Ecology 2020 Project Materials

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The Ecology 2020 Project

The Ecology 2020 project explores how innovative technology-based learning environments modeled on the professional practices of urban planners inform students' understanding of ecology.

Involving youth in the authentic professional practices of urban planners is a powerful way to get them thinking about the complex systems inherent in cities; we think that gaining an understanding of those complex relationships by taking action to solve urban problems in their own city leads to civic engagement and arms them with ecological understanding.

Urban Planning 101

Urban planners respond to complex urban problems by developing comprehensive land use plans that function to simultaneously accommodate human needs and ease the burden on the places people use.

They engage in professional practices that inform their ability to balance ecological relationships in the cities they help plan and maintain.

In Ecology 2020, students develop comprehensive plans that address the social, economic, and physical needs of their own community. Students use technologies to analyze existing problems and to visualize a future that meets the needs of the residents that live in the community.

Source: http://www.ci.madison.wi.us/neighborhoods/southmadison_plan.pdf
Urban Planning Technology

One of the most popular technologies used in urban planning are geographic information systems (GIS).

GIS enable urban planners to:
- analyze spatial information
- find solutions to urban problems
- determine locations of objects,
- assess environmental conditions,
- describe patterns of land use change

MadMod

To make these practices accessible to students, Ecology 2020 staff developed MadMod – an interactive game designed to help students make the tough decisions that planners must make every day.

In Ecology 2020, students use MadMod to create their comprehensive plan and gain insight into the complex interdependencies that occur as a result of their land use choices.

The MadMod design process: (a) a student makes a land use change in the shaded cell in the decision space, (b) the change is numerically reflected on the workshop in the deltas column and (c) the change is reflected spatially in the GIS.
Project Overview

In the Ecology 2020 project, students:

- use the MadMod game to design a comprehensive plan of a neighborhood in Madison, Wisconsin
- work as practicing urban planners in an after school program
- develop an understanding of urban ecological relationships
- take direct action to solve urban problems
- gain exposure to computing resources at the University of Wisconsin

Source: http://www.ci.madison.wi.us/neighborhoods/southmadison_plan.pdf (p.28)

Ecology 2020 workshop activities include:

- introducing the planning challenge
- holding planning discussions
- conducting a site analysis
- interviewing community residents
- moderating public information meeting
- using MadMod for data analysis
- creating maps using Geographic Information Systems
- making recommendations to the city planning commission
About the Academic ADL Co-Lab

The Academic Advanced Distributed Learning (ADL) Co-Lab serves as the focal point for academia in promoting high quality, reusable content for distributed learning. This Co-Lab is the ADL academic link to test, evaluate and demonstrate ADL-compliant tools and next generation technologies to enhance teaching and learning. It also serves as an academic demonstration site for ADL tools and content, including those developed by the federal government, academia, and industry.

About the Epistemologies of Practice research group

The Epistemologies of Practice research group at the University of Wisconsin designs and investigates technology-rich environments to support learning and development. We study how computers and other information technologies enable students to become active participants in the life of their community, and how professional practices such as architecture, engineering, journalism and urban planning can provide constructive models for making these connections.
## Project Timeline

<table>
<thead>
<tr>
<th>Year/Season</th>
<th>Epistemography</th>
<th>Technology Development</th>
<th>After-school Program</th>
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</thead>
<tbody>
<tr>
<td>2004 Nov-Dec</td>
<td>Fieldwork</td>
<td>Contact developer</td>
<td>Develop curriculum</td>
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<tr>
<td></td>
<td>Data analysis</td>
<td>Determine production schedule</td>
<td>Dissertation proposal</td>
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<td></td>
<td>Write up</td>
<td>Secure neighborhood data</td>
<td>Fieldwork</td>
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<tr>
<td></td>
<td></td>
<td>Write game narrative</td>
<td>Data analysis</td>
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<td>Produce a story board</td>
<td>Complete dissertation</td>
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<td>Move to production</td>
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<td>Receive product demo</td>
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<td>Show demo at CoLab meeting</td>
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<td></td>
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<td>Revisions of prototype</td>
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<td>2005 Jan-Mar</td>
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<td>2006 Oct-Dec</td>
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The Ecology 2020 Project Rationale

In the Ecology 2020 project, we explore how innovative technology-based learning environments modeled on the professional practices of urban planners inform students' understanding of ecology. We argue that before there was SimCity, there were real cities—and thus the epistemology and practices of urban planning may provide an authentic medium for understanding the complex relationships of urban ecology.

Ecology 2020 focuses on complex ecological systems in urban areas. Cities are places where students can experience how they are personally connected to an ecosystem that is directly affected by their actions. We believe that these environmental dependencies inherent in cities have the potential to become a fruitful context for new and innovative learning environments in ecological education.

We further believe that involving youth in the authentic professional practices of urban planners is a potentially powerful way to get them thinking about the complex systems inherent in cities; we think that gaining an understanding of those complex relationships by taking action to solve urban problems in their own city will lead to civic engagement and arm them with ecological understanding.

Previous work

The Ecology 2020 project builds upon previous work that explored connections between the professional practice of urban planning and the students’ developing understandings of ecology. In the Madison 2200 project, eleven high school students participated in a 10-hour workshop where they acted as urban planners to redesign a local street using a Geographic Information System (GIS) model. Students received a project directive from the mayor that asked city planners (that is, the students) to develop a design plan for presentation at the end of
the workshop. Students worked in teams to develop a land use plan using a custom-designed interactive GIS, *MadMod*, which enabled them to assess the ramifications of proposed land use changes. In the final phase, students presented their design plans to a representative from the city planning office.

**Pedagogical Praxis**

This pilot work was situated within the theory of pedagogical praxis, which claims that new technologies provide a bridge to assist students in gaining access to professional practices (Shaffer, 2003). The theory of pedagogical praxis suggests that authentic representations of professional practices are a useful framework for designing technology-supported learning environments. In a series of studies, these projects systematically develop and test experimental curricula that build a bridge between practices appropriate for adult professionals and the needs and abilities of younger students. The elements of pedagogical praxis are constituted together as the design research process unfolds, but for rhetorical convenience and conceptual clarity we separate them here and in the discussion that follows into five discrete steps:

1. **Baseline study**: Conduct a pilot study in which students engage in a prototype of the learning practices through which professionals are trained in a given field, exploring how students relate to the professional ways of thinking and working.

2. **Ethnography of practice**: Conduct ethnographic studies of the learning practices through which professionals are trained in a given field.

3. **Technology development**: Based on the ethnography of practice and baseline study, develop or adapt technologies that bring the domain of practice within reach of middle and high school students.

4. **Learning environment**: Create a learning environment using technologies built or adapted in technology development to help students learn using the pedagogies uncovered in the ethnography of practice.

5. **Outcome and process measures**: Based on the ethnography of practice and baseline study, identify, develop, or adapt outcome measures that assess progress in the target
domain or domains of thinking, as well as observational procedures that document how learning takes place in the context of professional practice.

These studies inform and support one another in the development process. The conceptual and procedural linkages between the steps are illustrated in Figure 2, which shows the baseline study and ethnography describing the needs and abilities of adolescents in relationship to the learning practices of a particular profession. These studies inform the development of a technology or technologies that help make the professional learning practices accessible to students, which in turn makes possible the creation, and then the evaluation, of a learning environment for students based on those practices.

Figure 1. Pedagogical praxis uses technology to build a bridge between learning practices appropriate for adult professionals and the needs and abilities of younger students.
Why not SimCity?

SimCity is a simulation that models complex urban systems (Starr, 1994). The simplified game rules enable students to quickly grasp and control the program. As a result, players can start acting upon the virtual environment almost immediately. Although there are significant differences in interface, content, and learning theory among SimCity and other environmental simulations such as Stella™ (Chalupsky & MacGregor, 1999) and StarLogo™ (Resnick, 1994), SimCity does exemplify the basic premise of technology-based ecological learning environments: students develop understanding of environmental issues by directly manipulating a model of a complex ecological system. SimCity models a city, enabling players to view the layers of complexity found in an urban ecosystem.

Cities are comprised of simple components; however, interactions among those components demonstrate dynamic patterns of movement that lead to high levels of complexity (Allen, 1996). These interactions between the human and the non-human, or the natural and the built, provide an opportunity for students to take action upon an environment that both influences and is influenced by their own actions.

In SimCity, game players take command of an urban grid and must ‘run’ the city by maintaining a balance between several elements: a growing population, environmental perturbations, urban and economic development, and multiple social issues including crime and transportation. They simultaneously play the role of mayor, urban planner, and city government official. The simulation exposes the complexities of urban ecology, or more specifically, what happens when a player tries to affect change in an urban ecosystem. For example, if a player increases green space in the city, the cost of public utilities also increases, or if he/she places an industrial site next to a residential one, the residential land values fall and the crime rate rises.
(Eiser, 1991). As a result, a player must decide: decrease the green space and move the industry, or risk urban flight. SimCity makes visible how human choices affect environmental outcomes, and in turn, enables players to view how those same outcomes subsequently inform human choices. Although these interdependencies are programmed into the simulation by designers, they become visible through the actions of the user. In SimCity, action in this virtual environment can lead to ecological awareness.

While SimCity is a program that can inform players about complex ecological systems, there are a number of potential problems to using it for environmental education. One problem is that the city that the player creates and maintains does not always represent an actual city. As in StarLogo and Stella, modeled behaviors may represent realistic patterns of great complexity, but there is no possibility for actual physical experience of the city that they maintain. The player may build their city, but they cannot live in it or walk down its streets; there is no actual planning or city council meeting for players to explain their purpose for placing, for example, industrial sites adjacent to residential ones. Sanger (1997) suggests, however, that fostering a connection to their own community provides students with a voice that shapes their place within that community. A potential consequence then of this lack of authenticity in SimCity is that students do not gain the appropriate experience necessary to solve complex problems occurring in their own city.

Another potentially problematic feature of SimCity is that changes happen on a wide-ranging geographical scale, thus presenting a macro level view of how cities function. SimCity presents players with an entire city to manage, and thus directs them to pay attention to the numerous interdependent relationships that affect that city as a whole. As a result, players
concentrate on these broader relationships, while less visible, micro relationships may go by unnoticed.

Finally, the compression of the temporal dimension in SimCity may also be problematic for the development of ecological understanding. In SimCity, players build new land use developments and solve urban problems on a relatively short time scale. Lemke (2000), however, claims that a fundamental change in attitudes or reasoning cannot take place over a short timescale; rather these changes are more likely to occur over a longer and more realistic time period. The fast-paced changes in SimCity may then actually weaken understanding of how ecological problems occur in the real world, specifically in this temporal dimension. Real ecological problems unfold over the course of months and years, not the virtually accelerated months depicted in SimCity.
Preliminary Results

Data in this section support four claims about the experience of students in the Madison 2200 pilot project. First, students developed a deeper understanding of the domain of ecology and of their city as an ecological system. Second, this developing understanding was linked to specific features of the workshop – specifically, the practices of urban planning and the interactive model they used to enact those practices. Third, students were able to transfer this understanding of ecology to problems facing other cities, and the practices and tools of urban planning shaped their thinking about these new problems. Finally, the data demonstrate that students were able to apply their understanding of ecology to issues in their own city.

The development of ecological understanding

Students developed an understanding of ecology through participation in the Madison 2200 workshops. In particular, students: (a) provided more extensive and explicit definitions of the term “ecology,” and (b) demonstrated their understanding of the complexity present in urban ecosystems by identifying more of the interconnections that exist in an urban ecological environment.

Definitions of ecology. In pre- and post-interviews, students were asked to define the term ecology. For example, in the pre-interview, one student said:

Ecology is…I’m not sure what that means; I guess I don’t really know.

In the post-interview, the same student said:

[Ecology is] the study of the ecosystem. Basically how one thing will affect the other thing. If something is removed or placed here or something like that. Like increasing population might lead to a lack of jobs for people, and then it leads to more waste and traffic or something like that, that’s like ecology in the city.
Only 9% of students (1/11) were able to offer a definition of ecology in the pre-interview, compared with 82% of students (9/11) in the post-interview \((p<0.01)\).

*Ecological interconnectedness.* In their explanations of ecological issues in the post-interview, students gave more specific examples of how ecological issues are interdependent or interconnected than in the pre-interview. For example, when asked whether there are connections between what happens in a city and what happens in the environment, one student said:

[L]et’s say we just had this new drink around and we just litter in the streets – it just depends, I don’t know.

In the post-interview, the same student answered:

[T]hey depend on each other, they affect each other, like they’re interrelated. Like trees for example. Trees help reduce pollution while the city could be producing pollution, so they help create a balance.

Overall, there was a statistically significant difference in the number of references students made to interconnectedness between pre and post interview (see figure 2; pre-interview mean = 3, post-interview mean = 13.09, \(p<0.01\)).

![Students' References to Interconnectedness](image)

**Figure 2.** Students increased their understanding of interconnectedness. (Students have been ordered for clarity of presentation).

*The complexity of urban ecosystems.* Students demonstrated an understanding of the complexities present in an urban ecosystem. Figure 3 demonstrates an increase in the number of
links and nodes (concepts) depicted on one student’s concept map from pre- to post-interview in response to the question, “How are people connected to their cities?”

**Figure 3. One student’s pre (left) and post (right) interview concept map response to the question “How are people connected to their cities?”**

As students completed the concept maps, they explained why they made the connections they chose. They described issues to consider when discussing how people and cities are connected. For example, during the pre-interview, one student said this about his concept map:

Like jobs are connected to the greenspace, like if you’re a gardener or someone who takes care of the parks or that. And traffic, it affects like car pollution and then you also plan where streets have reduced pollution too, so that kind of affects each other, and crime is left over there. Jobs do create crime there because there are people who have jobs and people who don’t have jobs, so they don’t have a source to get money from so they’ll probably steal that or steal cars. I’m not sure I can’t see too many other connections.

