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Beyond GIS: exploring ICTs in Planning Instruction

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Abstract

This article speaks to the challenges of introducing information and communication technologies (ICTs) in planning curricula. It begins by building a conceptual framework for describing ICT-related skills, a brief review of ICT instruction in accredited City Planning graduate programs throughout North America, and an overview of recent changes to the core curriculum at the Department of Urban Studies and Planning at the Massachusetts Institute of Technology. Through a detailed description of a new course and its pedagogical, logistical, and technical challenges, the author outlines an instructional approach that integrates computing and communication technologies. She also suggests that courses designed to introduce prospective planning professionals to ICT-related skills should adopt a substantive framework that encompasses departmental philosophies.

ICT-related Skills: A Conceptual Framework

Those involved in planning education and dedicated to preparing students for professional life often solicit feedback from the practitioner community to inform curriculum development. While some planning departments take a formal approach, which includes surveying alumni and interviewing planning practitioners, typically, the approach is informal. The question varies slightly from one region to the next, but can be summarized in this way; What range of skills should aspiring planning professionals possess?

To facilitate a creative pedagogical dialogue, it is helpful to rely upon a metaphorical framework. In doing so, the question becomes "Which tools are essential to the professional planner's toolbox?" Since tools are, in many respects, defined by the tasks they perform, let us begin with an examination of planning tasks.

Most tasks that planners perform can be grouped into one of two broad categories: analytical and communicative. While analytical tasks include capturing, manipulating, and summarizing information, communicative tasks involve collaborating with and presenting information to individuals, groups and organizations. Arguably, these basic planning tasks have changed very little over the past century.

In contrast, the tools that planning professionals use are in a constant state of flux. As today's modern societies moved from the industrial to the digital age, planning tools experienced a metamorphosis. For example, electronic devices like computers replaced mechanical devices like pencils, rulers, and paper. Thus, we can distinguish between two types of tools – the former will be described as "contemporary" and the latter as "traditional."

A two by two matrix provides a useful heuristic for visualizing the types of tools in our metaphorical toolbox. If we categorize planning tools as traditional or contemporary, and planning tasks as analytical or communicative, four types of planning tools can be depicted: Traditional tools for analytical tasks, traditional tools for communicative tasks, contemporary tools for analytical tasks, and contemporary tools for communicative tasks. As shown in Figure 1, traditional planning tools for performing analytical tasks include spreadsheets, drawings, photographs, map overlays and tangible models. They are traditional because they rely largely on mechanical writing, measuring and cutting instruments. Similarly, typed memorandums, postal/delivery services and face-to-face meetings represent traditional tools for communicative tasks. While often very effective, traditional tools possess some significant limitations. For example, drawings, photographs, and tangible models are difficult to reproduce, transport and preserve. Moreover, the use of postal services requires recipients to wait days for documents to arrive, and overnight delivery services are expensive.

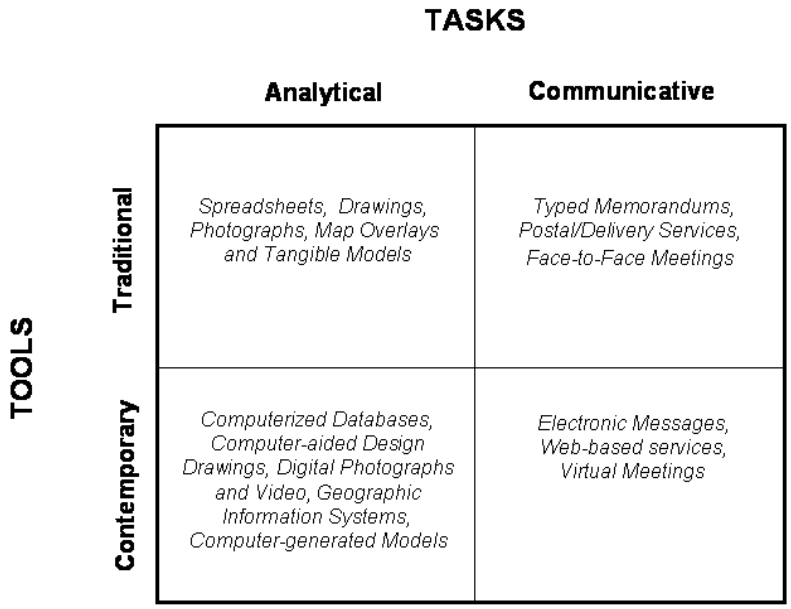

Fig. 1 Types of Tools and Description of Tasks

Contemporary tools for performing analytical planning tasks include computerized databases, computer-aided design drawings, digital photographs and videos, geographic information systems, and computer-generated models. They reside in the contemporary category because they rely on electronic devices like computers. Likewise, electronic messages, web-based services, and virtual meetings are contemporary tools for conducting communicative tasks. However, unlike their traditional counterparts, such tools as geographic information systems and the World Wide Web rely on digital technologies; therefore, plans are easily reproduced, transported, and preserved. Further, electronic mail and web-services allow document delivery within seconds.

