We Built This City: Developing Students' Understanding of Ecology Through the Professional Practice of Urban Planning

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Introduction

The Madison 2200 project explored how participation in a technology-based learning environment modeled on authentic urban planning practices informed students' learning of ecology. Unlike complex modeling programs such as StarLogo (Resnick, 1994) and augmented reality environments (Feiner, 2002), the learning environment in this study is augmented *by* reality: as students engage with a computational microworld, their problem solving experiences are guided by real-world tools and practices. In this study, urban planning practices and technologies enhanced students' ability to determine a solution to a complex problem presented to them in a simulation. It was informed by the theory of pedagogical praxis which posits that modeling technology-based learning environments on tools used in professional practices enable youth to develop a deeper understanding of particular domains (Shaffer, 2003).

Method

We developed an urban planning geographic information model (figure 1) using Microsoft Excel and ArcMap (ESRI, 2003). Twelve participants were given an urban planning challenge, which asked them to redesign a popular, local street. We conducted structured interviews with each participant before and after the workshop, including concept maps and questions about ecological principles and practices of urban planning.

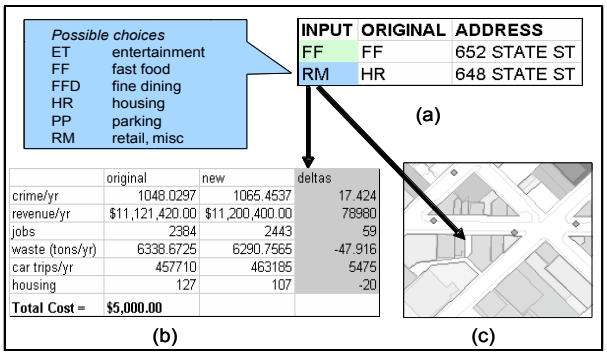

Figure 1. The tools used in the design process: (a) a land use change is made in the INPUT cell on the interactive spreadsheet, (b) numerically reflected in the *deltas* column and (c) reflected spatially in ArcMap.

Results

Participants learned ecology: In the pre-interview 9% of participants correctly defined the term ecology, compared with 82% in the post interview ($p<.01$). Pre-interview concept maps had a mean of 6.54 connections between nodes, while post-interview responses yielded a mean of 11.27 connections between nodes ($p<.01$).

Role of the model in learning ecology: Students' used the interactive model components to illustrate their ideas when discussing their understanding of ecology ($r=.711$, $p<.01$). As one student explained: "[Ecology is] the interaction between things. Like in the city, in that model – jobs might lead to more crime, and waste and revenue."

These results demonstrate that a learning environment augmented by reality using urban planning tools and based on the theory of pedagogical praxis (Shaffer, 2003) is a potentially effective method for developing students' ecological understanding.

References

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