In the post-interview, the same student said:

Well jobs can create crime because more jobs mean more money, and more money might mean more crime. And greenspace kind of attracts crime, because like if you had a really big park it would be easier for crooks and stuff to hang out. That’s kind of an image that the parks give me, sort of. Then if you have traffic you’re going to have pollution, so the best thing you can do is have greenspace to kind of fight that pollution. So, traffic produces pollution. Job produces pollution because of the trash that people accumulate like paperwork, and the pollution will affect the environment, either the air or the ground. Like and how about zoning? Well, people want greenspace, so it will create sort of a demand for it. Jobs would mean more people, more people would mean more pollution, which would mean more traffic, and more people would mean more crime. Like city-wise, like growth would mean more people, like it basically builds on each other, like one helps the other grow a bit…When the city grows and the city has more people its going to need like buildings to house them, or like jobs, like workplaces, you need buildings for that, and like if there are more buildings, there will be more traffic, more of everything, so everything is just connected to it. You can’t really change one thing without changing another.

Additionally, there was a statistically significant difference in the links and nodes they added to their concept maps from pre- to post-interview (see table 1).
Students’ acquisition of ecological understanding

Students’ ecological understanding was demonstrated through their use of both (a) urban planning practices and (b) the features of the interactive urban planning model to provide answers to post-interview questions.

Urban planning practices. During post-interviews students made frequent reference urban planning practices, suggesting that their thinking about ecological interconnectedness was embedded in thinking about how urban planners solve problems. Students used urban planning practices to explain their responses to the question, “Do you think it matters where physical structures (like buildings, houses, or parks) are placed in cities?” For example in the post-interview, one student said:

Yes, because, like, when it comes to parks, you wouldn’t want to place a big old park where nobody goes and it’s hard to reach, and when it comes to buildings, you wouldn’t want to place a big building in the middle of a suburban area or in the middle of a busy street to cause clutter and confusion around the area. These are like, relationships you have to think about. You wouldn’t put a big park with a lot of stuff made for people 45 minutes out of the way, and you wouldn’t make it hard for people to reach. You have to have a good plan. Maybe make it in walking distance and maybe city busses can take the kids to it. So if the parents can’t take them, they can give them money to go to the parks, but you wouldn’t make it so hard to get to cuz then it wouldn’t get its whole value….and, not necessarily a busy street, but you wouldn’t take it and put it in a corner, like if this is a street and this is a dead-end (draws diagram with his hands), you wouldn’t put a big old office building right there and then just come and disrupt the whole area and cause clutter in that area. I meant that you would rather have it in the industry or downtown where a big old building looks like it should go, where it can make money.

Table 1. One-tailed t tests detailing a significant increase in the links and nodes students placed on their concepts maps from pre- to post-interview (p<0.01).

<table>
<thead>
<tr>
<th></th>
<th>Pre-interview mean</th>
<th>Post-interview mean</th>
<th>Pre-interview standard deviation</th>
<th>Post-interview standard deviation</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Links</td>
<td>6.55</td>
<td>11.27</td>
<td>2.34</td>
<td>4.52</td>
<td>0.007</td>
</tr>
<tr>
<td>Nodes</td>
<td>6.90</td>
<td>8.27</td>
<td>2.63</td>
<td>2.88</td>
<td>0.005</td>
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</tbody>
</table>
There was a statistically significant correlation between students’ references to urban planning and interconnectedness ($r = 0.723$, $p<0.05$).

Students referenced the open-ended nature of urban planning practices when discussing the urban planning problem they solved during the workshop. For example, in response to the question “Did you learn anything from the workshop?” one student said:

I learned a lot of stuff about thinking about what city planners do, getting a feel for what they do, that’s kind of interesting. The scenario, like what we had to do, we had to redesign State Street, like zoning or destroying buildings or going to check out places to see what could be changed. There’s a lot to it and there’s like more than one way. Kind of like what city planners do, they go and like, they check out the area to see like what would be appropriate for like a park or a building and it’s a hard decision.

In post-interview responses, students noted the open-endedness of the urban planning problem and how making decisions about what to change was difficult. There was a statistically significant correlation between students’ references to the open-endedness of the workshop and their understanding of the complexity of issues ($r = .708$, $p<0.05$).

*Interactive urban planning model.* Students incorporated the interdependencies embedded in the model during their post-interview responses, stating that it assisted in their decision-making processes for the workshop task. For example, in response to a question inquiring about what she learned from the workshop, one student said:

I learned a lot about ecology and city planning, and if you change one thing essentially everything else is going to be changing too. Chain effect and stuff like that. When we were changing stores with the model, we figured out that we’d have to not necessarily put in everything that we wanted cuz it cost money and we had to stay in a budget, but if we changed one thing then maybe the waste would go down but the jobs would go up maybe the housing would go down, so we had to look at all that.

A second student, responding to the question “Can you think of anything that helped you learn?” provided a similar response by referring to the interactive model components in his answer:

Well, when you build a big housing complex it costs a lot of money, plus the revenue shoots down…by playing with it, one of the easiest ways is when you’re building a commercial area, then you have a high income so then you want to build some houses to lower the car trips, but then you put it there and then you see what your revenue is. Revenue should be good, and you can see when it’s not.
These student responses indicate that the interactive urban planning model used in this study was a central tool for completion of the task, and that the embedded interdependencies assisted in the development of their ecological understanding. Additionally, a statistically significant correlation was found between student references to using the model to illustrate their ideas and interconnectedness (r = 0.628, p<0.05).

Students’ use of their ecological understanding

During the post-interview, students were able to transfer ecological understanding gained from the workshop to solve additional urban planning problems. This was demonstrated by (a) students’ comments regarding how this workshop changed the way they viewed events that happen in their real, everyday encounters with cities and (b) students’ solutions to hypothetical urban planning problems.

Real-world experiences. During post-interviews, students responded to the question, “Has this workshop changed the way you think about cities?” 11/11 students said it had and further explained how their thinking changed as a result of participation. For example:

I’m looking at connections a lot closer now, usually you’ll see connections but you don’t think about them as much as you do now, like you know that cars pollute the air and trees like help create oxygen, but then after this you see a lot more different connections like between trees and buildings or why certain things are. Commercial areas are one way and why residential areas are another. I really noticed how they have to, when they think about building things they, like urban planners also have to think about how the crime rate might go up, or the pollution or waste depending on choices.

Students were also asked if this experience would change the things they pay attention to when walking down a city street in their neighborhood. 82% (9/11) of students said that it would. For example, one student mentioned:

Yeah, you notice things like that’s why they build a house there, or that’s why they build a park there.
Hypothetical urban planning problems. In the post-interview, students used the features of the interactive urban planning model to explain their solutions to novel urban planning problems. Specifically, they made more references to (a) the interactions between issues and (b) the interdependent features of the model itself. In this first example, during the pre-and post-interviews, students were asked to respond to the following urban planning problem:

The Graham County Waste Management Committee is concerned about the growing amount of waste in the county. The waste levels are continually rising and landfill space is becoming a concern. The committee is currently trying to figure out how the amount of waste in the county can be reduced to a level that can be managed. What suggestions could you make to the Waste Management Committee that would help them develop and justify their plan?

Before the workshop one student responded:

Uh, I mean, they could look for a new landfill, like a new place to build a landfill.

After the workshop, the student responded to a similar problem dealing with the closing of the town recycling station:

Okay, well, first of all, they should have not closed down the recycling plant. They could have cut other stuff, or they could’ve raised taxes to increase revenue, done surveys, or they could have made the zone larger with businesses so they could support the place if they were gonna close it down I think they should keep a recycling plant b/c they should be helping to reduce the amount of waste which is what they’re trying to go for which is like their goal. But like closing down a recycling plant is going against the goal. They could export the trash I guess, but then that would cost a lot more money too. And they’re like making budget cuts, so they probably wouldn’t be able to afford that. Hmm, okay, I’d say fundraising…like, they could have a festival, like a big festival where it’s a kind of fair that attracts tourism and stuff. That would bring in money. You could rent the fairgrounds, charge for parking, and they can get a certain percentage from the fair people, like in a tax or something. Like a revenue tax.

Students used the features of the model to think in an ecologically complex way about these urban planning problems. In a second example, one student explicitly referred to his experience with the model to explain the solution to a problem of raising money for a new elementary school:

He can probably just, isn’t this kind of like what we did, how we had to raise the revenue, like he needs to raise the revenue by adding more things to the city that might help raise the revenue? Just like more stores that people could shop at, or more restaurants, more theatres, stuff that they do that people pay money for.
In these post-interview urban planning problems, a statistically significant correlation was found between student references to using the workshop model to illustrate their ideas and interconnectedness ($r = 0.615$, $p<0.05$).

In summary, results suggest that through participation in the Madison 2200 workshops students a) developed an understanding of ecology and b) demonstrated this understanding by using the urban planning practices and the features of the interactive urban planning model learned in the workshop to provide post-interview answers. Students also transferred this new ecological understanding to urban planning problems during the post-interview.
Ecology 2020 Project Process

Previous work on pedagogical praxis suggests that different professional practices have distinct epistemologies, and that it is the alignment of epistemology and practice that leads to understanding in such contexts (Shaffer, 2003). We thus propose that an urban planning simulation using new technology informed by real-world urban planning practices and tools may be a productive platform for developing students’ understanding of the ecological domain. In the Ecology 2020 project, we will develop and implement an after school program in which students work as urban planners using an interactive geographic information system to design a comprehensive plan of a neighborhood in Madison, Wisconsin.

The Ecology 2020 project thus proposes the following action plan:

**Phase I: An Epistemography of Urban Planning Practices**

How do urban planners learn to become urban planners? To determine an answer to this fundamental question, an epistemography will be conducted to uncover the learning processes involved in becoming an urban planner. Observations and interviews at local planning firms and in urban planning courses taught at the University of Wisconsin will largely inform the content of this epistemography.

An epistemography is similar to an ethnography in both form and scope, however, a key difference is that we are focused on uncovering the epistemology of the profession; that is, we hope to determine how participation in the professional practices of urban planners informs how urban planners come to view and understand the world. This epistemography, in turn, will inform: 1) the development of appropriate and accessible technologies for project participants and 2) the authentic content necessary to develop a learning environment based on the professional practices of urban planners.
Phase II: Curriculum Development

We will recruit 12-15 students in grades 8 and 9 in collaboration with various summer camp programs throughout the city of Madison, Wisconsin, with particular attention to including students with a range of ethnic and socioeconomic backgrounds. We will recruit 3 UW-Madison student mentors. Sessions will take place at UW-Madison, with students and mentors in attendance. The summer program will entail 30-60 hours of organized activity (3-4 hours of instruction per day over 3 weeks).

In the Ecology 2020 workshop, students will act as urban planners charged with the task of creating a comprehensive land use plan for their neighborhood. They will conduct a site evaluation, participate in public involvement meetings with concerned community citizens, and utilize Geographic Information Systems technology to generate this plan. Finally, just as practicing planners do, students will have the opportunity to present their comprehensive plans to the Planning Council, which is the organization that makes final land use decisions for the city.

The task they will be presented with will not be easy. Just as urban planners must consider the wants and needs of the residents of the city they serve, so to will the students in the Ecology 2020 project. Through their planning efforts, they will learn that land use decisions always have consequences. By realizing how those consequences affect all parts of their city, students will begin to understand ecological issues, especially those that pertain to how human beings interact with the complex urban system that must ultimately sustain them.

Pending the outcome of the epistemography, the workshop curriculum is preliminary at best, however, Appendix B details a list of initial curricular ideas. Appendix C offers a sample comprehensive plan that students in the Ecology 2020 project will have the capability to generate.
Potential Funding Opportunities

**Spencer Foundation**
**Major Research Grants**

The Foundation's Major Research Grants Program supports research projects requiring more than $40,000. Research projects vary widely, ranging from medium-sized studies that can be completed within a year by an individual researcher to more extensive collaborative studies that last several years.

**Funding Priorities and Eligibility:** At the time of this report’s publication, the Foundation has not established funding priorities for subjects of research; projects originate from research ideas initiated in the field by scholars and other researchers. Ordinarily, principal investigators applying for a Major Research Grant must be affiliated with a school district, a college or university, a research facility, or a cultural institution. Researchers must also have an earned doctorate in an academic discipline or professional field or appropriate experience in the teaching profession.

**Restrictions:** Grantees may not receive two research grants simultaneously from the Spencer Foundation. Please note that the Foundation does not pay government-approved overhead rates on Research grants; overhead requests on Major Research Grants of more than $75,000 may not exceed 15 percent of the requested direct costs. The Foundation does not pay indirect costs on research grants of $75,000 or less. The Foundation does not fund direct interventions or evaluations of programs.

**Application Procedure:** Because the Foundation does not accept fully developed proposals unless it has requested them, applicants seeking research support from the Major Research Grants Program are asked to submit a brief preliminary proposal. Preliminary proposals should be no more than 1,500 words in length. Within those limits, we request the following information:

- a brief description of the project, its central research question(s) and their significance, the relationship of the proposed study to a defined literature or research area, and the new knowledge expected to result from it;
- a concise summary of the conceptual framework, research methods, data collection instruments, and modes of analysis that the project will employ;
- a clear identification of the principal investigator(s) and a clear definition of the role(s) he/she and any supporting researcher(s) will play; and
- an estimate of the time frame for the project and the approximate cost, including the approximate amount to be sought from the Spencer Foundation.