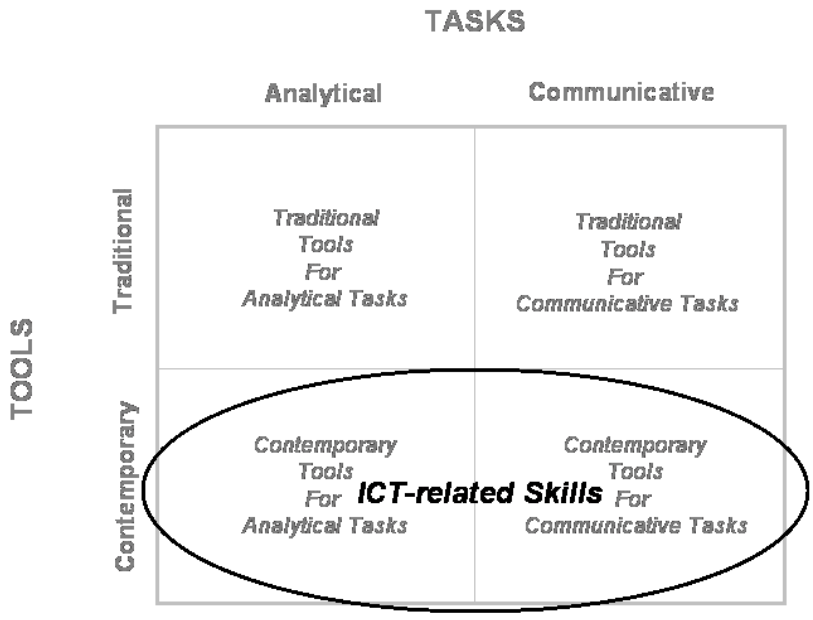

Fig. 2 Tasks Requiring ICT-related Skills

With this framework in mind, let us revisit the question at hand, "Which tools are essential to the professional planner's toolbox?" Let us assume for a moment that most planners in developed countries and regions have transitioned from traditional to contemporary planning tools. From the United States to Europe to Australia, such tools belong to a domain commonly referred to as "information and communication technologies," or "ICTs." The term "ICT" encompasses both types of contemporary tools – those used for analytical tasks as well as those used for communicative tasks. Planning professionals versed in the use of such tools, by extension, possess ICT-related skills (See Figure 2).

A preliminary review of required ICT courses in accredited City Planning graduate programs throughout North America suggests that an appropriate response to the question, "Which tools are essential to the professional planner's toolbox?" is that aspiring planning professionals should possess a range of ICT-related skills. Yet, the manifestation of such contemporary tools have not supplanted traditional planning tools, rather expanded the planner's toolbox.

ICT Instruction for Prospective Planners

Along with other professionals, planners experienced an incremental transition from traditional to ICT tools. And as information and communication technologies proliferated, planning educators adjusted course offerings and encouraged movement toward the use of contemporary communicative and analytical tools.

In the 1980s, planning educators typically introduced students to traditional analytical tools in methods-related courses that focused on the acquisition and analysis of data (Lusk and Kantrowitz, 1990). It is important to note that such courses rarely addressed communicative issues like the synthesis or presentation of data (Lusk and Kantrowitz, 1990). However, in the early1990s, several planning programs successfully integrated communicative skills into their curriculum (Lusk and Kantrowitz, 1990; Godschalk and McMahon, 1992). For example, instructors at the University of Michigan offered a course titled, "Planning Techniques, which emphasized such skills as problem definition, data analysis and various forms of communication (Dandekar and Clark, 1992). For more information, see http://www.tcaup.umich.edu/courses/urp505.html. In addition, the University of New Mexico's Department of Community and Regional Planning implemented a core course, "Techniques of Planning Communication," that encourages the use of electronic media for basic planning communications techniques. For more information, see http://saap.unm.edu. Both remain required courses for graduate students; however, "Planning Techniques," is now listed as "Fundamentals of Planning Practice".

