into segments based on their different functions. Social talk serves to create a friendly environment. Task talk is tool-related discussing how to use the hypermedia tool. A reading segment refers to verbatim reading of the text on the screens. In quizzing segments, peers test each other's learning and understanding. Finally, in negotiation segments, the focus of the third pass of coding, the peers attempt to reach shared understanding.

The final pass will focus on negotiation segments. A formal coding scheme will be developed to identify composed indicators of a constructive processing (Chi et al., 2001). People usually learn better when they connect the current learning material with their prior knowledge. Questions are indicators of peers mediating each other's learning. Paraphrasing and elaborating are acts of constructive processing that allow the partners to clarify their ideas and reorganize and integrate their understanding. Salient aspects of the system are the more macro levels that people regularly notice. Nonsalient aspects of the system refer to micro-levels of a system (Hmelo-Silver, Marathe, & Liu, 2004).

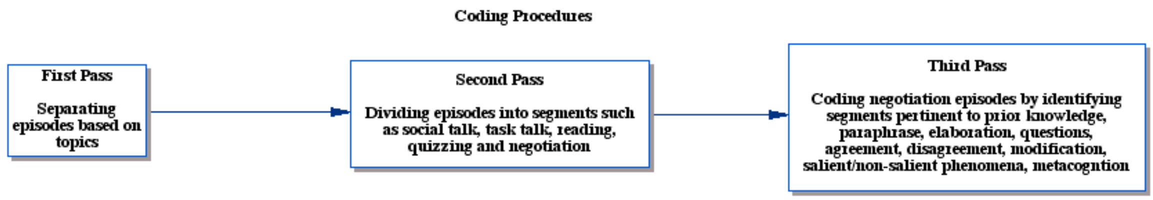

Figure 1. Coding procedures.

In addition to qualitative analysis, I will compare the two groups on learning outcomes and indicators of constructive processing. ANOVA will be used to measure differences in the effectiveness of two different versions of intervention in the experiment. Repeated measure will be used to compare the differences between numbers of coded indicators of constructive processing in two conditions. Correlation tests as well as regression tests will be used to identify major predictors of learning outcomes if there is any.

CONCLUSIONS

Conceptual representations are essential in collaborative learning. Most instructions about complex systems simply emphasize learning vocabulary, usually about structures (AAAS, n.d.). Previous research suggests that organizing learning around the functions and behaviors of the system engages learners in an effort after meaning. Using an appropriate conceptual representation can affect how students learn collaboratively. In this proposal I have described an alternative approach to transform the traditional structure-centered instructional tool into a functional-behavioral centered hypermedia embodying features of a knowledge co-construction community. The results of the proposed study might shed light to the direction of development of alternative instructional tools thus represent a useful contribution to the CSCL community.

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Cross-Cultural Effects and Affects in Asynchronous Learning Networks

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Abstract. Cross-cultural issues in asynchronous learning networks (ALNs) have largely been unexplored. The lack of proper understanding of culture's role in ALNs can be counter-productive to creating communities of learning, promoting collaborative learning and enhancing student-tutor interactions. In this paper I present my proposed PhD dissertation research about the cross-cultural issues in ALNs. I present a meta-summary of the literature review, preliminary research questions followed by a brief discussion of the proposed methodology. Potential contributions to CSCL are listed.

Keywords: culture, asynchronous learning networks, multicultural classrooms, online learning, collaborative learning.

INTRODUCTION

Culture refers to human activity. Culture has been defined in different ways by different researchers. Different definitions of culture reflect different theories for understanding, or criteria for valuing, human activity. My proposal uses Geert Hofstede's definition of culture as "*the collective programming of the mind which distinguishes the members of one group or category of people from another*" (Hofstede, 1997).

Asynchronous Learning Networks (ALNs) according to Mayadas (1997) *"combine self-study techniques with asynchronous interactivity to create environments in which learners can access remote learning resources asynchronously to learn at home, at the work place or at any place of their choosing."* ALNs can cross the boundaries of countries, cultures, genders, races and religions. This very advantage comes with the serious challenge of addressing and accommodating the inherent potential ethnic and cultural diversity.

LITERATURE REVIEW

Research into social aspects of Human Computer Interaction (HCI) (Nass, Steuer, & Tauber, 1994) has shown that even computer-literate users tend to use social rules and display social behavior in their interactions with computers. Social behavior is strongly grounded in culture as every person carries within himself/herself patterns of thinking, feeling and potential acting. To learn new patterns of thinking, feeling and acting one has to unlearn the old patterns, which is more difficult than learning for the first time.

Culture and HCI

The cultural issues in interface design identified in (Fernandes, 1995; Russo & Boor, 1993) consider only the symbols and rituals of different cultures but the potential issues due to the differences in cultural values and practices are left unidentified. The user interface design of ALNs should be sensitive to the cultural issues particularly when students come from diverse cultures.

