A Model and Case Analysis of Geographical Information Systems Curricula in Management Schools

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Abstract

Geographical Information Systems courses and curricula are beginning to appear in programs of management schools and IS programs. This paper develops a model of GIS curricular infusion in management schools that is based on three dimensions of maturation stages, teaching methods, and student learning approaches. The model is set in context of, and examines the limited prior research on GIS teaching and curricula in management and IS schools. It is tested and exemplified by a case study of infusion of GIS into a business school's curricula. The case study illustrates opportunities as well as constraints in designing, developing, and implementing GIS coursework in management school and IS programs. With rapid growth in GIS, the research responds to the upsurge in spatial applications in the business world, and may provide educators with curricular insights that foster and enhance education and training of a GIS workforce having a management focus.

Keywords

GIS, management school, curricular model, maturation stages, spatial analysis

Introduction

A Geographical Information System (GIS) can integrate business and socio-economic data with other forms of geographically referenced information to provide integrated data management, visualization, and analysis capabilities. Over the past two decades, organizational use of GIS has increased rapidly – especially among businesses. More recently, this has been fueled by the move from a mainframe to a desktop application, improvements in ease of use, availability across enterprise level platforms, (King and Arnette, 2011), declining costs of hardware and software (King and Arnette, 2011), widespread availability and access to geospatial data, especially through the internet, and finally migration of GIS software and data into the cloud – all of which arguably create business value. As geospatial orientation of business data becomes pervasive in the mobile and cloud environments and as GIS becomes available in the form of software-as-a-service (SaaS), use of GIS will increase much more rapidly.

The objective of this paper is to study previous efforts of management schools in the United States to infuse spatial thinking, possibly using GIS in their curricula. We examine instances of such infusion reported in the literature to identify catalysts of GIS infusion and attempt to discover trends in terms of disciplinary infusion and the extent and maturity of infusion. As a result, we propose a maturity model for GIS infusion in management school curricula. We next present a case study that thoroughly discusses various aspects of GIS infusion in the curricula of the School of Business at the University of Redlands – a private liberal arts university located in southern California. The case study intends to provide insights to business school educators regarding challenges and best practices of infusion of GIS in their curricula.
The remainder of this paper is organized as follows. In the second section, we study various instances of GIS infusion in management schools. In the third Section, we outline our maturity model of GIS infusion. The fourth section discusses the case study mentioned previously. Concluding remarks are presented in the last section.

GIS in Management School Curricula

In recent years, only a few studies have examined the status of GIS infusion in management school curricula in the US. Via an internet search of curricula in 140 management schools, Estaville (2007) determined that only 5 management schools at Baylor University, California State University – Fresno, University of Cincinnati, University of Massachusetts at Amherst, and West Chester University have incorporated GIS in varying degrees in graduate and undergraduate management school courses in disciplines such as IS, Marketing, and Supply Chain Management (SCM). Li, Wynned, and Babb (2009) found evidence that less than 7% of 460 AACSB-accredited management schools offer GIS-related courses. However none of the courses was part of core curriculum requirement. In a similar survey of online course catalogs of 30 Management Information Systems (MIS) or equivalent departments in management schools, Arnette and King (2008) and Ramakrishna, Sarkar, and Vijayaraman (2010) reported 12 more instances of GIS infusion in management schools – either reported in previous literature (Boasson, Boasson, and Tastle, 2006; Gadish, 2007; Miller, Mangold, and Holmes, 2006; Reames, 2006) or obtained by a preliminary internet search. Overall, it is clearly evident that GIS infusion in management school curricula in the United States is relatively uncommon in spite of the large number of business schools in the country. This indicates that management schools are indeed missing an opportunity to educate and train their students for a rapidly emerging area of employment.

Analysis of all instances of GIS infusion reported in the literature from 2006 to 2010 reveals some trends. (1) Instances of GIS infusion are split almost equally between graduate and undergraduate level courses. (2) Slightly more standalone courses in business GIS (for example, Business Geographics, Geomapping Fundamentals, etc) have been offered in this period compared to GIS infusion as part of another course (such as Decision Support Systems, Tools and Techniques for Logistics Analysis, etc). This hints towards the possibility of a reversal of the 1990’s trend when almost all instances (a very limited number reported in the literature) of GIS infusion took place as a portion of another course. (3) Information Systems and Marketing are two key business disciplines that seem to have embraced GIS the most followed by Real Estate and Logistics/SCM. This seems intuitive given the organic fit of GIS with marketing and information systems. (4) Elective course offerings during this period have slightly outnumbered core courses that have infused GIS. The fact that core courses in management schools have not lagged far behind electives in terms of GIS infusion may be viewed as encouraging. One can argue that core course enrollments far outnumber enrollments for electives thereby impacting a larger number of potential graduates. (5) Finally, instances of infusion in AACSB-accredited schools/colleges outnumber those in non-AACSB accredited institutions by almost 4:1 (Ramakrishna, Sarkar, and Vijayaraman, 2010).

