Learning SMET in digital playscapes: Research on reflection, knowledge acquisition and knowledge transfer in technology-enhanced, playful learning environments

This project seeks to enhance lifelong learning environments (formal and non-formal) by designing ways to promote knowledge transfer within computer-based playscapes in ways that prepares users for future learning of SMET. This effort fits into Quadrants II and III of the ROLE concentration areas: It will help to uncover conceptual learning strategies required for lifelong SMET learning; it will provide deeper insights into the pedagogical implications of pervasive and playful, digital media environments; and it will make available design prototypes that cross formal, non-formal and technological learning contexts to support reflection and knowledge transfer through computer-based play. The project builds upon and extends an existing NSF-funded collaborative—the Digital PlaySpace group supported by NSF's Center for Innovative Learning Technologies.

Our primary research questions are:
- In what ways can we as teachers, parents and designers facilitate the transfer of knowledge from computer-based playscapes to other domains for diverse communities of learners?
- How can reflection tools and strategies be used to build knowledge in computer-based play and game environments?
- How can opportunities for reflection be integrated into computer-based playscapes in such a way that the playfulness of the experience is not lost?
- How can the SMET learning that occurs in computer-based playscapes be documented and assessed in ways that do not disrupt the playful experience?
- What do digital playscapes that effectively promote reflection and knowledge transfer around SMET look and feel like?

To investigate these questions and develop prototype solutions, we propose a plan of three, overlapping phases. In an initial planning phase, we will further define and refine research questions and methods. We will create a network of nationally-distributed study teams to assist in these activities and to ensure their relevance for teachers, parents, and designers. These teams, led by members of the project group, will be composed of researchers, middle school teachers, parents, and children. In the second and third phases of the project, we will conduct preliminary research and develop prototypes of digital playscapes that embody the strategies and tools for reflection and knowledge transfer demonstrated as most effective in our research. Through competitions and co-operative retreats, we will invite teams of developers and community members to create design specifications for these prototypes.

The proposed research and development efforts draw from a deep and interdisciplinary corpus of literature. These theoretical wellsprings provide us with key insights about the characteristics of meaningful learning; the importance of reflection to knowledge transfer and learning; traditional tensions between maintaining engagement and promoting reflection; effective techniques for fostering reflection; and principles of effective game design. The project group's familiarity with this existing work as well as our applied research and development experience uniquely positions us to explore and develop ways that digital playscapes may be leveraged in support of life-long SMET learning.