Prior research has found that culture effects the usability evaluation process (Honold, 2000; Sears, Jacko, & Dubach, 2000; Yeo, 2001) However, the role of culture in usability testing remains largely unexplored and little empirical evidence exists in the literature about cultural effects. It is important to address these issues and concerns during the usability testing of ALN interfaces in cross-cultural settings.

Culture and CSCL

Kim & Bonk (2002) report cross-cultural differences in online collaborative behaviors of the US, Finnish and Korean participants in their study. Daniels, Berglund, & Petre (1999) found cultural differences in international projects in undergraduate CS education. McLoughlin (1999) based on her experiences with developing web-based instruction for Australian Indigenous education calls for a culturally responsive technology. Iivonen, Sonnenwald, Parma, & Poole-Kober (1998) found culturally influenced differences in language and communication styles in a library and information studies course taught over the Internet in Finland and US.

Culture and Learning

Hofstede's original cultural model consists of four dimensions. Each dimension groups together phenomena in a society that were empirically found to occur in combination. Hofstede's seminal work on cultures in organizations formulated a cultural framework of four dimensions identified across nations- power distance collectivism vs. individualism, femininity vs. masculinity and uncertainty avoidance. For definitions and detailed discussion of each dimension refer to (Hofstede, 1997). Hofstede's cultural model of dimensions indicates what reactions are likely and understandable given one's cultural background. Hofstede's (1986) discussion of the effects of these four cultural dimensions in traditional classroom settings is highly relevant to ALN environments and the cross-cultural differences have potential implications to the design, implementation and testing of ALNs .

This proposal will investigate if Hofstede's four cultural dimensions have the same effects and affects in ALNs as in traditional classroom settings. Observation and demonstration of the cultural dimensions' effects and affects in ALNs is the critical first step in problematizing cultural identity of students in ALNs. Exploratory and empirically rigorous studies are then conducted to formulate multicultural ALN design guidelines. I intend to compare and contrast the cross-cultural issues in multicultural settings of both traditional classrooms and ALNs.

PRELIMINARY RESEARCH QUESTIONS

R1: Given the cultural diversity of students taking an ALN course, do cross-cultural issues influence the communication, interaction, collaboration, cooperation, behavior, perception and leaning outcomes of the students? If so, what are the significant cross-cultural issues?
R2: Given the multicultural student composition, what differences and similarities in cross-cultural issues exist between traditional classroom courses and the ALN courses? What, if any, are the kinds, types and degrees of the cross-cultural issues?
R3: Can the cross-cultural issues identified in R1 be empirically evaluated and established under controlled experimental conditions?
R4: Can the cross-cultural issues be integrated into the design and delivery of multicultural ALN courses with noticeable benefits?

PROPOSED METHODOLOGY

I propose to study ALN students from the 8 cultural groups belonging to the United States, Indian, Chinese, Korean, Vietnamese, Filipino, Indonesian and Japanese cultures. The proposed research work is divided into four phases.

Phase One: Phase One is the empirical verification and validation of the cultural diversity of the students taking the selected ALN courses. Hofstede's original questions will be used to revalidate the four dimensions for the cultures studied in the project. The SL-ASIA acculturation scale (Suinn, Ahuna, & Khoo, 1992) will be used to assess the effect of the US culture on the students in the Asian cultural groups. The PRICA scale (Neuliep & McCroskey, 1997) will be administered to assess the students' intercultural communication apprehension. English language proficiency scores will be obtained for students who are non-native speakers of English. Correlations between the different measures listed above will be calculated.

Phase Two: All activity in the selected ALN courses- emails, online discussion board messages and reactions, questions and comments will all be observed, recorded and transcribed. The transcripts will be analyzed to discover the various patterns, methods, modes and techniques students' communication, collaboration, cooperation and knowledge building. Curtis & Lawson's (2001) coding scheme will be used to find evidence of collaboration. Critical incidents, if any, will be identified, recorded and classified. Discourse analysis, narrative analysis and other interpretative techniques will be deployed to investigate and interrogate the transcripts. Results from the various analyses mentioned above will be used to explain the differences and similarities among students both within and across the cultural dimensions groups. Follow-up instructor and student interviews will be conducted to qualitatively assess the data analysis results. Their overall significance to the design and implementation of ALNs will be discussed and reported.

Phase Three: Based on the results of phase two, guidelines and techniques to address and accommodate cultural effects in ALNs will be arrived at. These will help design culture conscious and culture specific ALNs that enhance and enrich the learning experiences of the students by providing a culturally sensitive and adaptable learning environment.