Maturity Model of GIS Infusion

Several accounts of GIS infusion discussed in the previous section vary by the extent of infusion. As reported earlier, during the period 2006-2010, a gradual shift in emphasis seems to have happened – from introducing GIS in the context of discussing major topics in standard business disciplines to more stand-alone courses that focus exclusively on business GIS.

Early instances of GIS infusion such as Mennecke (1998) and Smith, Langley, and Mundy (1998) introduced GIS in courses that focused on Decision Support Systems and Tools and Techniques for Logistics Analysis respectively. In Mennecke (1998), GIS is introduced as one part of the course and is presented as a tool that facilitates database management, decision analysis, and decision support in one software platform. In Smith, Langley, and Mundy (1998), GIS is presented as a tool for network optimization in logistics. Hands-on training using GIS software is an integral part of both courses. On the other end of the spectrum, standalone courses such as Business GIS (found in Estaville, 2007; Reames, 2006) focus on the application of GIS and spatial analysis to solve business problems. Such courses sometimes provide a conceptual overview of database management systems from MIS perspective.
to geodatabases and their integration with a GIS. Depending often upon the background of the faculty member teaching the course, emphasis is placed on problem solving in marketing (such as site selection, market segmentation, etc), real estate, and business strategy. Case studies are often used to illustrate fundamental to more advanced business principles in such courses. Hands-on exposure to GIS is facilitated by tutorials and lab exercises.

The difference between fairly distinct paradigms of GIS infusion witnessed so far in management schools can be explained by Kerski’s (2008) dimensions of GIS education. Standalone courses embody teaching and learning about GIS whose goal is to “become familiar with the theories concerning geographic information science and the acquisition of skills to manage GIS and operate GIS software” (Kerski, 2008, pp. 541). Courses emphasize topics such as data structures, database management, map scale and projections, data quality, and generalization. On the other hand, GIS infusion on an as-needed basis to develop and further understand key topics within specific business disciplines illustrates teaching and learning with GIS. The scope is smaller than teaching and learning about GIS and the focus is “not on GIS but on the disciplines that are home to the issues being addressed, using GIS” (Kerski, 2008, pp. 541).

Regarding the maturation of student learning of GIS, the present model incorporates levels of learning behavior pioneered by Bloom (1956) and further elaborated over the past half century by many others including Anderson and Krathwohl (2001). These levels, which consist of remembering, understanding, applying, analyzing, and synthesizing/evaluating, are relevant during the GIS curricular maturation stages. As the curriculum matures, we posit that the student levels of learning become weighted more towards the higher levels of learning.

Based upon insights derived from accounts of GIS infusion in business schools and Bloom’s Taxonomy (Bloom 1956; Anderson and Krathwohl, 2001), we now present a maturation model of GIS infusion in management school curricula. The model is somewhat adapted from Erevelles, Viswanathan, and Huntley’s (1998) model to use GIS to teach various courses in marketing.

Level of curricular maturation advances from GIS content in a single course to its inclusion in several courses; to a standalone GIS course and finally to GIS inclusion in all courses in a curriculum including the capstone. The maturity of curriculum is a function both of the hierarchy of student approach to learning, based on Bloom’s taxonomy, and on teaching methods employed, which progress from lectures to exercises and exams; then to GIS lab exercises; and finally to Integrative Case Studies, Capstone Projects, and GIS Technology Projects.

In the model (see Fig. 1), curricular maturation stages are shown on the vertical Y-axis, while student approach of learning and teaching methods are on the X- and Z-axis respectively. We posit that as curriculum matures (Y-axis), educational indicators on the other two axes tend to progress positively. For example, with increasing curricular maturity, instructors progress from traditional teaching methods such as lectures in specific disciplinary courses to using creative methods such as multidisciplinary integrative case studies. As a result student learning also progresses positively from remembering basic principles of business GIS to being able to understand concepts, apply concepts and technology to solve problems, and synthesize and evaluate solutions and their tradeoffs. Factors such as technology support, faculty training/qualifications, and dedicated assessment of the integration of the new technology/area are all hallmarks of mature infusion of a novel area such as GIS into the curriculum. Other possible candidates are institutional support through academic administration that may manifest itself in the form of allocation of funding and other resources for curriculum support, as well as employer support in the form of dedicated internships, advisory board, scholarships, etc.

