Social Networking and Culturally Situated Design Teaching Tools: Providing a Collaborative Environment for K-12

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Abstract. For over 25 years, HCI researchers and developers have been challenged with improving usability of products. More recently, the Computer-Supported Cooperative Work (CSCW) community has focused on developing collaborative systems but even though social interaction was recognized the emphasis was on work. The widespread use of the Internet by millions of diverse users for socializing is a new phenomenon that raises new issues for researchers and developers. Just designing for usability is not enough; we need to understand how technology can support social interaction and design for sociability. Moreover, increasing accessibility to Computer Science and Technology is essential for a discipline that relies on creativity and diverse perspectives. With the educational research community having begun to explore the causes behind the underrepresentation of females and students of color in computing courses, outreach efforts have commenced to overcome these enrollment discrepancies.

Keywords: Computer Collaborative Work, user interface, computing, culture, educational gaming, ethomathematics, mathematics, usability, Culturally Situated Design Tools (CSDTs).

1 Introduction

For over 25 years, HCI researchers and developers have been challenged with improving usability of products. More recently, the Computer-Supported Cooperative Work (CSCW) community has focused on developing collaborative systems but even though social interaction was recognized the emphasis was on work [1]. The widespread use of the Internet by millions of diverse users for socializing is a new phenomenon that raises new issues for researchers and developers. Just designing for usability is not enough; we need to understand how technology can support social interaction and design for sociability. Sociability is concerned with developing

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software, policies and practices to support social interaction online. Three key components contribute to good sociability [1].

- *Purpose.* A community's shared focus on an interest, need, information, service, or support, that provides a reason for individual members to belong to the community.
- *People.* The people who interact with each other in the community and who have individual, social and organization needs. Some of these people may take different roles in the community, such as leaders, protagonists, comedians, moderators, etc.
- *Policies.* The language and protocols that guide people's interactions and contribute to the development of folklore and rituals that bring a sense of history and accepted social norms. More formal policies may also be needed, such as registration policies, and codes of behavior for moderators. Informal and formal policies provide community governance.[1]

Decisions about *purpose, people* and *policies* by community developers help determine the initial sociability of an online community. Later, as the community evolves an understanding of which social norms and policies are acceptable and which are not gradually becomes established. This is what the CSDT tool base has taken into account for the framework and design.

Culturally Situated Design Tools (CSDTs) allow students and teachers to explore mathematics and computer science with depth and care, using cultural artifacts from specific times, places, and cultures. Ethnomathematics is the study of mathematical ideas and practices situated in their cultural context. The Culturally Situated Design Tools website provides free standards-based lessons and interactive "applets" that help students and teachers explore the mathematics and knowledge systems using ethnomathematics in areas such as African, African American, Youth Subculture, Native American, and Latino. The supporting materials for the CSDTs include lesson plans and evaluation instruments to ensure they are integrated into the curriculum through state and national standards. Based in K-12 schools with significant numbers of African-American, Latino, and Native American students (current locations include Alaska, California, Idaho, Illinois, Michigan, New York, and Utah), preliminary evaluations indicate statistically significant increase in both math achievement and attitudes toward technology-based careers[4].

CSDT in collaboration with CSCW tools, K-12(Kindergarten – 12th Grade) teachers can be encouraged to share and re-use best practices as a community to emulate the business industry that has highly benefited from sharing best practices through collaboration. For example, this can be seen by implementing how the software development industry that successfully utilizes code re-use during software development through collaboration.

The three main goals of the study: (a) Enhance technical skills of novice users, (b) encourage users to adopt the use the technology for collaboration instead of traditional methods, and (c) to introduce new technical skills to novice computer users. The project provides a source for increasing teaching aide in schools. In addition, develop a gaming convention that keeps the student's attention in the field

of mathematics. In addition, it evaluates and validates a tool or framework that can be used to encourage sharing of best practices within a community of practice to steadily benefit and enhance member's career aspirations significantly through CSCW as witnessed in the code-re-use within the software development industry. By tapping into CSCW benefits, K-12 teachers benefit and enhance re-use and collaboration using technology. These areas of study scare most students and keep them away from Computing and IT jobs because this is required in the coursework.

2 What Is the Approach of CSCW

By virtue of the first part of its name, the 'CS' part, the professed objective of CSCW is to support via computers a specific category of work - cooperative work. Therefore, the term computer support seems to convey a commitment to focus on the actual needs and requirements of people engaged in cooperative work. Of course, new technologies of communication and interaction necessarily transform the way people cooperate and CSCW systems are likely to have tremendous impact on existing cooperative work practices. Nonetheless, cooperative work can be conceived as a specific category or aspect of human work with certain fundamental characteristics common to all cooperative work arrangements, irrespective of the technical facilities available now or in the future.

By virtue of its commitment to support cooperative work, CSCW should not be defined in terms of the techniques being applied. CSCW is a research area aimed at the design of application systems for a specific category of work – cooperative work, in all its forms. Like any other application area, CSCW, in its search for applicable techniques, potentially draws upon the whole field of computer science and information technology. Accordingly, a technology-driven approach to CSCW inevitably dilutes the field. To some extent, the current lack of unity of the CSCW field bears witness to that.

CSCW, in a sense, should be conceived as an endeavor to understand the nature and requirements of cooperative work with the objective of designing computer-based technologies for cooperative work arrangements. The fact that multiple individuals, situated in different work settings and situations, with different responsibilities, perspectives and propensities, interact and are mutually dependent in the conduct of their work has important implications for the design of computer systems intended to support them in this effort.