Meanwhile, practitioners recognized the impact of computers on the planning profession. And geographic information systems while difficult to use and expensive, continued to become more popular (Godschalk and McMahon, 1992). As firms sought planners with GIS experience (Kaufman and Simon, 1995), educators responded by introducing computing-related courses to the curriculum, including courses on geographic information systems (Godschalk and McMahon, 1992; Esnard and MacDougall, 1997; Montagu, 2002). Shortly thereafter, courses on the use of GIS became a staple offering in most planning programs, and educators began a debate on GIS pedagogy that continues today (Goodchild, 1985; Shepherd 1985; Morgan 1987). More recently, debates over the pedagogical significance of GIS instruction includes innovative strategies for teaching GIS (Brown and Burley, 1996) integrating planning theory and GIS-related topics (Esnard and MacDougal, 1997) to designing exercises with substantive planning content (Montagu, 2001).

A recent and preliminary review of courses offered by accredited city and planning graduate programs throughout North America shows that required courses typically focus on teaching communication or computing-related skills; rarely are the two combined in one

offering. However, because such offerings equip students with the skills necessary for professional practice, they are worth describing here.

For example, the Department of Urban and Regional Planning at the University of Illinois at Urbana-Champaign requires graduate students to take a course titled, "Planning Analysis and Communication". This course focuses on effective communication and analysis in planning practice by introducing students to tools for gathering and analyzing data and presenting messages. For more information, see http://www.urban.uiuc.edu/Courses/up402/Current/Syllabus.html.

In the College of Urban, Labor and Metropolitan Affairs at Wayne State University, students working toward a Master of Urban Planning are required to take a course titled, "Resources and Communication in Planning." By introducing students to data resources, computer applications, and presentation techniques, this course also emphasizes the development of both communication and computing-related skills. For additional information, see http://www.bulletins.wayne.edu/gbk-output/gbk-index.html.

Finally, the Department of Urban Studies and Planning (DUSP) at the Massachusetts Institute of Technology (MIT) recently redesigned the Master of City Planning (MCP) core curriculum, introducing a course titled, "Planning, Communication and Digital Media." By introducing students to contemporary tools for performing both analytical and communicative tasks, this course allows for a rudimentary exploration of the professional planners' toolbox. Specifically, students not only learn to use digital photographs and computerized spreadsheets, databases, and geographic information systems to manipulate and summarize information, but also collaborate and present their work using the World Wide Web. For more, see http://gis.mit.edu/classes/11.204/Syllabus/11_204.html.

Changes to DUSPs Master of City Planning Core Curriculum

Located within the School of Architecture and Planning at MIT, DUSP is a department consisting of five program areas: City Design and Development; Environmental Policy; Housing, Community and Economic Development; International Development and Regional Planning; and Planning Support Systems.

In the fall of 2000, the MCP Committee, led by Professor Dennis Frenchman, committed to the challenge of revitalizing the program. Upon review, the Committee felt that DUSP's central mission, as articulated almost a decade ago, continued to reflect the spirit of the department's commitment.

> *The key elements of that commitment are: greater social and economic equality; greater commitment to democratic decision making emphasizing individual, government and corporate responsibility, as well as a belief in the necessity of governmental action in the face of inevitable market failures; and a focus on continuous improvement in the quality of life through institutional intervention aimed at the ways in which places and spaces meet the needs of diverse populations.*

Next, the MCP Committee conducted a detailed examination of the MCP Core curriculum, a set of subjects that students are required to take as they advance through the program. To confront the challenge of changing a core curriculum that had been in place for nearly twenty years, the members designed a comprehensive and participatory planning process that included regular meetings with students, alumni, and instructors from all program groups (Frenchman, 2002).

In the early 1990s, DUSP recognized the need to add computing-related requirements to a full curriculum. For more than a decade, MCP students acquired such skills as working with spreadsheets, databases, and computerized maps during the first two weeks of their first

semester as well as four full days of intensive, hands-on study in January before the start of the spring semester. The MCP Committee noted that this approach to teaching skills was inadeguate because the courses were removed from the other courses, lacked substantive content, and were too intense (Sanyal, 2001). Moreover, they found that the department had multiple cores, and that student requirements varied considerably from one program group to the next. While such goals that underlie the core as shaping growth and development, enhancing the quality of urban life, and promoting social, economic and environmental justice remained steadfast, the Committee concluded that DUSP would better prepare prospective planning professionals by highlighting the role of ICTs in planning practice and theory (Frenchman, 2002).