This maturation model of GIS infusion is a guide for management schools that recognize the importance of geography in business decision-making and hence aspire to foster development and implementation of curricula in business GIS. It intends to provide insights on correlates of curricular maturity and the connection to student learning. To illustrate the maturation model, we now present a case study of GIS infusion in the School of Business at the University of Redlands.
Case Study: GIS in University of Redlands, School of Business

The University of Redlands School of Business (URSB) constitutes a case study of incorporating GIS and spatial analysis into a business school. This section discusses this case by first considering the background context over the past two decades, followed by the current spatial curricula and courses, GIS software and technology issues, training of business school faculty, assessment of GIS progress in the school, and summary.

Background

URSB taught its first elective course in GIS in 1992 and introduced its first required GIS course in its B.S. in Information Systems curriculum in 1995. The early development was helped by the proximity to the campus of the global headquarters of ESRI, the world's dominant GIS software company. This locational advantage provided expertise and some teaching and curricular support, for example, some GIS courses could be taught by ESRI experts who could be consulted on course content or research. The close relationship with ESRI continued to be a stimulus for introducing GIS at URSB.
At the University of Redlands (UofR) in the 1990s, there was slow growth in GIS. The university did not have a geography department and did not start a Master of Science in GIS Program until 2000. University-wide in the 1990s, the group of full-time faculty who taught GIS could be counted on one hand. However, that number grew in the 2000s and today numbers about ten full-time faculty. In addition, today there are approximately 30 adjunct faculty who teach GIS, about 20 of whom are in the business school.

A GIS Emphasis in the MBA was first offered in 2004. Later the school realized this was the first such emphasis worldwide. The emphasis, developed by a committee of business school faculty and several ESRI experts, included courses on GIS and public policy, GIS and marketing, spatial analysis of global business, and a GIS capstone. From initial annual cohorts of ten students, today there are 35 MBA students annually who enroll in the emphasis. As detailed later, this emphasis mixes the management and technical sides of GIS. Its success is partly the “job pull” of employment needs for graduates who combine business skills and capabilities with GIS knowledge and skills.

Deficits in URSB’s early initiatives in GIS were missing pieces of GIS research, case studies, training, and contact with actual businesses. In 2006, a US one million dollar three-year grant awarded to URSB by the U.S. Small Business Association (SBA) attempted to fill some of these deficits. The grant included intensive “interventional” case studies of selected local small businesses, training workshops for small business owners and managers in GIS, and building a website that provided useful information to small businesses, academics, and the general public, including case studies and local socioeconomic mapping. Among the secondary benefits were to increase number of full-time URSB faculty actively involved in GIS, develop useful case studies in small business GIS, map social and economic trends in the local area, and post a compendium of academic reference information and contacts on business GIS.

Another indirect offshoot was the establishment in 2008 of a required course, GIS in Business, for undergraduates in the B.S. in Business (BSB) degree. About 350 students enroll in this required course annually, so it has led to about a fifty percent infusion of GIS knowledge in the undergraduate URSB student body. The grant also set the stage for the university to establish two URSB centers for GIS in 2011, Center for Business GIS and Spatial Analysis and Institute for Spatial Economic Analysis. Together, they have active involvement by about half the full-time URSB faculty and by about 25 part-time faculty. Among the offshoots of the centers for business GIS are the regular annual GIS speaker series, research presentations, enhanced website for business GIS, case studies, curricular and instructional videos, teaching workshops, posting of current map analyses, curricular development, and some technical support for faculty business research. The centers provide impetus to go beyond just offering repetitive courses, and to innovate in business knowledge creation and pedagogy. Support from the University’s and School’s academic administration was crucial to the development of these centers.

In summary, the School of Business steadily increased the scope and scale of its GIS themes, yet there are more opportunities to develop further.

**Curricula and courses**

Although URSB has five degree programs, GIS so far has been infused only in the two largest ones, the BSB and MBA. This section discusses briefly the GIS curricular and course design in those two programs.

