

Virtual Places:
**A Heterogeneous Network Architecture to Support Distant Learning and
Collaborative Science Simulations**

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With funding from the National Science Foundation, we are conducting an interdisciplinary program of social science and computer science research to develop a network-based learning environment that facilitates highly interpersonal learning and collaboration at a distance. We want to support student learning by situating it within a set of social relationships, functional places, collaborative activities, and authentic discourse.

In the design of our software, which we will demonstrate, we couple client-server, multi-user virtual environment (MUVE) technology with peer-to-peer, synchronous multimedia collaboration technology to support a range of asynchronous and synchronous collaborative interactions that include the following capabilities, places, and resources:

- Capabilities: Synchronous collaborative operation of simulations and other applications, the generation and simultaneous viewing of multiple representations, real-time spoken discourse, and shared gesturing.
- Places: A range of persistent virtual places that support the use of these applications and related artifacts in a variety of ongoing social relationships. Places will include private, personalized places, such as virtual offices; semi-private personal places for the sustained work of two or three people, such as virtual project rooms and lab benches; open, public places for storing and using information (e.g., digital libraries); and public places for large group meetings or off-task social interactions (e.g., virtual lounges).
- Resources: A variety of domain-specific collaborative multimedia simulations, digital resources, and specialized objects that take advantage of the above capabilities and usability of the architecture and that are customized for target learning communities.