In response to these findings, they decided to craft one experience for all incoming students and in light of the accreditation requirements they recommended that the new core focus on four basic competencies. In short, the Committee restructured the Core so that each incoming student would experience a common gateway course, take a course in their program area, acquire basic computing and quantitative skills, and apply their knowledge and skills by participating in a field-based practicum (Sanyal, 2001).

The Committee concluded that the "observed impacts of new ICTs on planning activities, urban functions and form suggest that students acquire a wide array of computational skills appropriate to the analysis, synthesis and communication of planning-related data," and proposed the design and implementation of a new course to the core curriculum (Sanyal, 2001). This new course, "Planning, Communications and Digital Media," replaces the two intensive computing-related requirements, takes place in tandem and integrates substantive content with the other core courses.

Planning, Communications and Digital Media

In implementing a core course that combines computing and communication technologies, it is prudent to rally departmental support and identify discrete pedagogical objectives. To do this, the instructor met regularly with faculty and students to solicit suggestions regarding course design and content. Two salient and seemingly polar positions emerged; one focused on the theoretical aspects of planning communications, while the other emphasized computer-based skills in planning practice. Rather than consider these mutually exclusive options, the instructor designed an innovative and deliberate format for the course. This format, a three pronged approach, includes lectures, recitations and laboratory exercises within a substantive framework that reflects departmental philosophies.

Content

To introduce ICT-related skills to prospective planning professionals, course lectures speak to the construction and delivery of visual arguments as well as spatial data analysis within a substantive framework of public participation and democratic decision making.

How Do You Create a Visual Argument?

On the subject of visual arguments, lectures include a discussion of the parallels between web site design and city planning. For example, lecture content borrows from Lynch, suggesting that design elements such as "gateways" and characteristics of good form like "legibility" and "justice" should be considered whether a physical or a virtual site is under consideration. Subsequent lectures speak to the use of web-based photographic images and digital video to analyze place and construct persuasive visual arguments that can be distributed to publics instantaneously and inexpensively. Specifically, one lecture is dedicated to the use of digital storytelling as a knowledge building tool for community-based organizations.

How Do You Represent Spatial Evidence?

Beyond the use of digital photographs and video to construct visual arguments, this course emphasizes the use of numeric values as data and the way in which tools such as computerized spreadsheets, databases, and mapping systems facilitate planning processes. For example, lectures speak to the use web-based geographic information systems as tools for displaying information and enhancing public democratic involvement by obtaining feedback on alternative courses of action. Students not only learn about the evolution of public participation GIS, but also investigate the debate on whether these systems are largely a democratizing or disenfranchising force.

How Do You Communicate Alternative Visions?

Finally, students turn their attention to the issue of presenting visual arguments, attending lectures that introduce them to advanced methods of urban simulation. For example, one lecture demonstrates how a series of satellite images can be used to describe the rapid urban development of Ho Chi Minh City during the last decade. Another reveals the usefulness of the Luminous Planning Table (LPT), a multi-layered manipulative platform that integrates digital and physical representations, as an urban design and planning interface (Ben-Joseph and Ishii, 2001).

Tools

While lectures call into question the role of ICTs within the planning profession, the fundamental purpose of each corresponding recitation session is to demonstrate the functionality embedded in planning-relevant software packages and prepare students for the laboratory assignments that require "hands-on" computer proficiency. Demonstrations, such as launching a mapping application, importing census data, and creating thematic maps to illustrate the spatial distribution of households by income classes, occur during recitation sessions.

Integrating Content with Tools

Laboratory exercises are place-based, planning-relevant, cumulative, and compliment departmental philosophies. Throughout the semester, students explore a single context - Central Square - located in Cambridge, Massachusetts just a few blocks from MIT's campus. Central Square is an appropriate context because the community has a diverse population and is undergoing extensive redevelopment. Consequently, through a series of seven exercises that require students to visit the site, collect information, and present findings, students explore issues of social and economic equality using of a variety of ICTs. These contemporary tools include Adobe's Photoshop and Macromedia's Dreamweaver to capture, manipulate, and display images (Lab 1), Microsoft's Excel and Access to manage and analyze data (Labs 2 and 4), and ESRI's ArcView to create maps and conduct basic spatial analyses (Labs 3 and 5).