Phase Four: This phase involves the design and implementation of a pilot ALN according to the guidelines and techniques developed in phase three. The pilot ALN will be tested for empirical validation and verification under controlled laboratory conditions. The results from the pilot study will be further analyzed to refine, revise and finalize the guidelines and techniques for multicultural ALNs.

POTENTIAL CONTRIBUTIONS TO CSCL

The potential contributions to CSCL from my planned dissertation proposal are:

- Application of Geert Hofstede's cultural dimensions model to address the cultural diversity of ALN courses.
- Exploration and identification of the cross-cultural issues in ALNs by studying the kinds, types, degrees, modes, styles and patterns of collaboration, cooperation, interaction and learning outcomes of American and International students enrolled in selected ALN courses at the University of Hawaii at Manoa.
- Empirical verification and evaluation of the cross-cultural issues identified in ALNs through controlled experiments.
- Development of cross-cultural implications, guidelines and techniques for interface and interaction design of multicultural ALNs.

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MULTIPLE ROLES DEVELOPMENT FOR LEARNING COMPANION

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Abstract. The aim of this research is to develop a Learning Companion (LC) with multiple roles. This simulates heterogeneity in terms of competency, communication modes and promotes different learning benefits to students. Different students' approach in solving problem-based exercises and the most suited responses and roles of the LC are identified. Therefore, the LC will be at its best accommodating the students' needs and expectations. Students are encouraged to solve the problem individually but interaction with the LC results in sufficient motivation to improve their critical thinking and reasoning skills. It is our interest to study how the implementation of the system benefits the students' performance, comprehension, motivation and learning skills.

Keywords: Learning Companion system, educational agent, social learning environment.

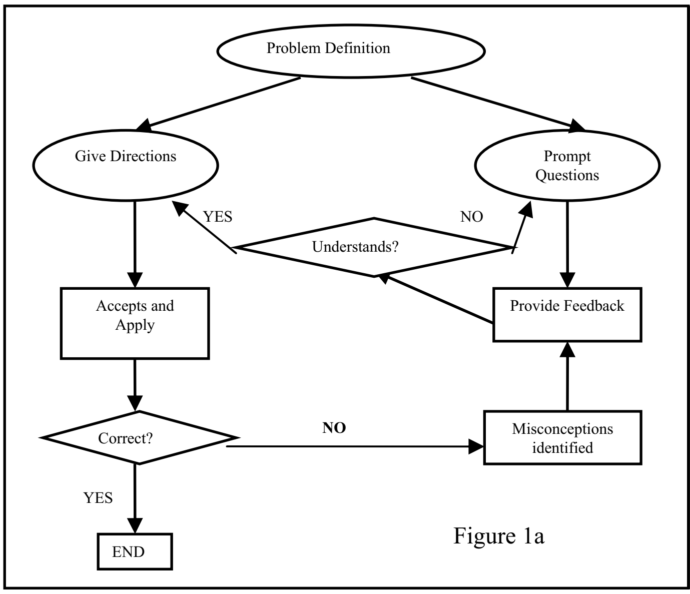
THE PROPOSED LEARNING COMPANION SYSTEM

The concept of Learning Companion (LC) was first introduced by Chan T.K. in his Ph.D. thesis in 1988. According to Chan & Baskin (1988), an extensive definition of an LC is a computer simulated character which has human-like characteristics and play non-authoritative role in social learning environment; it is a kind of educational agent. A Learning Companion System (LCS) involves a human student, a simulated learning companion and a simulated teacher. The learning companion is able to learn from the teacher, collaborate or compete against the human student. Within these one and a half decades, the intensity of research has gained its momentum and many LCs have been developed taking the roles of a tutor, tutee, collaborator, troublemaker, motivator, critic, questioner, facilitator and many more depending on their applications.

Hence, how should the proposed LC be different from the LC of the past? The proposed LC plays multiple roles depending on how a student approaches the problem-based exercise. Existing LC either concentrates in one of the roles (examples mentioned in Chou, Chan & Lin, 2003) or having multiple LC with different roles such as described by Hietela & Niemerpo(1988) and Uresti (1999).

Let's examine Figure 1a., the flow diagram which dictates the process of solving a problem and Figure 1b which depicts the relationship between a student's possible actions (arrows from the Student to the Learning Companion) and the corresponding LC's role (arrows from the Learning Companion to the Student). Once the Problem Definition is given, a student may react in two ways. If the student is confident enough to tackle the problem by giving instructions, the LC will act as a peer/tutee. The LC encourages the student to solve the problem individually. In this situation, collaboration with the LC is not necessary. If the student is in doubt and has a query, a mechanism of pedagogical multi agents which was introduced by Morin & Lelouche (1998) is implemented to provide a suitable feedback. The feedback is in terms of suggestions, examples and stimulating discussions. The LC will not resort to giving a direct answer at any time. If after the first attempt, the right answer could not be produced, the system identifies the 'wrong steps'. The LC is informed of the mistakes and misconceptions made by the students thus acts as a facilitator by guiding and encouraging the student to reflect on his/her past actions. The student shall accordingly make corrective actions and give appropriate feedback.