Attachments must include:

- the curriculum vita(e) of the principal investigator(s) (no longer than 6 pages), and
- phone number(s), fax number(s) and email address(es) where investigator(s) may be reached.

**Deadlines and Contact Information:** Preliminary proposals are welcome at any time and will be responded to with in one month of receipt. Please send them to:

**Major Research Grants Program**
**The Spencer Foundation**
**875 North Michigan Avenue, Suite 3930**
**Chicago, Illinois 60611-1803**
References


Appendices

Appendix A. Papers written about the Ecology 2020 project

Appendix B. Sample curricular ideas

Appendix C. Sample comprehensive plan
Appendix A. Papers written about the Ecology 2020 project

Shaffer, DW. Epistemic Games. Under review by Innovate.

Epistemic games
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Abstract
This paper discusses a theory and method for using professional practices as models for state-of-the-art educational games and simulations. I describe the theories of epistemic frames and pedagogical praxis (Shaffer, 2004a, 2004b), which link games, simulations, and professional practices, and then explain how these theories provide a set of tools and techniques for developing epistemic games: simulations that preserve the linkages between knowing and doing that are central to a reflective practice. The result, I argue, could be a set of educational games in which people learn to work as doctors, lawyers, architects, engineers, journalists, and other valued professionals, and thus learn to think in ways that are grounded in meaningful activity and well aligned with the skills, habits, and understandings of a postindustrial society. I illustrate these ideas with an example of one epistemic game that, while still a prototype, demonstrates how a deliberately constructed thick simulation of professional practice can be both an engaging activity and a compelling learning environment.

Jim Gee (this volume) asks the question “What would a state of the art instructional video game look like?” Based on the game Full Spectrum Warrior, he concludes that one model is “to pick [a] domain of authentic professionalism well, intelligently select the skills and knowledge to be distributed, build in a related value system as integral to game play, and give explicit instruction only ‘just in time’ or ‘on demand.’” That is, he describes a good instructional game as an adaptation of “authentic professionalism” in video game format.

Here I’d like to give a more detailed account of the vision that Jim describes so evocatively by looking more closely at the terms “authenticity” and “professionalism.” First, I connect these concepts more explicitly to some of the theories of learning on which they are
Based: ideas about communities of practice (Lave & Wenger, 1991; Wenger, 1998), reflective practice (Schon, 1987), epistemic frames (Shaffer, 2004a) and pedagogical praxis (Shaffer, 2004b). These theories link games, simulations, and professional practices more explicitly, and provides tools and techniques to guide the development of games. To show how this works, I’ll give an example of one such game that, while still a prototype, demonstrates how a deliberately constructed simulation of professional practice can be both an engaging activity and a compelling learning environment.

Epistemic frames and reproductive practices

Jim rightly explains that what we usually think of as the content of a knowledge domain comes “free of charge” when learners pursue meaningful ends within a coherent practice. More than that, though, when learners engage in socially-valued practices toward ends they value—that is when learners can use real tools and methods to address issues they care about—motivation tends to follow. Resnick and I have described learning contexts in which this kind of connection takes place as thickly authentic, meaning that activities are simultaneously aligned with the interests of the learners, the structure of a domain of knowledge, valued practices in the world, and the modes of assessment used (Shaffer & Resnick, 1999). In thickly authentic settings, content is free, and motivation is easy. Creating thickly authentic environments, though, is hard.

The problem of developing thickly authentic learning environments becomes more tractable if we recognize that such rich contexts for learning always involve becoming a participant in some community of practice—whether local or virtual. Lave and Wenger (1991) describe a community of practice as a group of individuals with a common repertoire of knowledge about and ways of addressing similar (often shared) problems and purposes. This collection of practices is made accessible to newcomers through the reproductive practices of the
community: the activities through which individuals develop ways of thinking and reframe their identities and interests in relation to the community. The training and apprenticeship of doctors, lawyers, midwives, and tailors are the reproductive practices through which the next generation of doctors, lawyers, midwives, and tailors is developed.

Elsewhere (Shaffer, 2004a, 2004b) I have argued that participation in a community of practice involves developing that community’s ways of doing, being, caring, and knowing, and that this way of doing being caring knowing is organized by and around a way of thinking. That is, practice, identity, interest, understanding, and epistemology are bound together into an epistemic frame. Different communities of practice (for example, different professions) have different epistemic frames. Lawyers act like lawyers, identify themselves as lawyers, are interested in legal issues, and know about the law. These skills, affiliations, habits, and understandings, are made possible by looking at the world in a particular way—by thinking like a lawyer. The same is true for doctors, but for a different way of thinking. If a community of practice is a group with a local culture (what Jim describes as an ideology or way of “seeing, valuing, being in the world”), then the epistemic frame is the grammar of the culture: the conventions of participation that individuals internalize when they become acculturated. The reproductive practices of the community are the means by which new members develop that epistemic frame.

The linkages between epistemology and practice that make up an epistemic frame are potentially quite powerful in the design of instructional games because one way to create thickly authentic learning contexts using new technology is to adapt the reproductive practices of valued communities of practice—an idea I have described elsewhere in some detail as the theory and method of pedagogical praxis (Shaffer, 2004b).
Dewey argued that knowing and doing are tightly coupled (Dewey, 1915, 1958; Menand, 2001). Learning happens in the context of activity when a person is trying to accomplish some meaningful goal and has to overcome obstacles along the way. Schon (1985) describes professionals as people who make this link between knowing and doing through reflective practice. They think in action. Schon further suggests that professionals develop this ability to reflect-in-action in the professional practicum. Professional practica are environments in which a learner acts as a professional in a supervised setting and then reflects on the results of his or her action with peers and mentors. Ways of knowing and ways of doing become more and more closely coupled as the novice progressively adopts the epistemic frame of the community. Think of internship and residency for doctors, moot court for lawyers, or the design studio for architects. Reflective practice is developed in the progressive internalization of an epistemic frame through action in a practicum scaffolded by the knowledge, skill, and values of peers and mentors.

The good news, then, is that extant communities of practice have already done a lot of work for us. Doctors know how to create more doctors; lawyers know how to create more lawyers; the same is true for a host of other socially-valued reflective practices. Thus the ways in which reflective practitioners develop their epistemic frames may provide an alternative educational model. Rather than constructing a curriculum based on the ways of knowing of mathematics, science, history, and language arts, we can imagine a system in which students learn to work (and thus to think) as doctors, lawyers, architects, engineers, journalists, and other valued reflective practitioners—not in order to train for these pursuits in the traditional sense of
vocational education, but rather because developing those epistemic frames provides students with an opportunity to see the world in a variety of ways that are fundamentally grounded in meaningful activity and well aligned with the core skills, habits, and understandings of a postindustrial society.

To accomplish this end, one has to uncover the structure of a reproductive practice, which means understanding how activities bind epistemology, practice, identity, interest, and understanding to form the epistemic frame of the practice. Because some parts of the reproductive practices are more central to the creation of an epistemic frame than others, analyzing how the epistemic frame is created tells you, in effect, what it might be safe to leave out. That analysis thus guides the development of tools to adapt those activities to the skills, habits, understandings, and abilities of young people. The result of such a process is a simulation that preserves the linkages between knowing and doing central to an epistemic frame—a form of simulation that I refer to as an **epistemic game**. An epistemic game is not necessarily a game in the traditional sense of a video or computer game. As Vygotsky (1978) suggests, “pleasure cannot be regarded as the defining characteristic of play” (p. 92). Rather, he argues, play is the world a child enters when he or she learns to resolve in imaginary form desires that can not be immediately gratified. In play, we participate in a simulation of a world we want to inhabit, and epistemic play is participation in a thickly authentic simulation that gives learners access to the epistemic frame of a community of practice. When it succeeds, it is fun, not because fun is the immediate goal, but because interest—linked to identity, understanding, and practice—is an essential part of an epistemic frame, and thus of an epistemic game.
*Madison 2200: an epistemic game*

To illustrate the idea of an epistemic game, I’ll describe *Madison 2200*, a learning environment developed here at the University of Wisconsin by a student of mine, Kelly Beckett, using the theory of pedagogical praxis. In Madison 2200, high school students learned about urban ecology by working as urban planners to redesign State Street, a downtown pedestrian mall popular with young people in Madison.

Urban planners take a central role in keeping urban ecological systems in balance. They develop land use plans that meet the social, economic, and physical needs of communities. As in many professions, urban planners use technology to develop solutions to these problems, including geographic information systems (GIS) that make it possible for planners to ask “what if” questions and get feedback to informs their decision making process. Urban planning is thus a valued reflective practice though which ideas in ecology impact the environments in which students live, and urban planning practica involve learning to use GIS models and other tools to solve real-world problems.

In the Madison 2200 project, eleven high school seniors from a summer enrichment program worked with a graduate student for ten hours over two weekend days in an urban planning workshop. The students had no prior experience with urban planning before the workshop. At the start of the workshop, students received a project directive from the mayor, addressed to them as city planners, to create a detailed redesign of State Street. An informational packet included a city budget plan and letters from concerned citizens about issues such as crime, revenue, jobs, waste, traffic, and affordable housing. Students watched a video about State Street, featuring interviews with people about the street’s redevelopment, then walked to State Street to conduct a site assessment. Next, students began to work in teams to develop a land use
plan using MadMod, a custom-designed interactive GIS model of State Street that let them assess the ramifications of proposed land use changes. For example, if a student was interested in raising the number of jobs available on State Street, she might make the decision to place a new retail business on State Street (see Figure 1). The model would show whether that proposal would raise or lower the number of jobs predicted for the neighborhood. However, the model would also show how other issues were affected by the same land use choice, thus leaving students with a decision to make regarding the overall impact (and therefore the utility) of alternative land use proposals. After completing a land use plan in MadMod, students entered their decisions into an interactive map of the State Street area. In the final phase of the workshop students presented their plans to a representative from the city planning office.

Data collected in pre and post interviews show that in playing this game students formed—or started to form—an epistemetic frame of urban planning. They developed their understanding of ecology and were able to apply it to urban issues. More important, the urban planning practices and GIS model that the game was built on played an important role in shaping
the development of that understanding. During post-interviews, all of the students said the workshop changed the way they think about cities. One student commented: “I really noticed how [urban planners] have to... think about building things... like urban planners also have to think about how the crime rate might go up, or the pollution or waste depending on choices.” Another said about walking on the same streets she had traversed before the workshop: “You notice things, like, that’s why they build a house there, or that’s why they build a park there.” Students consistently referred to the MadMod simulation model (r = 0.628, p<0.05) and urban planning practices (r = 0.723, p<0.05) when explaining their understanding of the interconnectedness of urban ecological issues.

Perhaps this epistemic game doesn’t seem very game-like—not as game-like, say, as SimCity, or Full Spectrum Warrior. The students in Madison 2200 did enjoy their work. But more important is that the experience let them inhabit an imaginary world in which they were urban planners. They first entered that world because they had volunteered to participate in an experimental workshop. But the world of Madison 2200 recruited these students to new practices, identities, interests, and understandings, as part of a new way of seeing the world. Urban planners have a particular way of identifying, evaluating, and addressing urban issues. By participating in an epistemic game based on these practices, students began to appropriate the epistemic frame of urban planning. This was play. Most serious play. Epistemic play. And as a result, it was fun, too.

Epistemic games as a new paradigm for learning

My point in describing Madison 2200, even though it is only in its pilot stage, is to show how designing an epistemic game based explicitly on professional learning practices has particular advantages. A more intensive study of the reproductive practices of urban planners
will support the development of a more authentic simulation of those practices. Even the current version, though, could be easily adapted for important streets in other cities, and could be used in classrooms to help students start thinking about ecological and civic complexity.

Madison 2200 is just one example of a collection of projects that my students and I have undertaken to explore how the reproductive practices of reflective practitioners such as architects, journalists, mediators, and engineers can form the basis for compelling, computer-supported learning environments for middle and high school students (Shaffer, 1997, 2000, 2002, 2003, 2004a, 2004b, in press). These projects show that (a) one transformative power of new technologies is that they support the creation of epistemic games; (b) such games are developed by analyzing how the epistemic frames of professionals are created, and (c) creating epistemic games depends _both_ on developing appropriate simulation technologies—what I have referred to elsewhere as the game engine or _simulation engine_ (Shaffer et al., 2000)—_and_ on developing an appropriate activity system. That is, what matters is the things learners do, the people with whom they work, the tools they use, and the context in which all of this takes place. The implications of epistemic frames and their role in developing epistemic games are thus quite profound. They suggest that the ways in which professionals acquire their practices may provide an alternative model for organizing our educational system. Epistemic games make it possible for students to learn through participation in authentic recreations of valued reflective practices, and thus gives educators an opportunity to move beyond disciplines derived from medieval scholarship constituted within schools developed in the industrial revolution—a new model of learning for an era of dramatic social and economic transformation brought about by new technology.
References


Augmented by reality: The pedagogical praxis of urban planning as a pathway to ecological thinking
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Abstract

In this paper, we present a study focused on developing students’ understanding of ecology through participation in a technology-supported urban planning simulation—specifically, eleven high school students in Madison, Wisconsin acted as urban planners to redesign a local shopping street using a Geographic Information System (GIS) model. This experimental design was situated within the theory of pedagogical praxis, which suggests that modeling learning environments on authentic professional practices enables youth to develop a deeper understanding of important domains of inquiry (Author, 2003). Results presented here suggest that through participation in the project students (a) developed an understanding of ecology and (b) developed this understanding through the urban planning practices and the features of the GIS model used during the project. Thus, we propose that this augmented by reality learning environment modeled on the professional practices of urban planners extends the theory of pedagogical praxis into the domain of ecology and offers a useful method for developing ecological understanding through participation in simulations that incorporate the authentic tools and practices of urban planning.