At this juncture, it is important to caution planning instructors. Courses that teach the application of ICT-related skills should refrain from promoting the use of a particular product. Rather they should focus student learning on the tasks (functionality) that the tool (software application) performs. For example, it makes little difference whether students use Word or WordPerfect for text editing, Access or Oracle for database management, or ArcView or MapInfo for analyzing geographic information. What matters is that students acquire the confidence and savvy necessary to manipulate contemporary tools.

Additionally, assignments are cumulative in nature. By the time a student has completed all of the assignments, he/she has analyzed the Central Square community from several perspectives and with a variety of tools. Students not only acquire "hands-on" ICT-related skills from one laboratory exercise to the next, but the final assignment requires them to create a presentation that communicates their findings. Students post the final and other

assignments in their web-based planning portfolio. Therefore, fellow students, members of the Central Square community, and anyone in the world with Internet access can review their work and begin a dialogue if so compelled.

The first laboratory exercise is the design and implementation of a web-based planning portfolio. The portfolio becomes a space that preserves and displays the work students do in *Planning, Communications and Digital Media*. Further, students are encouraged to add content and make improvements to their portfolio as they progress through the program. The web-based portfolio benefits students because it facilitates sharing amongst fellow classmates and other peers (local and remote), requires students to sharpen their ICT-related skills, communicates their abilities and achievements to prospective employers. The first page of the portfolio is a social and professional portal through which planning students may become acquainted with one another and critique each other's work. For example, the syllabus (for *Planning, Communications and Digital Media*) is available online and lists each student enrolled in the course; each name provides a link to the student's online portfolio. Further, adding content and improving the design of their web-based portfolio as they advance through the program requires students to sharpen and build upon the ICT-related skills they acquired during their first semester. Finally, the students only complete the program with a comprehensive collection of their work that demonstrates their proficiency with ICTs, but also benefit from a format allows them to share work with potential employers inexpensively, instantly, and remotely.

Logistical and Technical Challenges

In designing such a course, there are also several logistical and technical challenges. For example, issues regarding access to computing equipment and technical assistance require thoughtful consideration.

Annually, DUSP admits approximately sixty students to the Master in City Planning program. *Planning, Communications & Digital Media* is a required course for incoming graduate students; hence, the challenge of providing adequate access to computer-related resources is formidable. In previous years, students met DUSP's computing requirements for one week in September and January, so instructors simply reserved computer laboratories outside DUSP to accommodate them. Because students now fulfill this requirement in semester-long course, there is an unprecedented demand for computers and related resources. Logistically, students taking *Planning, Communications & Digital Media* are simply unable to meet in a single laboratory and work on exercises simultaneously.

To address this problem, the instructor offers a variety of supervised laboratory sessions throughout the week and in several locations. In other words, there is no mandatory laboratory time, and students work through projects and exercises at a time that fits their schedule; however, teaching assistants are available to provide technical assistance. Moreover, students taking *Planning, Communications & Digital Media* have priority over students who are not enrolled in the class when it comes to using computer workstations and equipment like digital cameras, scanners, and the like.

This course exposes students to a minimum of five software applications by completing seven assignments. Most students require some type of technical assistance; therefore, the course calls for a small team of teaching assistants. They not only assist students who have technical and assignment-related questions, but they also ensure that the requisite data files and software programs are loaded and functioning properly on student workstations. To complicate matters, it is difficult to find students (even at MIT) who possess the range of skills needed to function as an effective teaching assistant for such a course; a possible explanation is that ICT-related skills remain compartmentalized. For example, some students possess advanced skills in database management and GIS, while others are expert in web authoring and image editing. Fortunately, this problem is ephemeral. During the first year, the

instructor will identify a cohort of students who excel in the course and recruit them to work as teaching assistants the following year.

Conclusion

Despite noble efforts made by city planning programs throughout North America to cope with an endless stream of new tools for analytical and communicative tasks, a host of challenges remain. To approach these challenges, let us move beyond the rhetoric of the GIS revolution and embrace a new pedagogical conversation. Let us begin to explore role of ICTs in planning practice and instruction and debate the importance of learning skillfully to manipulate ICT tools. And whether we believe ICT-related skills are essential to the planner's toolbox, let us continue to communicate to the next generation of planners such values as social equality, efficiency in the use of resources, and democratic participation.

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