**Bachelor of Science in Business (BSB)**

The BSB program is a two-year degree completion program. Students enter the program with some college level coursework, and then proceed to matriculate in an undergraduate program in business. BUSB 433 GIS in Business is a core course; it provides an overview of GIS and spatial analysis applied to organizations, including geographic information, locational decision-making, spatial data, costs and benefits of GIS, ethical aspects, and spatial strategies. Students analyze case studies and utilize GIS software and web services to solve problems. The objectives are for students to learn key concepts and skills in these areas, and to be able to apply the concepts hands-on at the lower intermediate level, as well as through decision-making insights.
studies discussed in the course cover a variety of sectors such as retail, banking, real estate, and utilities. Customer-facing GIS such web-based, E-commerce, and mobile-GIS solutions are discussed. As seen in Table 1, the GIS for Business course (BUSB 433) occurs at the half-way point of a two-year curriculum, and is preceded by a course on Management Information Systems (BUSB 333); note that BUSB 333 is a pre-requisite for BUSB 433. This has the advantage that students will already have a basic business and economics, quantitative, and information systems (IS) background prior to the GIS course. Since IS and GIS are closely related, placing them sequentially next to each other enables student learning of databases, systems development, and decision making to be leveraged directly into similar concepts in the GIS course. Another advantage of this sequencing is that a student can potentially utilize GIS knowledge and skills in the specialized business courses to follow and in the Management Capstone course. For example, the geo-segmentation concept, studied in the GIS course, can be applied in the Marketing course. Geo-segmentation characterizes a neighborhood into one of dozens of tapestries that can identify each neighborhood in the U.S. In the Capstone, students can do integrative projects that include GIS maps and knowledge concepts.

<table>
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<tr>
<th>Course Sequence</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BUSB 300</td>
<td>Ethical and Legal Environment of Business</td>
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<td>BUSB 330</td>
<td>Economics for Business</td>
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<tr>
<td>BUSB 145</td>
<td>Critical Analysis: Written and Oral Communication</td>
</tr>
<tr>
<td>BUSB 333</td>
<td>Managing and Leading Organizations</td>
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<td>BUSB 232</td>
<td>Business Statistics</td>
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<tr>
<td>BUSB 433</td>
<td>GIS for Business</td>
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<tr>
<td>BUSB 330</td>
<td>Financial and Managerial Accounting</td>
</tr>
<tr>
<td>BUSB 370</td>
<td>Managing Quality and Operations</td>
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<tr>
<td>BUSB 342</td>
<td>Financial Management</td>
</tr>
<tr>
<td>BUSB 340</td>
<td>Principles of Marketing</td>
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<tr>
<td>BUSB 485</td>
<td>Strategic Management</td>
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<tr>
<td>BUSB 481</td>
<td>Management Capstone</td>
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Table 1. Sequence of Courses in the BSB Curriculum

MBA GIS Emphasis

The MBA program’s GIS Emphasis was revised in 2012. Its three courses are GIS for Marketing (GISB 691W), Spatial Analysis for Global Business (GISB 692w), and GIS Strategy: Concepts and Implementation (GISB 693w). GISB 691W blends basic marketing principles with elementary GIS concepts. Students practice these concepts with five hands-on exercises. GISB 692w emphasizes the global economy; its locations and flows; industry sectors and their geographic arrangement; and how global economic and environmental trends spatially influence business operations and decision making. Students gain a working knowledge of ArcGIS, the mainstay full-featured software from ESRI, as well as a variety of web-GIS services such as Business Analyst Online (BAO), World Mapper and Gapfinder. GISB 693W is a Capstone course, and GISB 691W and 692W are both pre-requisites of GISB 693W. In 693W, student teams are sent to one or more nonprofit or governmental organizations; they interview leaders and provide to the organization a strategic plan and some portion of prototype technical implementation
of the plan. This course gives students experience in teamwork; developing spatial strategies for an organization; acting as consultants and customizing solutions to derive the most benefit to a particular organization. At the end of the GIS emphasis, students are expected to gain at the minimum intermediate level of GIS hands-on skill and a higher level of understanding of business GIS concepts. The recent upgrade of the emphasis also examined very closely the mix of management and technical content, and adjusted the emphasis to have about an even balance between these elements.

Graduates of the GIS Emphasis have pursued both GIS specialty and general management careers. About half go into GIS-related jobs, including middle management, senior management, consulting, doctoral studies in GIS-related fields, and entrepreneurial ventures. It is pertinent to mention that while MBA GIS emphasis graduates as well as undergraduate students often apply for a variety of job openings at Esri, no formal arrangement or understanding exists for Esri to commit to hiring the School of Business graduates.