The objective of social science contributions to CSCW should not be to cash in on the new wave and do what they have always done but rather to explore exactly how insights springing from studies of cooperative work relations might be applied and exploited in the design of useful CSCW systems. This demand not only raises the issue of how to utilize insights already achieved in related fields to influence the design process. It raises more fundamental issues such as: Which are the pertinent questions being pursued in field studies and evaluations for the findings to be of utility to designers? And how are the findings to be conceptualized? If CSCW is to be taken seriously, the basic approach of CSCW research should not be descriptive but constructive.

On the other hand, as a research area devoted to exploring and meeting the support requirements of real world cooperative work arrangements, CSCW requires that technologists extend out from a strict technical focus and investigate how their artifacts are, or could be, used and appropriated in actual settings. In short, the drive of CSCW should be directed towards designing systems embodying an ever-deepening understanding of the nature of cooperative work forms and practices.

While this conceptualization of the general approach does recommend the CSCW field to focus on understanding the nature of cooperative work so as to better support people in their cooperative efforts, it does not prescribe a particular research strategy. Of course, field studies of cooperative work in diverse domains with the objective of identifying the research requirements of various kinds and aspects of cooperative work is much needed, but the design and application of experimental CSCW systems may also yield deep and valid insights into the nature and requirements of cooperative work. [3]

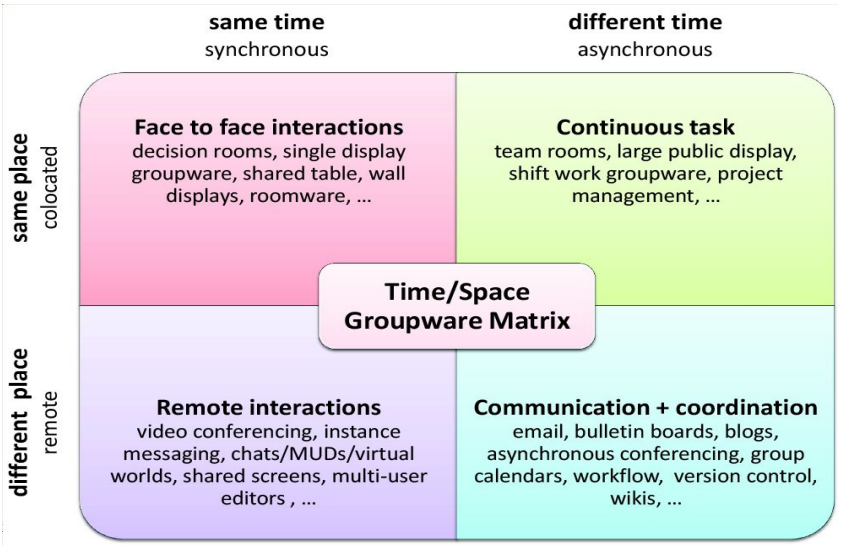

Fig. 1. Computer Supported Collaborative Work Matrix. (Source: Johansen, R. 1988 "Groupware: Computer Support for Business Teams" The Free Press.)

3 Preliminary Data Analysis

The study conducted surveyed 33 teachers in North Carolina city schools with different backgrounds and levels of education using a forum based prototype system. The surveyed group filled the usability survey to express their experiences of the system. The results were encouraging since 70% of those surveyed felt that a forum type virtual tool would be good for K-12 education and expressed confidence in using the proposed tool to teach if it were available. To confirm and validate the preliminary results, this study extends the previous study and focuses on creating a secure and

user-friendly environment for a community of practice to share best practices. The proposed system would require the three to entangle to safety and privacy of the community members while on line. For the success of the system, the stakeholder's opinion weighs heavily on the adoption and usability of the system. As stakeholders evaluate the system, they give their opinions and suggestions to improve chances for the future adoption and improved usability of the system. The primary objective of the study were to address the following:

1. Investigate educational tools that are currently available to facilitate and supplement traditional classroom learning.
2. Design an educational style learning environment to provide educators and students with the ability to use and online system that is interactive and open to students.
3. Determine if the educational prototype environment improves effectiveness of educators by providing more interactive lessons and more collaboration among the teaching community.

Participant Experiment Number	Group	Interaction
1	Experiment	CSCW Environment
	Control	------
2	Experiment	CSCW Environment
	Control	--------

Fig. 2. Example Data Table

4 Results

From the preliminary analysis, we gathered that there is a venue for improvement on CSCW networks and teachers would want to use this avenue. It will source teachers with a learning avenue that can pull teachers and students into one unit and encourage collaboration from a broader perspective. Teachers saw this method as a way to resource presentation and increase the usage of educational materials and applications among community of instructors and students. Moreover, grab the attention of students in the early stages before entering a college career. This, in turn, raise the interests of students for these fields and increase retention rate of students going into these areas during their future college careers. Furthermore, raise the awareness of educational tools and bring in alternate form of teaching for the instructor.

The outcome of this research is to have created a novel approach on how to create CSCW environment that attract teachers and students. This encourages opening doors for a new era of teaching STEM methods to enter the classroom. While HCI has continuously made great strides, there is still always room for development and

improvement in our new world of technological advancements. This CSCW environment serves as a catalyst toward the continued development of collaboration among the teaching community and students.

5 Conclusion

This study encourages the learning of a new environment for collaboration within groups of communities of practice. The study produces a tool that can be used with Android, Internet, or Wii. It also focuses on the usability of the tool and by doing a comparative study of its usefulness. The data was gathered from the K-12 teacher population in the initial stages of this study to find out if the study was right for the study group.

Moreover, we implemented a better tool for aiding teachers in K-12 environments, facilitating information to their students in a way that is interactive and engaging without losing the goal of education. This shows that there are uses for informal educational environments in the classrooms that serve as content management systems as well as incorporates some of the social networking community features that students are accustomed to today. Social networking has become the norm in regards to students and using social networking technology to provide more intrinsic motivation to educate them is beneficial to keeping their attention.

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