Introduction

“Before the city, there was the land.” So begins William Cronon’s (1991) book Nature’s Metropolis, an environmental and economic history of Chicago and the Great West. Cronon argues that the city and the land upon which it is built are inherently related: human beings are the architects and planners of cities, so good stewardship and good citizenship require an understanding of the interdependent relationships between both built and natural environments. The environmental dependencies inherent in cities have the potential to become a fruitful context for new and innovative learning environments in ecological education. Ecology is, of course, a much broader domain than the study of interdependent urban relationships. However, cities are
examples of complex systems that students can both view and experience, thus making concepts in the domain of ecology more tangible and relevant. Cities are places where students can experience how they are personally connected to an ecosystem that is directly affected by their actions.

One way students can gain an awareness of a city’s ecological relationships is through urban simulation: for example, in computer games such as SimCity, where players solve urban problems by maintaining or improving interdependent relationships in a fictitious urban environment (Maxis, 2003). Such simulations model the city as a complex system, providing students with an opportunity to manipulate variables within the system and observe the consequences of their actions (Starr, 1994). The interactions in these simulated worlds provide a context for understanding cities and their ecological complexity.

Here we argue that before there was SimCity, there were real cities—and thus the epistemology and practices of urban planning may provide an authentic medium for understanding the complex relationships of urban ecology. In what follows, we present an analysis of a learning environment that asks students to solve a complex urban problem through the use of a virtual model of their own city.

This work is situated within the theory of pedagogical praxis, which claims that new technologies provide a bridge to assist students in gaining access to professional practices (Author, 2003). Briefly, the theory of pedagogical praxis suggests that authentic representations of professional practices are a useful framework for designing technology-supported learning environments. We thus hypothesize that an urban planning simulation using new technology informed by real-world urban planning practices and tools may be a productive platform for developing students’ understanding of the ecological domain.
To test this conjecture, we developed the Madison 2200 project: a learning environment created to (a) determine if youth can understand concepts in ecology by participating in a simulation activity modeled on the professional practices of urban planners, and (b) if successful, provide data that suggest how this understanding developed. To that end, in this paper we analyze the ecological thinking of 11 students as they worked to solve an urban planning design challenge using an urban computer simulation model. Although we use statistical techniques and a traditional pre-test/post-test design, our account is fundamentally qualitative in nature: we seek to explain the experience of these students in a learning environment modeled on the tools and practices of urban planning.

We situate this study relative to previous research on simulations that develop ecological understanding, including SimCity and augmented reality learning environments (Klopfer & Squire, in press). We then describe the methods and results of Madison 2200, examining whether and how participation in a complex urban planning simulation in the context of real world tools and practices informed student understanding of ecology. Our analysis focuses on (a) the properties of the technology that make complex relationships visible and accessible to students, and (b) the role that authentic urban planning practices played in the development of students’ ecological understanding. We conclude with a discussion of the implications of this research for the theory of pedagogical praxis, and more generally for the development of learning environments based on ecological simulations supported by authentic urban planning practices.

**Theoretical Framework**

Cities are comprised of simple components; however, interactions among those components create dynamic patterns of movement that lead to high levels of complexity (Allen,
1996). This complexity is represented, for example, by relationships among traffic jams, road construction and summer vacationers, or industrial sites, air pollution and land property values. Altering one variable within the system affects all the others, reflecting the interdependent, ecological relationships present in the modern city. A number of approaches currently exist that attempt to model this urban complexity for students.

Urban simulations

Gaming environments such as SimCity (Maxis, 2003) are one means by which students can experience complex urban relationships. SimCity is a simulation that models complex urban systems (Starr, 1994). The simplified game rules enable students to quickly grasp and control the program. As a result, players can start acting upon the virtual environment almost immediately. Although there are significant differences in interface, content, and learning theory among SimCity and other environmental simulations such as Stella™ (Chalupsky & MacGregor, 1999) and StarLogo™ (Resnick, 1994), SimCity does exemplify the basic premise of simulation-based learning environments: students develop understanding of ecological issues by directly manipulating a model of a complex system.

In SimCity, game players take command of an urban grid and must ‘run’ the city by maintaining a balance between several elements: a growing population, environmental perturbations, urban and economic development, and multiple social issues including crime and transportation. They can simultaneously play the role of mayor, urban planner, and city government official. The simulation exposes the complexities of urban ecology, or more specifically, what happens when a player tries to affect change in an urban ecosystem. For example, if a player increases green space in the city, the cost of public utilities also increases, or if he/she places an industrial site next to a residential one, the residential land values fall and the
crime rate rises (Eiser, 1991). As a result, a player must decide: decrease the green space and move the industry, or risk urban flight. SimCity makes visible how human choices affect environmental outcomes, and in turn, enables players to view how those same outcomes subsequently inform human choice. Previous studies have shown that SimCity can help students understand concepts in the domain of urban geography (Adams, 1998) and community planning issues in social studies curricula (Teague & Teague, 1995).

While urban simulation games such as SimCity can help students gain intellectual access to complex ecological systems, there are also significant limitations in using such tools to develop ecological thinking. In SimCity, for example, the city that a player creates and maintains does not always represent an actual city. As in StarLogo and Stella, modeled behaviors may represent realistic patterns of great complexity, but there is little possibility for actual physical experience of the city complexity being modeled. Further, there is no context (such as a planning or city council meeting) in which players explain and justify their actions—their purpose for placing industrial sites adjacent to residential ones, or funding road construction instead of the development of greenspace. As Sanger (1997) suggests, fostering a connection to local issues provides students with a voice that shapes their place within the community—a connection that may be lost in SimCity’s relative lack of grounding in the authentic structures, issues, and activities of students’ lives.

The expansion of space and compression of time in SimCity may also be problematic for the development of ecological understanding. In SimCity, changes occur on a wide-ranging geographical scale, presenting a macro level view of how cities function. SimCity presents players with an entire city to manage, and directs them to pay attention to the numerous interdependent relationships that affect that city as a whole rather than understanding the more
local relationships that they may experience more directly in their day-to-day lives. Real cities grow and change slowly, but to make game play interesting and enjoyable, games such as SimCity let players build new land use developments and solve urban problems on a compressed time scale. Previous research has suggested however, that complex ecological and ecosocial processes exhibit fundamentally different patterns at different timescales (Latour, 1983; Lemke, 2000). Thus, the fast-paced changes in SimCity may actually weaken understanding of how ecological problems occur in the real world — problems that typically unfold over the course of months and years, rather than the virtually accelerated time depicted in SimCity.

*Augmented reality learning environments*

One approach to creating stronger connections between students’ experience of the real world and students’ actions in a virtual model of a complex ecological system is to link real and virtual elements in *augmented reality* learning environments for ecological education (Klopfer & Squire, in press). In these environments, participants are exposed to both a physical and virtual reality, thus providing students with multiple representations for constructing solutions and engaging in actions that solve complex ecological problems. While virtual reality attempts to replace the real world, augmented reality seeks only to supplement it (Feiner, 2002). Innovations in handheld, mobile technologies such as the Global Positioning System (GPS) and the Pocket PC are becoming more common in ecological education. A GPS, for example, enables a student to both gather and respond to data while maneuvering through an outdoor environment and then store it for further analysis (Broda & Baxter, 2003). Learning environments afforded by such technologies are referred to as augmented reality environments because the real world that students explore is supplemented by a related virtual component that is sensitive to changing real world information (Klopfer & Squire, in press). Augmented reality learning environments enable
students to take the technology out of their classrooms and use it to explore the environment around them.

Klopfer & Squire (2004) argue that learning environments designed with augmented reality technologies enable students to participate in the process of scientific investigation because they provide students with the opportunity to develop sampling strategies, analyze data, read and interpret scientific texts to understand problems and design potential solutions. For example, the game *Environmental Detectives* is an augmented reality simulation where students are introduced to topics in environmental science (Klopfer & Squire, in press). In one *Environmental Detectives* study, students were prompted with a simulation of an environmental disaster on their hand-held technology as they explored a local watershed (Klopfer & Squire, 2004). While they traversed the area, they collected and analyzed simulated data to solve the problem. Klopfer & Squire (2004) showed that as students acted to solve the problem, they developed both scientific and ecological understanding.

*Augmented by reality*

The study presented here builds on such augmented reality learning environments. However, in this study, the learning environment is *augmented by reality*: as students engage with a virtual simulation, their problem solving experiences are explicitly guided by real-world tools and practices. Using their own city as an ecological environment, the Madison 2200 project engaged students in a learning environment modeled on the professional practices of urban planners. As in SimCity, participants made land use decisions and considered the complexities that surfaced as a result; however, here they used real-world data and authentic planning practices to inform those decisions. This experimental design was thus situated within the theory of *pedagogical praxis*, which suggests that modeling learning environments on authentic
professional practices enables youth to develop a deeper understanding of important domains of inquiry (Author, 2003).

The theory of pedagogical praxis. The theory of pedagogical praxis suggests that new technologies make it possible for students to learn and participate in meaningful activity by serving as a bridge between professional practices and the needs and abilities of young students (Author, 2003). In other words, new technologies make professional practices accessible to students. To be successful, learning environments based on pedagogical praxis depend upon the alignment of authentic professional practice, technological tool, and domain of knowledge. This study examines this conjecture by mapping it to the professional practices of urban planning, the use of a specialized geographic information system, and the domain of ecology.

The professional practices of urban planners. Urban planners engage in a variety of practices that promote urban development. According to the American Planning Association (2003), these practices include:

1. Formulating plans and policies to meet the social, economic, and physical needs of communities, and developing the strategies to make these plans work
2. Developing plans for land use patterns, housing needs, parks and recreation opportunities, highways and transportation systems, economic development, and other aspects of the future
3. Working with the public to develop a vision of the future and to build on that vision
4. Analyzing problems, visualizing futures, comparing alternatives, and describing implications, so that public officials and citizens can make knowledgeable choices
5. Designing and managing the planning process itself, in order to involve interest groups, citizens, and public officials in stimulating and thought provoking ways
6. Being technically competent and creative, showing both hardheaded pragmatism and an ability to envision alternatives to the physical and social environments in which we live
In short, urban planners take a central role in trying to keep urban ecological systems in balance. They respond to complex urban problems by developing land use plans that function to simultaneously accommodate human needs and ease the burden on the places people use.

Previous research on youth involvement in urban planning programs suggests that involvement in local planning initiatives is an empowering experience, one that can lead to ecological competence and community action (Chawla & Heft, 2002; Horelli, 1997, 2001; Horelli & Kaaja, 2002; Simpson, 1997). However, this body of work emphasizes participatory urban planning efforts between children and adults rather than student engagement with computational models of urban ecological complexity, such as the models that play a significant role in the authentic practice of urban planning.

*Urban planning technology.* One of the most popular technologies used in urban planning are geographic information systems (GIS), broadly defined as a “powerful set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world (Burrough, 1986, p. 6)” GIS models are integral to urban planning practices. Urban planners use GIS to analyze spatial information and find solutions to urban problems (Batty, 1995). GIS models have many applications, helping urban planners to ask fundamental questions about the locations of objects, how landscapes change in response to environmental conditions, or highlight patterns of emergent phenomena that become apparent over time. GIS models make it possible for planners to explore multiple potential solutions to problems, asking “what if?” questions and obtaining feedback that informs the decision making process (Maguire, 1991). In these ways, GIS models support the practices of urban planners, and thus potentially provide access to those practices for students learning about the ecology of complex urban relationships.
The domain of ecology. Ecology, broadly defined, is the branch of science concerned with the interdependence of organisms and the complex systems in which they co-exist. The science of ecology analyzes the connections among biotic and abiotic elements of such complex systems, describing the delicately balanced relationships upon which these systems depend and the ramifications that can occur if those relationships are disrupted. This study focused on the complex ecological systems in urban areas. A key aspect of urban ecology is that such systems directly affect and are directly affected by human activity (Alberti et al., 2003); therefore students need to understand how decisions about the urban environment—and thus their decisions about the urban environment—have interdependent consequences that shape the ecology of the city in which they live.

The Madison 2200 Project

The Madison 2200 project focused on developing students’ understanding of this central ecological principle while they were engaged in solving an authentic urban planning problem using a GIS-based planning simulation tool. The project situated student experience at a micro level by focusing on a single street in their city. Instead of the fast-paced action required to plan and maintain virtual urban environments such as SimCity, this study focused only on an initial planning stage, which involved the development of a land use plan for this one street. And instead of using only a technological simulation, the learning environment here was orchestrated by authentic urban planning practices. These professional practices situated the planning tool in a realistic context and provided a framework within which students constructed solutions to the problem.

Thus, in the Madison 2200 project the profession of urban planning and the technologies that inform it served as the curricular model for introducing youth to the ecological domain. As
such, our analysis of student work in the Madison 2200 project explores a new approach to student understanding of ecology—and more broadly tests the theory of pedagogical praxis as a model for the development of innovative contests for the development of scientific understanding.

Method

Participants

The Madison 2200 project conducted two workshops during the summer of 2003. Eleven high school seniors from a summer enrichment program on the University of Wisconsin campus spent ten hours over two weekend days. The participants volunteered for a workshop focused on city planning and community service. All participants were persons of color, including eight African American, two Latino/a students and one participant of Asian descent. All participants indicated they planned on attending a post-secondary institution. Four participants were female and seven were male.

Workshop Activities

Workshops were divided into three phases: introduction, planning, and presentation.