**GIS Software and Technology**

GIS software and technology have changed rapidly over the past two decades. URSB currently emphasizes ArcGIS software, Business Analyst Online (BAO) web service from ESRI, and several minor spatial web services. The ESRI software and services are part of the university's ESRI site-license.

**BAO** – This is a user-friendly, one-of-a-kind web-based location analysis and mapping software that has rich datasets on demographic, economic, and business variables for the entire U.S. Addresses can be geocoded within BAO and reports on demographic and socio-economic attributes of locations can be generated from BAO. Due to a very user friendly and intuitive interface for data extraction, manipulation, mapping, and rudimentary spatial analysis, students learn quickly and are able to obtain data and perform analysis once they have framed their spatial problems or questions.

**ArcGIS** – It is the world standard for professional GIS, with over 500 features, web access, and powerful analytic capabilities. Although students have a harder time learning ArcGIS, it gives them insight into the vast analytic and spatial power of world-class software. The trick in teaching ArcGIS in the MBA Emphasis is to constrain its uses to pre-set exercises, since there is not sufficient time to learn and use it at an advanced level (unless a student enters with a strong GIS background).

**World Mapper, Gapminder, and Google Earth** – They are free web-based services that are utilized as secondary spatial tools somewhat in the undergraduate GIS course and more fully in the GIS emphasis in the MBA. They are useful for specific problem solving in the courses, and they also communicate to students the variety of public domain and commercial spatial tools that are available.

**Technical and GIS Software Support**

An essential challenge faced in the entire progression of building GIS utilization in the School of Business is technical and GIS support. With 24 full-time faculty, URSB has been too small to hire a full-time technical/software support staff person. Hence, it has relied on several staff members of the university's central Information Technology Services (ITS) for GIS technical/software support, including management of licensing, lab set-ups and maintenance, and GIS software and spatial services set-up in faculty offices. Deeper software issues have been assisted since 2000 by an applied research unit, the Redlands Institute (RI). However, since the RI is grant-funded, its services have been typically expensive and constrained in time for technical support and consulting on URSB projects. Both ITS and RI have benefited by the close relationship of the campus with ESRI. Nevertheless, for over a decade URSB has been able to take sufficient advantage of this centralized support, as well as some faculty technical expertise, to achieve its growth steps in management school GIS.

**Training of Management School Faculty**

A critical factor in achieving widespread GIS curriculum and teaching in URSB has been training of faculty. The GIS teaching faculty has grown over the past decade to a level of 3 qualified full-time
professors and 15 qualified adjunct faculty. Since the late 1990s, there have been annual training workshops on GIS teaching and pedagogy. The workshops emphasize hands-on use of GIS software and services. Faculty have been oriented to the software, briefed on common mistakes and pitfalls, and put in the students’ place to take part in student exercises under training supervision.

For example, BAO was introduced for widespread faculty use in winter of 2011. An all day workshop, attended by 20 faculty included a presentation by an ESRI developer of BAO, orientation to teaching with BAO, demonstration of BAO features, and practice session based upon a case study involving supply chain and customer proximity to Starbucks’ locations in San Francisco. Following the workshop, all faculty teaching GIS courses received that session’s complete training materials electronically, so that faculty not able to attend can maintain up-to-date currency. We have learned that training sessions imparted over ten years to a fairly stable core of faculty teaching business GIS courses has raised teaching effectiveness from good to excellent levels as evident from student evaluations. Since BAO is a web service that has over 7,000 business variables, it has proven user-friendly to students and also stimulates students’ ability to explore on their own spatial business phenomena. This has encouraged a sense of innovation and discovery. A further advantage is that students are exploring with BAO locational features for subsequent courses such as marketing, finance, and strategic management.

**Assessment**

In the innovative and challenging steps of introducing GIS, there is an urgent need to assess the impacts of steps taken and adjust initiatives accordingly. In fall of 2011, a study of student evaluations in the GIS courses in the BSB and MBA curricula was performed. The rating scale ranged from 1 to 4, with 4 indicating “strongly approve” and a 3 indicating “approve” of teaching measurements. The average of results for six key evaluation metrics was 3.57 for the MBA GIS Emphasis courses and 3.27 for the BSB required course. Hence, overall at 3.42, the effectiveness of GIS teaching is in between “strongly approve” and “approve” and at a level somewhat higher than the school’s average MBA or undergraduate teaching effectiveness levels. In 2014, assessment findings for the MBA program showed the GIS emphasis courses of spatial analysis for global business and the GIS capstone to be successful, exceeding MBA averages, while GIS in marketing was sub-average.

