

The Collaboratory: a Virtual, Collaborative Learning Environment

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ABSTRACT

The Collaboratory is the result of a future-oriented project in learning, in which the process of human-centered design was applied to the observed problems and opportunities in learning in high schools [1]. It is a shared virtual space which teaches and facilitates collaboration and project work. This video describes the Collaboratory project and demonstrates the environment and interface as a product of the users and design process which helped develop it.

Keywords

Collaboration, project management, learning, human-centered design, user interface design, virtual spaces, interactive TV, multimedia, teleproxy, user observation.

INTRODUCTION

Collaboration is an essential part of many jobs, but it is uncommon in schools and it is rarely taught. The Collaboratory is a project in the future of learning at the Institute of Design, exploring one solution to the problems and issues surrounding the teaching and facilitation of collaboration three to five years in the future.

In the working world, people collaborate on projects and are evaluated on their process and results. In schools, however, students typically work individually and are evaluated with tests; they miss the opportunity to learn "real world" skills.

While most teachers recognize the value of collaboration, the barrier to its use in schools is that teachers have difficulty managing team projects and evaluating the students who work in them. Moreover, collaboration is hard to teach, but easier to learn in practice. Collaboration in schools also suffers from lack of pervasive shared space for students and an appropriate set of tools for working on shared projects, both synchronously and asynchronously.

The Collaboratory is a digitally-created project room which a student teams owns and uses to work on a project, much like the way many creative teams in business use a shared project space. It helps students learn to collaborate by embedding tools to facilitate collaboration within the environment itself. It embeds that collaboration within

project-based learning so that students learn by doing. Students own the project and their space, and are thus more motivated to learn. Teachers have a palette of tools which provide quantitative and qualitative information for evaluation.

THE INTERFACE

The interface is a three-dimensional environment that organizes information and tools in the same intuitive way that people do in physical environments, but one that still provides access to common GUI computer applications such as word processors for doing project work. It is virtual, but non-immersive. The blend of 3D and 2D interfaces provide a highly functional, shared interaction environment.

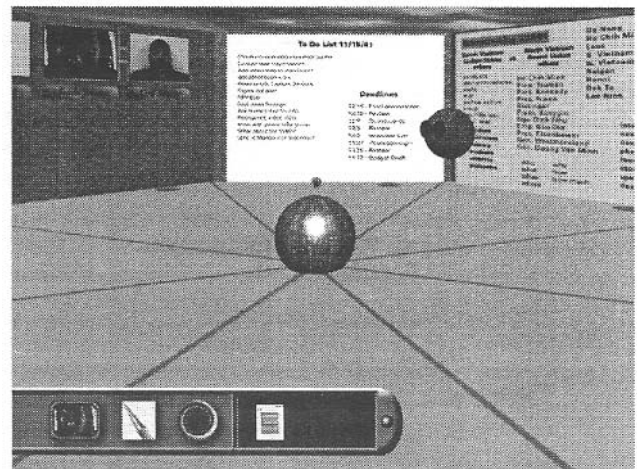


Figure 1: View of the Collaboratory facing the Management Wall with the Brainstorming Wall to the right and Communications Wall left.

The Collaboratory is laid out in the form of a room with eight walls arranged in an octagon. Each wall represents a step in a project: brainstorming, organization, planning, research, development, and deliverables. The sequential nature of project steps is represented in the flow of one wall to the next, while the cyclical nature of project steps is represented in the way that walls form an enclosed unit.

Walls typically house whiteboards or applications, while the floor shows the project schedule. Walls can be adapted as needed during a team work session. The Collaboratory also has a robust set of collaboration tools, including

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avatars, "recipes", various forms of video and voice communication, video "post-its", and whiteboards. Project tools include "teleproxies", a media organizer, a web vortex, applications, and wall mapping. Finally, teachers can make use of various tools, including logs, documents, and trails.

Each student team working on a project has their own Collaboratory which they can customize at any time. Collaboratories for all teams working on a given class assignment are clustered in project neighborhoods. Students can visit other Collaboratories, share resources, and collaborate with other student teams.

The Collaboratory prototype is designed to run on a broadband network or interactive television platform. While it takes advantage of a "next generation," gamepad-like input device, users can use standard input devices. Such a platform would allow students to use the Collaboratory at school or at home, without expensive computers or virtual reality goggles and gloves.

HUMAN-CENTERED DESIGN

The Collaboratory involved students and faculty at Paul Robeson High School, a Chicago inner city public high school, and was developed using human-centered design methods which focus on the needs of the user. The process involves observation techniques that are derived from anthropology and the social sciences, as well as numerous prototyping phases for visualizing and testing the design.

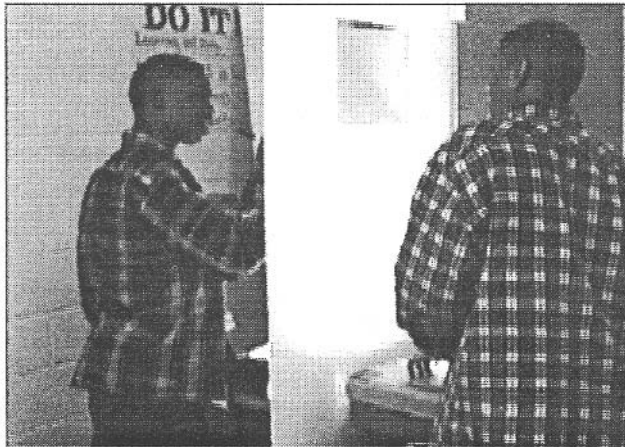


Figure 2: This behavioral prototype showed the importance of constant voice communication during "remote" collaboration.

Initial observation was conducted in various classes at Robeson and led to the initial concept of the Collaboratory. A constructivist approach to education emphasizing learning by doing [4] served as a compelling model for introducing the learning concepts. The Collaboratory design also benefited from research in various areas of education theory and collaboration, including [2,3,6].

Students used and evaluated various prototypes, which included both behavioral prototypes in the form of constructed environments and functional prototypes running on a computer with a special input device designed by fellow graduate student Jeff Harris. The video illustrates how observing students throughout the design process led to specific insights and interface enhancements.

CONCLUSION

Much work has been done in the area of collaborative interfaces. The Collaboratory continues and extends this work by exploring how a collaborative environment can help participants learn to collaborate in the context of project work. Its interface offers some new designs and new twists on existing designs based on user observation. While the project involved collaboration in a school setting, the designs and issues it presents have general applicability. The design points out many issues and opportunities for work in the future.

Compared to the standard methods of teaching and testing, the Collaboratory offers the advantages of learning by doing, a solid set of real world skills including collaboration and project work, increased motivation and higher productivity through the use of technology, and better results through collaboration.

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