Introduction (1 hour). Upon arrival at the workshop, students were presented with an urban planning challenge: to create a detailed re-design plan of State Street, a major pedestrian thoroughfare in Madison, Wisconsin and a popular downtown destination for local adolescents. A key practice of urban planners is to formulate plans that meet the social, economic, and physical needs of communities. To align with this practice, students received an informational packet addressed to city planners which contained a project directive from the mayor, a city budget plan, and letters from concerned citizens providing input as to how the street should be redesigned. The directive asked the city planners (that is, the students) to develop a plan ready for presentation to a representative from the planning department at the end of the workshop on
Sunday afternoon.

Students then watched a video about State Street, featuring interviews of people who expressed concerns about the street’s redevelopment that were aligned with issues in the informational packet. For example, the video featured a college student who suggested that the city should place more affordable housing on State Street; a letter from the fictitious ‘Concerned Citizens for Housing’ on the issue of affordable housing appeared in their information packets. Research to determine the current urban planning issues on State Street was conducted prior to the study; both the video and the participant information packet were created in accordance with those findings.

Planning (7 hours). During the planning phase, students walked to State Street and conducted a site assessment. They took pictures of buildings, and became familiar with the locations of stores and housing developments, and with the various ways the street is used. Following the State Street walk, students returned to the planning space and began to work in teams to develop a land use plan using a custom-designed interactive geographic information system (GIS) called MadMod. MadMod is a model built using Excel and ArcMap (ESRI, 2003) that lets students assess the ramifications of proposed land use changes. MadMod has two interrelated interactive components: (1) a decision space and (2) a constraint table. The decision space displays address and zoning information about State Street. Students used 2- or 3-letter zoning codes to designate changes in land use for property parcels on the street (see Figure 1).

![Possible choices](chart.png)

**Possible choices**
- ET: entertainment
- FF: fast food
- FFD: fine dining
- HR: housing
- PP: parking
- RM: retail, misc

**Figure 1.** A piece of the decision space in MadMod. Students made land use changes by placing 2- or 3-letter zoning codes in a shaded cell in the INPUT column.
As students made these decisions, they received immediate feedback about the consequences of changes in the constraint table. The constraint table showed the effects of changes on 6 urban planning issues raised in the original information packet and video: crime, revenue, jobs, waste, car trips, and housing. For example, if a student was interested in raising the number of jobs available on State Street, she might make the decision to place a new retail business there. The model would then show whether that proposal would raise or lower the number of jobs predicted for the neighborhood. However, the model would also show how the five other categories of revenue, crime, waste, car trips and housing categories were affected by the same land use choice, thus leaving students with a decision to make regarding the overall impact (and therefore the utility) of alternative land use proposals. After completing a land use plan in MadMod, students entered their decisions into an interactive map of the State Street area (see Figure 2 for an overview of this planning process).

![Figure 2. The workshop tools used in the design process: (a) a student makes a land use change in the shaded cell in the decision space on MadMod, (b) the change is numerically reflected on the workshop in the deltas column and (c) the change is reflected spatially in ArcMap.](image-url)
Presentation (2 hours). Following the practices of urban planners, in the final phase of the workshop students presented their plans to a representative from the city planning office. (For logistical reasons, this was actually another researcher with knowledge of urban planning practices and unknown to the students who was playing the role of a city planner.) Each group of students designed a presentation that included their final interactive constraint table, the rationale for their decision-making process, and their newly created maps of State Street. Each group had the opportunity to attach additional information such as photos they took of State Street to their presentation if they desired.

Data Collection

Data were collected for the Madison 2200 project using (a) clinical interviews conducted with each participant before and after the workshop, (b) videotapes of the workshops, and (c) field notes taken by project researchers. Students land use plans were also preserved for review and analysis. Interviews included: (a) open-ended questions about ecology and urban planning; (b) novel urban planning scenarios; and (c) a concept map in response to the question, “How are people connected to their cities?” Post-interviews also included questions about the workshop and students’ experiences during workshop activities.

Data Analysis

Data were analyzed using a grounded theory framework (Glaser, 1978; Lincoln & Guba, 1985; Strauss & Corbin, 1998). Pre- and post-interviews from the workshop were transcribed and broken into excerpts. Each excerpt represented one complete answer to a question, and included any follow-up questions or clarifications between the student and the interviewer. Using a constant comparative method (Lincoln & Guba, 1985), emergent trends were identified and categories for coding were developed. Five analytic categories emerged from the data:
Interconnectedness, Understands complexity, Planning practices, Use of model, and Openendedness. When qualitative analysis was completed, frequencies from each code were further analyzed to determine if statistically significant correlations existed between categories. Significant correlations were then used as supplementary support for previously established qualitative findings.

Results

Data in this section support three claims about the experience of students in the Madison 2200 project. First, students developed a deeper understanding of the domain of ecology and of their city as an ecological system. Second, this developing understanding was linked to the practices of urban planning and the interactive GIS model used to enact those practices in the workshop. And third, students were able to apply this framework of tool and practice to novel problem contexts.

The development of ecological understanding

Definitions of ecology. As compared to their pre-interview responses, in post-interviews, students were able to provide more extensive and explicit definitions of the term “ecology”. For example, in the pre-interview, one student said:

Ecology is… I’m not sure what that means; I guess I don’t really know.

In the post-interview, the same student said:

[Ecology is] the study of the ecosystem. Basically how one thing will affect the other thing. If something is removed or placed here or something like that. Like increasing population might lead to a lack of jobs for people, and then it leads to more waste and traffic or something like that, that’s like ecology in the city.

Only 9% of students (1/11) were able to offer a definition of ecology in the pre-interview, compared with 82% of students (9/11) in the post-interview (p<0.01).
Ecological interconnectedness. In their explanations of ecological issues in the post interview, students gave more specific examples of how ecological issues are interdependent or interconnected than in the pre-interview. For example, when asked in the pre-interview whether there are connections between what happens in a city and what happens in the environment, one student said:

[L]et’s say we just had this new drink around and we just litter in the streets – it just depends, I don’t know.

In the post-interview, the same student answered:

[T]hey depend on each other, they affect each other, like they’re interrelated. Like trees for example. Trees help reduce pollution while the city could be producing pollution, so they help create a balance.

Overall, there was a statistically significant difference in the number of references students made to interconnectedness between pre- and post-interview (see Figure 3; pre-interview mean = 3, post-interview mean = 13.09, p<0.01).

![Students' References to Interconnectedness](image_url)

*Figure 3. Students increased their understanding of interconnectedness. (Students have been ordered for clarity of presentation).*
**Complexity of urban ecosystems.** Concept maps showed an increased awareness of the complexities present in an urban ecosystem in the post interview compared to the pre interview. Figure 4 shows one student’s concept maps made in response to the question, “How are people connected to their cities?” The post-interview map has both more nodes and more links than were present in the pre-interview.

![Figure 4. One student’s pre (left) and post (right) interview concept map response to the question “How are people connected to their cities?”](image)

Overall, there was a statistically significant difference in the links and nodes they added to their concept maps from pre- to post-interview.

These more complex concept maps reflect a more sophisticated understanding of the conceptual space. As students completed the concept maps, they explained why they made the connections they chose. For example, during the pre-interview, one student said this about his concept map:

Like jobs are connected to the greenspace, like if you’re a gardener or someone who takes care of the parks or that. And traffic, it affects like car pollution and then you also plan where streets have reduced pollution too, so that kind of affects each other, and crime is left over there. Jobs do create crime there because there are people who have jobs and people who don’t have jobs, so they don’t have a source to get money from so they’ll probably steal that or steal cars. I’m not sure I can’t see too many other connections.

In the post-interview, the same student said:
Well jobs can create crime because more jobs mean more money, and more money might mean more crime. And greenspace kind of attracts crime, because like if you had a really big park it would be easier for crooks and stuff to hang out. That’s kind of an image that the parks give me, sort of. Then if you have traffic you’re going to have pollution, so the best thing you can do is have greenspace to kind of fight that pollution. So, traffic produces pollution. Job produces pollution because of the trash that people accumulate like paperwork, and the pollution will affect the environment, either the air or the ground. Like and how about zoning? Well, people want greenspace, so it will create sort of a demand for it. Jobs would mean more people, more people would mean more pollution, which would mean more traffic, and more people would mean more crime. Like city-wise, like growth would mean more people, like it basically builds on each other, like one helps the other grow a bit…When the city grows and the city has more people its going to need like buildings to house them, or like jobs, like workplaces, you need buildings for that, and like if there are more buildings, there will be more traffic, more of everything, so everything is just connected to it. You can’t really change one thing without changing another.

Role of tool and practice in the development of ecological understanding

Students thus appear to have developed a richer understanding of urban ecology through their work in the project. In this section we examine the role that features of the MadMod tool and elements of urban planning practice played in developing that understanding.

MadMod. When asked in the post interview about elements of the workshop that helped them understand ecological issues, students referred to the interdependencies embedded in MadMod. For example, one student said:

I learned a lot about ecology and city planning, and if you change one thing essentially everything else is going to be changing too. Chain effect and stuff like that. When we were changing stores with the model, we figured out that we’d have to not necessarily put in everything that we wanted cuz it cost money and we had to stay in a budget, but if we changed one thing then maybe the waste would go down but the jobs would go up maybe the housing would go down, so we had to look at all that.

Overall in the post interviews, students consistently referred to the MadMod simulation model when explaining their understanding of the interconnectedness of urban ecological issues ($r = 0.628$, $p<0.05$).

Urban planning practices. During post-interviews students also made frequent reference to urban planning practices when explaining their thinking about ecological interconnectedness. For example, when asked “Do you think it matters where physical structures (like buildings, houses, or parks) are placed in cities,” one student replied:
Yes, because, like, when it comes to parks, you wouldn’t want to place a big old park where nobody goes and it’s hard to reach, and when it comes to buildings, you wouldn’t want to place a big building in the middle of a suburban area or in the middle of a busy street to cause clutter and confusion around the area. These are like, relationships you have to think about. You wouldn’t put a big park with a lot of stuff made for people 45 minutes out of the way, and you wouldn’t make it hard for people to reach. You have to have a good plan. Maybe make it in walking distance and maybe city busses can take the kids to it. So if the parents can’t take them, they can give them money to go to the parks, but you wouldn’t make it so hard to get to cuz then it wouldn’t get its whole value….and, not necessarily a busy street, but you wouldn’t take it and put it in a corner, like if this is a street and this is a dead-end (draws diagram with his hands), you wouldn’t put a big old office building right there and then just come and disrupt the whole area and cause clutter in that area. I meant that you would rather have it in the industry or downtown where a big old building looks like it should go, where it can make money.

Overall there was a statistically significant correlation between students’ references to urban planning and the interconnectedness of urban ecological issues (r = 0.723, p<0.05).

The open-ended nature of urban planning problems and practices seemed to have been of particular importance to students in understanding ecological complexity. For example, when asked “Did you learn anything from the workshop?” one student said:

I learned a lot of stuff about thinking about what city planners do, getting a feel for what they do, that’s kind of interesting. The scenario, like what we had to do, we had to redesign State Street, like zoning or destroying buildings or going to check out places to see what could be changed. There’s a lot to it and there’s like more than one way. Kind of like what city planners do, they go and like, they check out the area to see like what would be appropriate for like a park or a building and it’s a hard decision.

Overall there was a statistically significant correlation between students’ references to openendedness and their understanding of the complexity of issues (r = 0.708, p<0.05).

Students’ use of their ecological understanding

Students developed a deeper understanding of urban ecology through the Madison 2200 workshop, and the tools and practices of urban planning appear to have played a significant role in shaping that change in students’ thinking. In this section of the results, we examine the extent to which students were able to apply ecological understanding gained from the workshop to solve novel urban planning problems, and the role that tool and practice played in this process. In particular, we look (a) at how the workshop changed the way students viewed events in their
real, everyday encounters with cities and (b) at how students addressed hypothetical urban planning problems.

*Real-world experiences.* During post-interviews, 100% of the students (11/11) said the workshop changed the way they think about cities. For example, one student said:

I’m looking at connections a lot closer now, usually you’ll see connections but you don’t think about them as much as you do now, like you know that cars pollute the air and trees like help create oxygen, but then after this you see a lot more different connections like between trees and buildings or why certain things are. Commercial areas are one way and why residential areas are another. I really noticed how they have to, when they think about building things they, like urban planners also have to think about how the crime rate might go up, or the pollution or waste depending on choices.

Most of the students (82% or 9/11) similarly said the experience changed the things they pay attention to when walking down a city street in their neighborhood. “You notice things,” said one student, “like, that’s why they build a house there, or that’s why they build a park there.”

*Hypothetical planning problems.* In the post-interview, students responded to novel, hypothetical urban planning problems, and their answers show increased awareness of the interconnection of urban ecological issues. For example, in pre-and post-interviews, students were asked to address the following urban planning problem:

The Graham County Waste Management Committee is concerned about the growing amount of waste in the county. The waste levels are continually rising and landfill space is becoming a concern. The committee is currently trying to figure out how the amount of waste in the county can be reduced to a level that can be managed. What suggestions could you make to the Waste Management Committee that would help them develop and justify their plan?

Before the workshop one student responded:

Uh, I mean, they could look for a new landfill, like a new place to build a landfill.