No formal assessment of GIS faculty research has yet been conducted, which points to a future need. However, over the past few years, six management school faculty have published books, journal articles, and refereed conference proceedings on GIS research.

**Summary**

There has been progress on bringing GIS fully into URSB. In over a decade of growth, barriers have included faculty and staff unfamiliarity with GIS and spatial analysis, secrecy and proprietary policies in the business world that restrict teaching cases and knowledge, resistance to change in URSB, and in the beginning lack of a critical mass of skilled faculty and support staff. However, more than offsetting these constraints were the proximity and strong relationship with ESRI, concordance with university strategy in GIS, hiring of business faculty who knew some GIS or had strong motivation to learn it, grant funding, and the groundswell of web-based mass consumer adoption of spatially oriented technologies in the 2000s. Beyond its current features, anticipated initiatives in GIS in School of Business in the coming two years include:

- development of more case studies based on interviews with high-end user organizations, done cooperatively with ESRI and with local counties,
- expanding GIS content coverage gradually across more of the business curricula, outside of GIS courses,
- seed grant funding in business GIS with focus on instructors using web services and Excel with maps, and
- external grant funding to expand the activities of the centers that so far includes a federal grant and a pending international grant application.
From URSB’s steady progress in incorporating the GIS sub-discipline, it is today a unique strategic feature of the school. With the strong support of the school’s Dean for GIS, two spatial centers, active business faculty scholarship, and growing enthusiasm across its student body, URSB continues to build and emphasize GIS by undertaking the next steps and challenges. An overall lesson is that the critical factor is not just having deployment of up-to-date spatial technology, but developing “mindset” across the school, motivation, and sense of “payoff” to the students, faculty, administration, and staff.

Returning to the paper’s theoretical model, in the URSB case, over time, the curricular maturation progressed from an initial standalone elective course to the present stage in between standalone required courses having full and partial GIS content and curriculum-wide infusion. Student learning approach has moved in the GIS Emphasis in the MBA to greater weighting towards application, analysis and synthesis, but falls short of evaluation. In the BSB program, the learning is more centered at the steps of understanding and applying. In teaching methods, both the BSB and MBA GIS Emphasis have added more lab content and some more case studies, although the availability of GIS business cases is severely limited. Although the GIS Emphasis has progressed to capstone and GIS technology projects, the BSB remains far short of this, and points to necessity of more effort in infusing GIS across the undergraduate curriculum and into its capstone course.

Lastly, it is not our intent to prescribe a maturity model for GIS infusion in management school curricula. While standalone courses on GIS – both at the graduate and undergraduate levels have facilitated curricular infusion at URSB, we do not have evidence to suggest that infusion with standalone courses will result in better learning and overall improvement in student learning outcomes compared to other models of curricular infusion. One can argue that if the objective of integrating GIS is to simply raise awareness about location and its importance in managerial decision-making, then embedding GIS within standard management school coursework such as economics, marketing, supply chain management, MIS, etc. may be the “optimal” path towards curricular maturity.

Conclusions and Future Research

Businesses and government agencies are increasingly using GIS to harness the power of spatial analytics to make better decisions quickly and efficiently, while evaluating the impact of those decisions. However existing, limited scholarly evidence suggests that the response among management schools educators to infuse GIS in their curricula has been lukewarm. Before business school and IS academics fall too far behind real-world practice, it is imperative for the schools to respond so that graduates are well prepared for rapidly emerging geotechnology and locational needs of organizations. In this paper, we have analyzed previous instances of GIS infusion in business school curricula and reported on industry and academic trends. Schools are somewhat more interested in standalone business GIS courses in recent years, possibly indicating a shift compared to the 1990’s. We propose a maturity model of GIS infusion in management schools that carries over to information schools. Maturity of GIS infusion varies along a continuum and depends on student approaches to learning GIS and of teaching methods adopted in business and management school courses. The maturity model is exemplified by a case study that thoroughly discusses various aspects of GIS infusion in the curricula of the School of Business at the University of Redlands.

The X- and Z-axis in our model (Bloom’s student approach and teaching methods) are likely to be generally applicable to most domains. While one can contend that teaching methods and corresponding pedagogy further up the Z-axis would always correspond with higher levels of learning along the X-axis, further validation, possibly empirical in nature is required to confirm such a contention. Furthermore, our model of curricular maturity may be possibly applied more generally by replacing GIS on the Y-axis with novel topics such as business analytics, business process reengineering (BPR), or ERP. Further work is required to validate the broader applicability of our model under such circumstances.

REFERENCES