Vygotsky's Zone of Proximal Development (ZPD) refers to distance between the actual and potential development of a learner with assistance of others. Things that can be done independently by student are indicative of actual development of the student and problems solved collaboratively with the LC are indicative of potential development of the student**.** So how does collaboration with an LC with multiple roles helps the student potential development? This research attempts to answer this question.



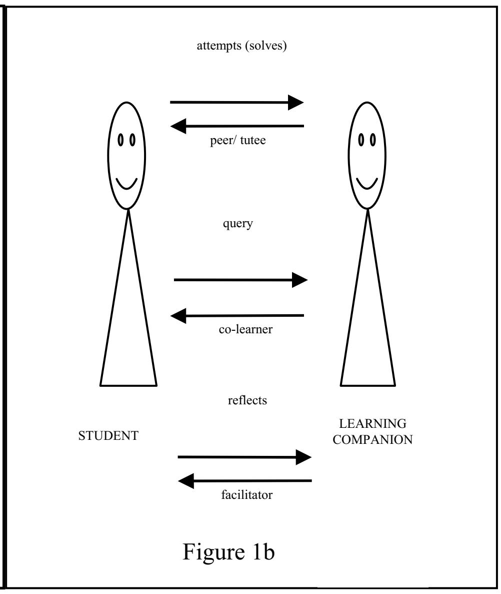


Figure 1a. Flow diagram for problem solving process indicating student's actions and LC's responses.
Figure 1b. Relationship between a student's action and the corresponding LC's role.

JUSTIFICATION OF STUDY

Understanding the subjectivity of students needs, cognitive abilities and expectations and translating or implicating it into a system, is a very challenging task. Existing learning environments are design to accommodate the vast learning styles and requirements. So, how do a multiple roles LC contributes to an effective learning environment?

The LC may act as a motivating factor for the student to learn, as mentioned by Dillenbourg & Self (1992), 'What one expects from our partner partially determines one's motivation to learn'. Students' expectations from its LC will determine the LC's roles and performance. In many ways, depending on its role, the LC may assist, encourage, simulate or may even be provocative. This simulates heterogeneity in terms of competency, communication modes and promotes different learning benefits to students. However, regardless of any role, it is vital to make sure that the LC does not obstruct the student from 'speaking their minds'. The proposed system should encourage the student to work individually in attempting problem-based exercises.

Existing multiple LC systems (Hietela & Niemerpo, 1988 and Uresti ,1999, for example) lets the student to choose which LC they want to work with and they may change their preference even when they are in the middle of tackling the problem. The proposed model does not give this flexibility; the LC changes its roles depending on the student's approach. This gives a social advantage as it simulates a human like peer who acts accordingly when approached differently. Computationally, it is very complex in assigning attributes to the LC model however, by having a single LC, greater control can be placed in order to channel feedback (communications between domain, student and LC) and evaluation of the student model.

METHODOLOGY

Like the traditional Intelligent Tutoring System (ITS) model which consists of four components, the domain expert module, the student model, the tutoring module and a learning environment, the proposed learning system has an additional component which is the learning companion model. The system architecture is perhaps similar to GCM model introduced by Chou, Chan and Lin (2002) with some modifications on the design. Communications between the learning companion, the student and the domain is managed by a group of multi agents which its protocols follows the architecture introduced by Morin & Lelouche (1998).

It is assumed that the LC is designed for an engineering subject problem based exercise. The different ways a student may approach a problem-based exercise and the most suitable feedback and behaviour an LC responses are identified (as indicated in Figure 1a and 1b.). The table below (Table. 1) shows the relationship between the student's action and benefits with LC's role, feedback type and dialogue and student's benefit.

Table 1: Relationship between student's action and benefits with LC's role, feedback and dialogue

Student's action	Feedback Type	LC's Role	Dialogue from LC	Student's benefits
Attempts	Affirmation	Accepts directions with no questions asked by student and performs operations.	Are you sure? Shall we proceed?	Self-efficacy
Query	Recall (giving clues) Suggestions (examples)	Discuss the domain knowledge that they shared and evaluate all the possible solutions given by students.	We learned that . . . . There are two options, x or y	Self-revising and reasoning
Reflects	Justification	Misconceptions identified hence highlighting the students' mistakes and request/suggest the students for other actions.	Why did you choose to	Self-assessment

Following the implementation of the system, the completed prototype will be tested onto a number of sample (students). Parameters of evaluation are identified and we shall examine how the system impacts on the student's performance, comprehension, learning skills and motivation.

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