After the workshop, the same student responded to a similar problem dealing with the closing of the town recycling station:

Okay, well, first of all, they should have not closed down the recycling plant. They could have cut other stuff, or they could’ve raised taxes to increase revenue, done surveys, or they could have made the zone larger with businesses so they could support the place if they were gonna close it down I think they should keep a recycling plant b/c they should be helping to reduce the amount
of waste which is what they’re trying to go for which is like their goal. But like closing down a recycling plant is going against the goal. They could export the trash I guess, but then that would cost a lot more money too. And they’re like making budget cuts, so they probably wouldn’t be able to afford that. Hmm, okay, I’d say fundraising…like, they could have a festival, like a big festival where it’s a kind of fair that attracts tourism and stuff. That would bring in money. You could rent the fairgrounds, charge for parking, and they can get a certain percentage from the fair people, like in a tax or something. Like a revenue tax.

Changes such as these suggest that students were able to mobilize understanding developed in the context of the redesign of one local street to think more deeply about novel urban ecological issues. Moreover, the data suggest that students used particular features of the interactive GIS model to think in an ecologically complex way about these urban planning problems. For example, in another problem that asked students to generate ways to fund construction of a new elementary school, one student explicitly referred to his experience with the MadMod model:

He can probably just, isn’t this kind of like what we did, how we had to raise the revenue, like he needs to raise the revenue by adding more things to the city that might help raise the revenue? Just like more stores that people could shop at, or more restaurants, more theatres, stuff that they do that people pay money for.

These post-interview urban planning problems show a statistically significant correlation between student references to the workshop model and the interconnectedness of urban ecological issues (r = 0.615, p<0.05).

In summary, these results suggest that through participation in the Madison 2200 workshops students (a) developed an understanding of ecology and applied this new understanding to urban planning problems during the post-interview and (b) that urban planning practices and the features of the interactive GIS model used in the workshop played an important role in shaping the development of that understanding, and in its mobilization in novel contexts.
Discussion

Ecology is the study of the interdependence between organisms and their environment. In order to understand ecology, students need to be exposed in some way to experiences that make visible that interdependence and appropriate complexity. Klopfer & Squire (in press) have shown that augmented reality learning environments can help to resolve the existing dichotomy between indoor technology environments and outdoor experiences by using mobile technologies in the context of nature exploration. In this way, it is possible to adapt technological tools once tied to an indoor classroom for use in authentic ecological settings. Augmented reality bridges reality and virtual reality using technology to supplement, rather than replace reality, and thus enables students to experience both simultaneously (Feiner, 2002).

Addressing the same issues from a different, yet potentially powerful perspective, the Madison 2200 project used an augmented by reality learning environment, which offers another method to bridge the qualities of outdoor education and technology-based learning. As in augmented reality learning environments, participating youth experienced both an outdoor environment and a simulated one. Rather than using technology to enhance their outdoor experience, however, here students took realistic action to determine a solution to a complex problem within their simulated, virtual environment by using real world tools and practices.

Following the theory of pedagogical praxis (Author, 2003), the tools and practices students used to construct ecological understanding in the Madison 2200 project were mapped from the professional practices of urban planners, which have ecological principles embedded within them. Urban planners employ a particular way of thinking about and finding solutions to complex urban ecological problems. By using these practices, the Madison 2200 project
provided students with an urban planning framework for thinking about urban ecology. In this augmented by reality learning environment, students engaged in a course of action that paralleled the decision-making processes and technological tools of practicing urban planners. As a result of using these tools and practices through their actions within the virtual simulation environment, students gained a functional understanding of ecology and they were able to apply that ecological understanding to situations in both real-world and hypothetical contexts in their post-interviews.

In *Democracy and Education*, John Dewey claimed that education is valuable:

“when the young begin with active occupation having a social origin and use, and proceed to a scientific insight in the materials and laws involved, through assimilating into their more direct experience the ideas and facts communicated by others who have had a larger experience (1916, p. 227).”

In this study, students acted to solve a realistic urban problem. Working to solve that problem using authentic urban planning practices provided them with an opportunity to develop ecological understanding. The Madison 2200 project thus offers one potential method for instilling understanding of ecology in youth through participation in a simulation that incorporated the professional practices of urban planning. The results presented here suggest that these students did learn concepts in ecology by engaging in authentic urban planning practices using urban planning tools—and this conceptual development was linked to the technologies and practices of the profession. These results thus suggest that (a) simulations modeled on authentic professional practices offer a new method for developing ecological understanding and (b) the theory of pedagogical praxis may be an appropriate framework for furthering the development of such simulations.
References


Author. (2004). Teacher’s College Record.


Appendix B. Sample curricular ideas

Day 1:
Welcome
Hold a preliminary planning discussion (to provide context)
Introduce the planning challenge
  • Issue a project packet containing the following information: a problem statement, budget statements, and letters from the public
  • Determine Project Teams
  • Ask/Answer questions
Hold planning meeting (to go over packet information and discuss what is meant by a Comprehensive Plan)
Begin research for neighborhood statistics (start using game engine – MadMod v2)

Day 2:
Begin Site Analysis (travel to site)
Take digital pictures
Talk to residents about issues facing the neighborhood
Hold planning meeting (compare and discuss fieldnotes)

Day 3:
Continue discussion of fieldnotes if necessary
Begin to compile a list of site features (what the neighborhood already has -- a grocery store, library, park, etc.)
Look at pictures as a point of reference
Reference that list with what the residents (and the public letters from the packet) need
Store information in MadMod
Produce a map of the existing land uses of the neighborhood at both the broad level and the parcel level, including the site features
  • Note: Map should be constructed in MadMod v2 and use the colors typically used in everyday practice
  • Save the map in MadMod and print out a large copy for display
Hold planning meeting (discuss what they think about the land uses, outline what they feel are priorities, etc.)

Day 4:
Discuss potential land use changes/or areas for new development with team
Enter those proposed changes into the MadMod v2 interface
Discussion: What is zoning?
Activity to uncover zoning and ordinance regulations (using information obtained from the epistemography)

Day 5:
Discuss potential impacts of zoning regulations on land use plans
Discuss how products created thus far will fit into the Comprehensive Plan
Appendix C. Sample comprehensive plan

Note: This is an amended version of an existing comprehensive plan produced for the city of Madison, Wisconsin and is in no way intended for distribution. It is provided here only as an example. The original plan may be viewed in its entirety at: http://www.ci.madison.wi.us/neighborhoods/southmadison_plan.pdf

South Madison Neighborhood Plan
Adopted by Common Council
Resolution No. __________, I.D. No. ____________
___________, 2004

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¹ All names have been changed.
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Introduction

South Madison is a vibrant component of the greater Madison community. During the past three years, an array of planning projects have been undertaken or planned on the south side: Park Street Revitalization: Opportunities to Reality Report, Park Street Urban Design Guidelines, Badger-Ann-Park Redevelopment District Plan, Penn Park Master Plan, Wingra Creek BUILD Grant, and Wingra Creek Parkway Master Plan, to name just a few. Many of these planning initiatives have focused on the future growth of the Park Street corridor: an arterial roadway that bisects the planning area into east-west quadrants. Serving as the southern gateway into the heart of Downtown Madison, its very location channels people the length of Park Street as well as through its adjacent neighborhoods to work, play, or visit Downtown Madison, UW-Madison, St. Marys and Meriter Hospitals and other local destinations. (See Map 1.)

Planning Area Study Boundaries

The South Madison Neighborhood Planning Study Area, which is bounded by Monona Bay-Haywood Drive on the north, Lake Monona on the east, Fish Hatchery Road on the west, and the West Beltline Highway on the south, is an urban, older, built-up neighborhood. (See Map 2.) The neighborhood planning area lies within two municipal jurisdictions: the City of Madison and the Town of Madison. For the sake of this report, the vision, goals, and strategies focus on lands lying within the City unless otherwise noted. The planning area includes parts of Aldermanic District 13 and parts of Aldermanic District 14.
**Plan Focus:**

There is strong support by South Madison residents to instigate change within their neighborhoods. However, any efforts to bring about change must not be executed at the expense of long-time residents and businesses. The challenge of the community is to identify what changes are necessary to enhance the community, to develop a strategic plan to bring about such changes, while at the same time remaining cautious of the breadth and scope of such changes may have on the community as a whole. Furthermore, there lies an additional challenge for the South Madison: to remain a place of affordability for all residents and businesses. The focus of this plan is threefold:

1. Develop a vision, goals, and objectives for the residential and business areas lying to the east and west of South Park Street corridor from West Badger Road to Haywood Drive.

2. Formulate strategies and plan recommendations for key issues identified by neighborhood residents in areas of: economic development, housing, land use, parks and open space, and transportation related issues.

3. Identify short- and long-term action strategies for high priority recommendations for governmental officials, City staff, as well as the South side organizations to foster, initiate, monitor, and implement.

Madison’s Downtown, UW-Madison, and St. Marys and Meriter Hospitals lie directly to the north of the study area. Capturing new business development to serve these key generators and providing a range of housing opportunities for people to walk to work are key for future growth of the area.
While it is inevitable that South Madison will change, the depth and diversity of the input of the district alderpersons, neighborhood planning council, neighborhood associations, and business community will ultimately shape how such change is carried out. The South Madison Neighborhood Plan is just one of the many steps that will enable South side residents and business community members to be proactive. Above all, this mid-range plan (5 to 10 years) articulates a vision, goals, and a set of improvement projects that will transform the neighborhood into a more livable community to live, work, and to play.

**Strategic Positioning for the Future**

South Madison is ripe for redevelopment. Its strategic location to the employment generators of the UW-Madison, St. Marys and Meriter Hospitals, and the heart of Madison’s Downtown as well as its accessibility to the West Beltline Highway makes it attractive for businesses. The South Park Street corridor has a range of small- to large-scale sites that will eventually change uses. It is critical to have a clear vision of the future, capturing the potential of economic growth, retention of key businesses, and tapping into specific market niches.

Residents that have chosen South Madison to live recognize its many assets and its strategic location provides easy access to much of Madison. Improving the pedestrian movement in the neighborhood can only enhance the walk to work and/or livework environment that is already conducive to the area. In the future, it is envisioned that Park Street can function as a multimodal corridor (i.e., streetcar or trolley) linking with the University, hospitals and health care facilities, and Downtown Madison. Development of a possible commuter line on the Union Pacific rail corridor will make it more accessible to residents and attractive for the business community.

The South Madison neighborhood associations want to remain proactive in shaping the direction of their neighborhoods. To help them accomplish this, the Madison Community Development Block Grant (CDBG) Commission designated South Madison (Census Tract 13 and part of Census Tract 14.01) to receive one year of planning services and two subsequent years of CDBG funding. The criteria used to select this neighborhood area was based on the percentage of low- and moderate-income population residing in the area, the willingness on the part of residents to develop a neighborhood plan, and the past successes of neighborhood-based organizations in executing neighborhood projects.

In September of 2001, the Madison Common Council confirmed the appointment of a neighborhood-based steering committee to guide the planning process in South Madison. The South Madison Neighborhood Steering Committee (SMNSC) then set forth the framework for the planning process by:

1) Identifying the major issues facing the neighborhood;
2) Formulating strategies to achieve desired outcomes; and
3) Setting the foundation for collaborative efforts between public and private sectors to help implement plan recommendations.
Planning Process

The planning process was conducted in five phases:

*Phase One: Determining Objectives*
*Phase Two: Data Collection & Analysis*
*Phase Three: Issue Identification & Goal Formation*
*Phase Four: Plan Development*
*Phase Five: Review and Adoption*

The South Madison Neighborhood Planning Process was a longer planning process than originally anticipated. A historical event occurred nine months into the process: negotiations commenced between the City of Madison, City of Fitchburg, and Town of Madison that would result in the dissolution of the Town of Madison over the next twenty years. It was determined that the planning process should resume after the final agreement was approved by the State of Wisconsin. SMNSC resumed its planning process in late December 2003 after a hiatus that lasted from July 2002 to December 2003.

**South Madison Planning Initiatives**

Early in the planning process, it was recognized that several other planning and/or project activities were underway or planned for in the greater South Madison area. The South Madison Plan provides the comprehensive framework for major improvements in the residential, commercial, and industrial areas. Many of the other plans will provide detailed strategy on how to accomplish the objectives highlighted in this document.

Neighborhood residents identified major assets and opportunities for the South side.

**Planning Process Outcome**

The South Madison Neighborhood Plan will serve as the comprehensive framework for future improvements on the South side. Neighborhood residents have identified the major issues facing the neighborhood, formulated strategies to achieve desired outcomes, and have set the foundation for collaborative efforts between the public and private sectors to assist in implementing the plan recommendations. The implementation of plan recommendations will vary based upon existing resources, community support, and priority of need relative to other citywide planning initiatives. A summary of the top priority plan recommend actions are described in the *South Madison Neighborhood Plan Summary Report* (2004).
Neighborhood History, and Sub-Area Profiles

History
The South Madison neighborhood is one of the oldest areas of the City. South Madison began as one of the City’s first platted suburbs. It was described in a 1902 article in the Wisconsin State Journal as a “suburban addition to the Capital City, beautifully located on the south shore of Monona Bay. It has a population of about 400, cosmopolitan in character.” The area became home to working and middle class families whose members walked to work on the isthmus by way of the Chicago & North Western Railroad tracks. As do so many urban neighborhoods, South Madison has evolved. Some landmarks from the early years remain. The former dairy at Fish Hatchery and Park Streets, started by the Bancroft family in the 1920s, was one of many that delivered bottled milk daily to Madison homes and shops before sunrise. Neighborhood resident Mary Ann Opelt’s fondest memories are of the dairy. The ice cream parlor and soda fountain, closed in 1967, “was a very popular place for high school kids, and families,” she reminisces. Ice cream was sold at the dairy until 1969.

Around 1950 the South Madison Neighborhood Center on Taft Street was established (on the site of what now is the Boys and Girls Club), as South Madison and its residents developed a sense of identity. The University of Wisconsin Arboretum, Olin-Turville Park, and Wingra Creek, with its turtles and herons, all remain to provide tranquility in the center of a busy city. Many places and landmarks in South Madison are gone. A sand ridge, Dead Man’s Hill, rose south of today’s Haywood Drive and held Indian mounds and the remains of some early settlers. It was leveled at the turn of the century to be used as fill for lowlying areas, as was Richmond Hill, where Romnes Apartments for the elderly now stands. A sanitarium converted to the Lakeside House hotel in what is now Olin Park drew tourists from as far away as St. Louis, but burned to the ground in 1897. The Monona Lake Assembly, in tents in Olin Park, had a national reputation in the early 1900s and drew 15,000 people each summer to swim, play, listen to live musical performances, and hear inspirational, intellectual, and political lectures.

More recently, the A&P grocery store on South Park Street became the Post Office; the K-Mart on Ann Street is now a building materials supplier; the Bob White Candy Company on East Olin Avenue is gone, but the nearby Eddie’s Wonder Bar, a favorite of gangsters on their way from Chicago to the north woods in the 1930s, remains as a tavern. Additional recent changes include:

The Bancroft Dairy bar (Morningstar Dairy site) was a popular place until it closed in the late 1960s. (Photo courtesy of Wisconsin Historical Society)
• Construction of the Dane County Forum in 1963 (rebuilt as the Exhibition Hall in 1995)
• Construction of the Dane County Coliseum in 1967 (subsequently renamed the Alliant Energy Center)
• Construction of Madison Fire Department Station #6 on West Badger Road in 1987 (replacing the old station at South Park Street and Fish Hatchery Road)
• Construction of the South District Police Station on West Badger Road in 1987 (now occupied by Centro Hispano, an agency providing services to South Madison’s burgeoning Hispanic community)
• Remodeling of Burr Oaks Bowl to Harambee Health and Family Center at Villager Mall in 1995
• Construction of James Coleman Wright Middle School on Fish Hatchery Road in 1997
• Construction of the Boys and Girls Club teen addition (former South Madison Neighborhood Center) on Taft Street in 2001
• Construction of the Catholic Multicultural Center on Beld Street in 2002 (replacing St. Martin House)
• Construction of the new South District Police Station on Hughes Place in 2002
• Demolition of the Olin Avenue Bridge to create a street level crossing on West Olin Avenue in 2003
• Construction of a new and larger Mt. Zion Church on Baird Street in 2004

Some landmarks of the past are gone, but remain clear in the memories of South Madison residents and neighborhood activists. Many local residents have memories of the area dating back over half a century. Longtime activist Richard Harris, PhD remembers the 1930s and 1940s when parts of South Madison were still a swamp, while resident Jewell Freeman remembers the late 1940s and early 1950s when a trailer camp was located at the corner of South Park Street and West Badger Road. It was a mixture of “dogs, mud, weeds and everything else,” she remembers. Ben Parks came to Madison in 1953. He remembers the outhouses in the neighborhood because people did not yet have indoor plumbing. Melba McShan remembers neighbors raising chickens and pigs in South Madison back when Bram’s Addition was an outlying area commonly known as ‘Hell’s Half-Acre.’

While the settlement of South Madison began late in the 19th century, it was hastened by the destruction of the Greenbush neighborhood, (“the Bush”), bulldozed in the late 1950s as Urban Renewal came to Madison. Just north of South Madison, the Bush was an ethnic enclave where immigrants black, white, and Jewish from Eastern and Western Europe settled, in part because they were not welcome in other parts of Madison. The old ethnic neighborhood was replaced by spot clearance and redevelopment of land into a range of uses. Streets were paved; including curb, gutter, sidewalk and streetlight installation; storm and sanitary sewers were built, trees were planted, Penn Park was completely redeveloped, a tot-lot was built on Fisher Street, and a number of apartment complexes were built, many for those who had been displaced. The relocation of Greenbush community members caused a rapid increase in South Madison population. The
construction of John Nolen Drive causeway in 1966 increased the linkage of South Madison to downtown, further contributing to an increase in population and construction.

During the 1960s, the growing population created a demand for community facilities. Mt. Zion Baptist Church and St. Paul United Holiness Church were established in Bram’s Addition. Lincoln Middle (now Elementary) School, originally planned as Burr Oaks Junior High School, was built in the Burr Oaks neighborhood. St. Martin House, operated by the Catholic church for social service and religious purposes, was relocated to the South side from the northern end of Park Street. As mothers joined the workforce, childcare became an issue and Madison Day Care, now Child Development, Inc., was created by the community. The ethnic diversity of South Madison continues to this day. The area continues to welcome the newest immigrants to Madison.

Between 1980 and 2000, the Hispanic population in South Madison increased by 660%, from 114 persons to 869 persons (U.S. Census). During the same period, the Asian population increased by 1,271%, from 65 persons to 891 persons. Many new businesses have replaced some of the gas stations that bus driver Noel Johnson remembers seeing as he drove a Madison bus down South Park Street. There are now five Asian food stores on the street and Hispanic grocery stores are beginning to appear. Resident Peaches Lacy remembers when the Park Plaza Shopping Center (now the Villager Mall) replaced a golf course in the 1970s. “It was a really nice shopping center, with Borman’s Clothing store, a Rennebohm’s, Burr Oaks Bowl, a grocery store and other stores. Today the shopping center remains, but its focus has shifted from primarily retail to human services with a smaller retail component, including the Dane County Department of Human Services, the Harambee Health and Family Center, the South Madison Branch of the Madison Public Library, and facilities operated by UW-Madison, Edgewood College, and Madison Area Technical College.

The historic richness of the diversity of South Madison residents is shared with the city as a whole, whether through restaurants, grocery stores, ethnic festivals, or simply the opportunity to meet and work with people with a variety of life experiences.

**Sub-Area Profiles**

The planning area contains multiple neighborhoods that vary in age, character, and composition. Four neighborhood associations lie within the planning boundaries: Bay Creek, Bram’s Addition, Burr Oaks, and Capital View Heights. One resident association, Romnes Apartment Association, also provides resident based representation from the diverse population living in a public housing complex. Map 3 depicts neighborhood association boundaries. The South Metropolitan Planning Council, a coalition of neighborhood associations, is the umbrella organization that coalesces broader neighborhood issues in the area (but their boundaries are larger than the planning area). Moreover, the South Metropolitan Business Association and Park Street Partners are also major stakeholders in the revitalization of South Park Street business corridor. A brief profile of the residential and commercial-industrial areas follows. Appendix A and B contains statistical data and thematic maps of the planning area.
Opportunity Analysis

Neighborhoods are dynamic, complex systems that are in the process of change, some gradually and others rapidly, depending upon a variety of factors. At the present, there is tremendous momentum occurring in South Madison to revitalize the South Park Street corridor and to enhance and upgrade the various residential neighborhoods, parks and open spaces, shopping areas, and anchor institutions. South Madison neighborhoods are undoubtedly vibrant culturally, economically, and as well as recreationally. To build upon these rich attributes - the people, natural resources, and location amenities - underscores the potential to improve the sense of identity of the South Madison neighborhoods. However, for such change to occur, public and private support will be required to alter the character of the South side. To better understand the intricacies of the South side neighborhoods, it is important to visually map the physical and other significant features that influence the past and present workings of the South side neighborhoods.

Map 4: South Madison Opportunities Analysis
Major Barriers

Physical Barriers

- Natural and physical barriers have greatly influenced the various linkages that interconnect the four neighborhood areas.

- The South Madison study area has strong, well-defined edges. The West Beltline Highway on the south, Fish Hatchery Road on the west, and John Nolen Drive on the east create explicit, impenetrable barriers, especially to pedestrian movement.

- While the majority of the neighborhoods have good north-south transportation connections, the east-west connections are inadequate. These physical barriers, in connection with the other major arterial street systems, create an environment where neighborhoods are not connected with one another, creating the potential for isolation.

- The Union Pacific Railroad line, running north-south in the eastern section of the neighborhoods, is another strong edge due to its elevated grade, which, transverses the neighborhood from West Badger Road to West Olin Avenue. Within this 1.1 mile distance, there are only two points for pedestrians to cross and only one point for vehicles to cross in the east-west direction.

- Wingra Creek, a navigable waterway, runs east west, parallel to West Wingra Drive. Since pedestrians transverse South Park Street to access the abundance of goods and services available to them, an ongoing conflict remains between vehicular traffic and pedestrian traffic throughout the length of the South Park Street corridor.

Political - Social Barriers

South Madison is located within two distinct jurisdictions: City of Madison and Town of Madison. For the most part, neighborhood residents, the local business community, and the Madison and Dane County region are oblivious to the differences in past and current governmental policies, services, and priorities that have influenced the growth on the south side.

However:

The difference in multiple jurisdictions, between the City of Madison and Town of Madison, have created difference in the land use planning, capital improvements, and delivery of services.

Perceptions of the South side of Madison - that of being higher crime, lower income households, risky business ventures - has hampered the reinvestment in a vibrant community.
**Major Opportunities**

South Park Street is the southern entrance to major employment centers of Madison: University of Wisconsin-Madison, St. Mary’s Hospital, Meriter Hospital, and Downtown Madison.

South Park Street will be the key element in uniting, blending and connecting these neighborhoods together.

St. Mary’s Hospital, Meriter Hospital and Dean Clinic are stable institutions that have historically invested in the future of their properties. Moreover, they represent a vital lifeline of the neighborhoods by providing a strong job market, purchase of neighborhood goods and services, and providing funding for neighborhood-based projects.

Celebration of the different cultures is a strong influence on the vibrancy of the neighborhoods: public art, restaurants, retail stores, centers of worship, and gathering places are rich in the African-American, Hispanic, and Southeast Asian cultures.

The South Madison neighborhoods have several places where the cultural, educational and social activities of the community have traditionally been situated or are growing to preserve cohesive neighborhoods. The anchoring institutions include, but not limited to: Lincoln Elementary School, Wright Middle School, Franklin Elementary School, Boys and Girls Club of Dane County, South Madison Branch Library, South District Police District, Mt. Zion Baptist Church, St. Marks Lutheran Church, Catholic Multicultural Center.

The neighborhoods hold the public schools in high esteem as a place of learning, as well as a place of gathering for both children and neighborhood residents. There are three schools in this neighborhood: Franklin Elementary, Lincoln Elementary, and Wright Middle School. The stability of the educational centers is a priority for the future growth of the area.
**Major Assets**

South Madison is abundant in resources. Map 6 shows some of the assets on the South side.
Visions, Goals, and Objectives

South Madison is a vibrant place to live, shop, and to experience the cultural and ethnic diversity that it offers. Both neighborhood residents and the business community support many of the changes that are occurring on the South side. Developing a neighborhood plan is just one way that residents can become involved in the decision-making process, which ultimately shapes the outcome of their community. To be proactive, to anticipate change and to continually build upon existing resources, will lead to a deliberate dialogue in the direction, support, and advocacy that is required to initiate the positive changes that South side residents are striving for.

**Vision Statement**

The South Madison Neighborhood Steering Committee (SMNSC) developed a vision statement that captures the essence for the future of the South side (see sidebar). With their strong acknowledgement that the Park Street corridor is the backbone of the neighborhood, they also reaffirmed the vision statement generated from the *Park Street Revitalization: Possibilities to Reality Report* (2001). It is crucial for the visions to work together – to complement each other – to ensure the South side becomes the place both residents and businesses will cherish.

<table>
<thead>
<tr>
<th>South Madison Neighborhood Plan Vision Statement</th>
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<tbody>
<tr>
<td>South Madison will be a safe, attractive and healthy community to live, work, learn and play -- a place where:</td>
</tr>
<tr>
<td>• Cultural diversity thrives;</td>
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<tr>
<td>• Children are cherished;</td>
</tr>
<tr>
<td>• Deep community and social connections prevail;</td>
</tr>
<tr>
<td>• Pedestrians, bicyclists and motorists can safely and easily transit;</td>
</tr>
<tr>
<td>• Affordable housing is abundant;</td>
</tr>
<tr>
<td>• Compatible businesses locate and prosper;</td>
</tr>
<tr>
<td>• Parks are inviting to residents and visitors; and</td>
</tr>
<tr>
<td>• Green space is treasured.</td>
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</tbody>
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<tr>
<th>Park Street Revitalization: Possibilities to Reality Report</th>
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<tbody>
<tr>
<td>The South Madison Neighborhood Plan builds upon the <em>Park Street Revitalization: Possibilities to Reality Report</em>. Within this plan, the vision statement for Park Street was confirmed by the steering committee. It is:</td>
</tr>
<tr>
<td>Park Street will be a visually appealing and socially stimulating corridor by increasing economic multimodal travel, and capitalizing on the rich ethnic diversity of the surrounding neighborhood through partnerships with the surrounding neighborhoods and the University, the city at large, and the Downtown.</td>
</tr>
</tbody>
</table>
Neighborhood Goals and Objectives
The SMNSC identified nine major goals. The goals and associated objectives are intended to guide future policy decisions regarding South Madison.

It is important to understand the character of a neighborhood when determining what to preserve, enhance, and change to make the neighborhood livable today and for future generations. The history of the neighborhood, the values of its residents, and the physical, social, and economic components that contribute to the well-being of the neighborhood are all important factors to review in planning for the future. Preservation of residential areas, reinvestment in business districts, and the well-planned redevelopment of underutilized properties are just some of the land use decisions that will ultimately influence the long-term stability of a neighborhood.

Goal 1: Neighborhood Character
Goal 1 – Respect and celebrate the cultural diversity of the residents and business community.  
Objective 1.1 – Support neighborhood cultural programs, services, and businesses that reflect the values and cultures of the south side.  
Objective 1.2 – Support expression of cultural diversity through physical design.

Goal 2: Neighborhood Land Use
Goal 2 – Promote sound and orderly development that will enhance the greater South Madison Neighborhoods.  
Objective 2.1 – Preserve single-family and two-family residential areas in the predominantly residential areas within the neighborhoods, while encouraging multi-family and mixed-use projects along major transportation corridors.  
Objective 2.2 – Provide adequate buffers between the residential and commercial, office and industrial uses. Encourage the gradual transition of industrial and heavy commercial uses directly adjacent to residential areas to more compatible uses. Relocate intense commercial and manufacturing uses to more appropriate sites within the neighborhood.
Goal 3: Business and Commerce
Residents of South Madison are interested in the continued economic vitality of their neighborhood and its connection with the larger regional market. The area welcomes the continuation of businesses, expansion of businesses, and new business startups. A glimpse of South Park Street Corridor reveals a resurgence of new businesses. It is desirable to foster this new entrepreneurship, provide adequate space for businesses, and to attract other prominent businesses that would employ persons living within the neighborhood.

Promote the continuation of businesses, expansion of businesses, and new start-ups that fit the overall makeup the area.

Objective 3.1 – Develop strategies to attract growing businesses, such as those in the biomedical and high technology sectors that would be complementary to the strong economic base that the hospitals and University of Wisconsin-Madison currently provide.
Objective 3.2 – Develop business strategies to attract and retain small- to medium-scale retailers, whose products are unique to the regional market, to create a vibrant mix of uses. South Park Street hosts international retailers and restaurants that are an important asset to continue to nurture.
Objective 3.3 – Develop a marketing plan for South Park Street Corridor. Explore the creation of a BID (Business Improvement District) to implement coordinated marketing plans.
Objective 3.4 – Improve the internal circulation in the areas zoned for commercial and manufacturing uses off of Fish Hatchery Road and South Park Street. Attract employers to the available commercial and industrial zoned properties.
Land Use Recommendations

Map 6. South Madison Major Plan Recommendations
Recommendations
As part of the City of Madison Comprehensive Update, request that the Department of Planning Development incorporate the proposed land within the adopted comprehensive plan.

Map 7. Proposed Land Use Map Changes
Redevelopment Recommendations

SMNSC identified five potential redevelopment sites that would help revitalize specific residential and commercial areas in greater South Madison. Although the community does not have site control, it is hopeful that existing property owners or future site developers will use the guidelines embedded in the conceptual redevelopment designs for these key strategic sites. Map 9 depicts future proposed redevelopment areas.

Map 8: Proposed Redevelopment Areas in South Madison
Implementation of the South Madison Plan

The SMNSC has solicited support for the plan recommendations through a variety of methods, such as a neighborhood inventory, newsletter articles, personal face-to-face interviews, and public meetings. The major role that the neighborhood will play is during the implementation of the plan recommendations. There are three major steps for plan implementation:

• Adoption of the **South Madison Neighborhood Plan** by the Madison Common Council. The *South Madison Neighborhood Plan* was introduced August 3, 2004, to the Common Council for adoption. During the adoption process, nine City Boards and Commissions reviewed the plan recommendations for approval. Attached to this neighborhood plan is the Common Council resolution that designates the lead City agencies and departments to implement the plan recommendations. Inclusion of neighborhood improvement projects in the capital or operating budgets, work plans, or other sources of funding from state or federal governments are possible ways to implement plan recommendations.

• Monitoring of plan recommendations by Alderpersons and neighborhood associations. As part of the adoption process, the Department of Planning and Development (Planning Unit) will submit status reports to the Common Council on plan recommendation implementation. It will be important for the neighborhood associations to develop a strategy for plan implementation and to monitor the status of the plan’s recommendations. This effort will necessarily involve seeking funding from a variety of sources, including governmental, private, and non-profit organizations. To be successful in this endeavor, neighborhood organizations will need to understand the annual budget cycles so that they can be strategic in their timing to request funds.

• CDBG funding. As part of the planning process, the South Madison Neighborhood will receive approximately $152,000 in Community Development Block Grant (CDBG) funding over the next two years to implement eligible neighborhood improvement projects. The SMNSC will work with various community-based organizations to carry out the neighborhood’s top plan recommendations.
Top Plan Recommendations
Steering Committee members identified the top recommendations that would make the overall difference in the quality of their neighborhood. Below is a summary of the top seven recommendations:

1. Redevelop the Villager Mall-Comstock Tire site with high quality, commercial redevelopment that would result in new employment opportunities, improved service facilities, and improved pedestrian circulation;

2. Improve South Park Street intersections, especially West Badger Road, Hughes Place, Buick Street and Haywood Drive, for pedestrian safety;

3. Create and expand recreational opportunities at the Lincoln Elementary School playground;

4. Improve Wingra Creek’s navigability, shoreland stabilization, and shoreline amenities, such as canoe launches and storage, and the installation of a solar system walk for recreational and public purposes;

5. Promote business retention and redevelopment of underutilized sites to residential and/or commercial uses in the area from West Wingra Drive to the Morningstar Diary site;

6. Increase owner-occupancy in existing and planned housing development (includes both single-family homes and multifamily apartments);

7. Improve Quann Park’s facilities and the accessibility to the park area, especially pedestrian safety at the Bram-Koster railroad viaduct and install sidewalks along Bram-Koster Street.

The SMNSC has diligently worked with residents, business community, and other major stakeholders to prepare this document. The SMNSC will continue to work with major stakeholders to implement plan recommendations. It will be important for the community to monitor the progress of implementing plan recommendations.
Appendix A. Statistical Analysis: U.S. Bureau of the Census Data

The South Madison Neighborhood Planning Area includes land area that lies within two Census Tracts: Census Tract 13 and a portion of Census Tract 14.01. Census Tract 14.01 includes both the City of Madison and Town of Madison. For the purposes of this report, only data for City of Madison is included in this profile. Appendix A contains detailed statistical profile of Census Tracts 13 and 14.01. Below is a summary of notable information regarding South side neighborhoods (data is from the 2000 U.S. Census unless otherwise noted):

**Population.** According to the 2000 U.S. Census, 2,572 people live in CT 13 and 3,829 in CT 14.01. This represents a total of 3.1 percent of the City’s population of 208,054.

**Prior Residence.** In 2000, 46.5 percent (CT 13) and 25.5 percent (CT 14.01) of persons five years or older lived in the same residence for the last five years or more compared to 39.2 percent City-wide. From 1995-2000, approximately 47.1 percent of the residents moving into the neighborhood were moving from other parts of the City.

**Race and Ethnicity.** The City of Madison was 84.0 percent white and 16.0 percent persons of color. CT 14.01 has the most diverse population of all Madison census tracts, with 31.5 percent white and 68.5 percent persons of color. CT 13 was closer to the representation of the City as a whole with 88.6 percent white and 11.4 percent persons of color.

- Black or African-American persons were the largest concentration of persons of color in CT 14.01 at 31.2 percent (ranked second among City census tracts). In CT 13, Black or African-American persons constituted 4.7 percent.
- Asians and Pacific Islanders were the second largest concentration of persons of color in CT 14.01 at 21.2 percent (ranked second among City census tracts). In CT 13, Asians and Pacific Islanders constituted 3.1 percent.
- Race refers to skin color and other physical characteristics, whereas ethnicity refers to country of origin. Persons of Hispanic origin may be of any race. The City of Madison had 4.1 percent persons of Hispanic origin. CT 14.01 had 20.7 percent persons of Hispanic origin (ranked highest of all Madison Census tracts) and CT 13 ranked 23rd with 3.0 percent.

**Age.** The median age in CT 13 was 39.6 years, higher than the City’s median of 30.6 years, while the median age in CT 14.01 was 25.5 years. Persons over age 60 comprised the largest age group in CT 13, accounting for 22.2 percent of the neighborhood’s population, almost twice the City-wide percentage of 11.9 percent. In CT 14.01 persons age 60 and over were only 7.0 percent of the neighborhood’s population. In CT 14.01 the percentage of minors was 35.2 percent of the neighborhood, the highest percentage in the city. This compared with 11.2 percent in CT 13 and 17.9 percent in the City for the same age group.
Families and Households. Family households comprised 48.0 percent of all households in the City of Madison. The rate was higher in CT 14.01 at 58.9 percent and lower in CT 13 at 33.8 percent. There was a greater difference in the households headed by married couples, however; 79.2 percent of CT 13 and 56.9 percent of CT 14.01 were headed by married-couple families while 78.5 percent of City-wide households were headed by married couples. The rate of female-headed households with children in CT 13 (21.5 percent) was almost equal to the Citywide rate of 21.6 percent, while the rate of such households in CT 14.01 was over double, at 55.2 percent.

- Average family size varied by race and ethnicity. White families had the smallest family size in CT 13 and CT 14.01. In CT 13, Black or African-American families had the largest family size at 3.3 persons per family. CT 14.01 Asian or Pacific Islander families had the largest family size at 4.7 persons per family.
- Average family size varied between the neighborhoods as well. In 2000, CT 14.01 had the largest family size of any Census Tract in the City, with 3.8 persons per family. The average family size in CT 13 was 2.7 persons per family. The City-wide average was 2.9 persons per family.
- CT 14.01 ranked second in persons per household, with 2.9 persons per household, compared to 1.8 persons per household for CT 13 and 2.2 persons per household City-wide.

Income. In 1999, the median household income ($29,951 in CT 13 and $26,296 in CT 14 in 1999 dollars) was less than the Citywide median income ($41,941). The median family income in 1999 was $44,730 in CT 13 and $24,975 in CT 14 compared to $59,840 City-wide.

Poverty. In 1999, the poverty rate (the percentage of persons below official U.S. poverty income thresholds) City-wide was 15.0 percent. In CT 13 it was 13.0 percent, while in CT 14.01 it was more than double, at 32.6 percent. The poverty rate for families in the city was 5.8 percent. In CT 13 it was 3.8 percent, while in CT 14.01 it was almost 4 times as high at 26.9 percent. The poverty rate in the neighborhood for persons age 65 and over was higher than the City-wide rate of 0.4 percent in 1999 (2.3 percent in CT 13 and 1.1 in CT 14.01).

Housing Types. In 2000, a total of 1,340 housing units were located in CT 13 and 1,385 housing units were located in CT 14.01. One-unit structures represented 51.7 percent (693 housing units) of CT 13 housing units and 31.5 percent (436 housing units) of CT 14.01 housing units, compared to 48.3 percent Citywide. Two-unit structures represented 7.2 percent of CT 13 and 3.0 percent of CT 14.01 housing units (6.2 percent City-wide). Three to four-unit structures represented 15.7 percent of the housing units in CT 13 and 24.4 percent of the housing units in CT 14.01 (8.7 percent City-wide). Five to nine-unit structures represented 7.5 percent of the housing units in CT 13 and 18.5 percent of the housing units in CT 14.01 (9.5 percent City-wide). Ten to 19-unit structures represented 1.0 percent of CT 13 and 8.3 percent of CT 14.01 (also 8.3 percent City-wide). Twenty to 49-unit structures were 5.0 percent of CT 13 and 11.0 percent of CT 14.01 (10.0 percent City-wide). The neighborhood contained one building with 50 or more units (11.9 percent of CT 13 units). Buildings of 50 or more units contained 8.0 percent of City-wide units.

Housing Tenure. Almost one-half (45.9 percent) of CT 13 and over one-fifth (21.8 percent) of CT 14.01 occupied housing units were owner-occupied in 2000, compared to 47.7 percent Citywide. Of the 53 Census Tracts with owner-occupied housing units, CT 14.01 ranked 8th lowest within the City in the percentage of owner-occupied units. When compared with the Census Tracts with smaller number of owner-occupied units, all but one had other factors, such as adjacent to the UW-Madison campus with high student population to explain the lower percentage of housing units in owner-occupancy.
**Housing Costs.** The median value of owner-occupied homes in Madison was $139,300. In Census Tract 13 median value was $118,000 and Census Tract 14.01 was $96,900, 15.3% and 30.4% below the city median, respectively. Of the 53 Census Tracts in Madison, CT 14.01 had the second lowest value homes. Of all of the Census Tracts in Madison, Census Tract 13 has the lowest median contract rent ($502) and Census Tract 14.01 has the fifth lowest contract rent $517 (with three of the four lower contract rent areas situated in heavily college populated student areas). The City-wide median contract rent was $602.

**Housing Affordability** In 2000, 15.2 percent of CT 13 and 19.7 percent of CT 14.01 homeowners spent 35 percent or more of their household income on housing costs compared to 13.1 percent City-wide. 32.6 percent of CT 13 renters and 37.9 percent of CT 14.01 renters spent more than 35 percent of household income on housing costs, compared to 35.6 percent City-wide. Out of the 53 Census Tracts with owner-occupied housing units, 25.9 (140) percent of CT 13 and 59.6 (115) percent of CT 14.01 housing unit value was $99,999 or less in 1999. In comparison, the City of Madison had 13.2 percent of Housing units valued at $99,999 or less during the same time period.

**Age of Housing Stock** In 2000, 21.9 percent of CT 13 housing stock and 8.6 percent of CT 14.01 housing stock was over 35 years old compared to 13.1 percent City-wide.
Appendix B. Existing Condition Maps

South Madison Planning Area Boundary

Legend
- City Parcels
- Town of Madison
- Study Area Boundary
- Madison City Limits

[Map showing the South Madison Planning Area Boundary with various labeled locations and legends indicating different areas and boundaries.]