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Understanding How Location Analytics Is Implemented in Information Systems and Business Education

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ABSTRACT

This paper is an exploratory study of the implementation of Location Analytics (LA) in business curricula. Location analytics, fueled by geospatial technology, is increasingly being deployed by organizations worldwide for strategic, tactical, and operational purposes. Using a semi-structured interview approach, faculty adopters of LA in information systems (IS) and other business disciplines were interviewed from sixteen universities. The objectives were to gauge the extent of LA integration in IS and business curricula, the motivations and paradigms of integration, and the benefits and challenges. Three distinct paradigms of LA integration emerge from analysis of the data. They are discussed, compared, and contrasted with respect to several key attributes of LA implementation, including its maturity. Findings show that a majority of faculty are implementing LA in one or two courses across a spectrum of business disciplines including IS. While pedagogical approaches vary, faculty adopters agree that LA helps IS and business graduates situate core theories and concepts in real-world applications, sparks intellectual curiosity and entrepreneurial aspirations, and advances several critical competencies outlined in the IS2020 and MSIS2016 competency models, heightening their appeal to prospective employers. Faculty adopters caution that LA implementation is affected by limited awareness of the potential of LA and its attachment with geography, a social sciences discipline. Adopters also indicate that the lack of administrative support, insufficient resources, and rapid evolution of LA technology can challenge implementation efforts. Implications of these findings are discussed. Practical recommendations are provided to increase the implementation of LA in IS and business curricula.

Keywords: Geographic information system (GIS), Location analytics, Information systems education, Business analytics education, Curriculum design & development, Critical thinking, Employment skills

1. INTRODUCTION

All business problems have a spatial and temporal component. Managing supply chains, assessing risk, understanding consumer behavior, choosing the optimal site for a business expansion or service delivery, and many other fundamental business workflows depend upon location. Location data used in these decisions often exhibit spatial and temporal patterns. The decision-maker must analyze these patterns to extract meaningful relationships among variables, understand trends, and gain insights to make better decisions. To make such decisions, a rigorous set of tools, along with analytical workflows and spatial data, is essential. These tools, workflows, and data form Geographic Information Systems (GIS). When applied to business decisions, they are commonly known as Location Analytics (LA). LA enables organizations to evaluate changes in business conditions. It generates location-based insights or intelligence from combining business, behavioral, and demographic data with geographic attributes such as location (Dangermond, 2024; Horan et al., 2022). This is critical for sustainable and resilient assessment and planning.

Of Fortune 500 companies, 50% use GIS technology created by Esri, the global market leader in GIS software, location intelligence, and mapping. Most national governments, 20,000 cities, all 50 U.S. states, over 7,000 universities, totaling more than 350,000 organizations worldwide also rely on Esri technology alone (Esri, 2021). Other GIS software abounds, including QGIS, Mapbox, and Leaflet. The increased adoption of LA tools and workflows brings increased demand for employees with data analytics skills (Kolding et al., 2018). This demand for employees with GIS knowledge and LA skills is further catalyzed by competitive pressures, persistent supply chain disruptions, growing stress on natural resources, and uncertain business, economic, and geopolitical climates. Despite rising demand, theoretical foundations and practical skills grounded in LA are not commonly taught in most schools or colleges of business and information systems (IS) programs. Location analytics, however, is taught in rich and meaningful ways by a small number of IS and business faculty across a broad spectrum of disciplines (Erskine et al., 2024). Against this background, this study seeks to understand the extent and various paradigms of LA integration in information systems (IS) and business curricula, as well as the benefits and challenges of such integration. The research questions (RQs) are as follows: (RQ1) *What are the various paradigms of LA implementation in IS and business curricula?* (RQ2) *What are the challenges and benefits of such implementation?*

This study is important and needed at this time for several key reasons. First, the world faces increasing challenges at the intersection of natural and human-built environments, including health, natural hazards, climate, soil erosion, habitat loss, decline in fisheries and other food sources, energy, water, and across other sectors (Dangermond, 2024). Each of these challenges has spatial and temporal components. To understand these spatiotemporal interactions with other key factors, GIS and location analytics can be combined with other analytical methods and technologies to estimate impacts, provide guidance for policy development, and to shape decisions and actions by businesses and societies (Horan et al., 2022).

Second, business managers from local shop owners to CEOs of global firms have recognized the need for spatial skills. According to the results of a 2024 survey conducted by the *Urban and Regional Information Systems Association* (now known as Geospatial Professional Network), position titles such as Director of Geospatial Business Intelligence, Geospatial Strategy Officer, Chief Geospatial Data Officer, and Technical Director of Enterprise GIS are being created by forward-thinking organizations that are embedding LA, in addition to traditional GIS Analyst, GIS Manager, GIS System Administrator, GIS Database Administrator, and GeoData Manager roles (URISA, 2024). Consequently, the demand for university graduates with LA skills has outpaced the supply of such graduates (Horan et al., 2022). In the same URISA survey, respondents indicated the highest in-demand skills for GIS and LA jobs include data analysis, data manipulation, data visualization and reporting, data acquisition and creation, followed by mapping and cartography (URISA, 2024). These skills are integral to competencies articulated in IS graduate and undergraduate competency models and highly prioritized by business schools. To close the supply-demand gap and help businesses create economic opportunities and growth in climate-resilient and societally responsible ways, it is essential that graduates from IS and business programs possess spatial reasoning skills, knowledge of LA methods and tools, and the ability to apply LA knowledge to achieve key business objectives. A more sustainable, economically vibrant, and resilient society, including the

business sector, will be achievable if spatial reasoning and LA skills are embedded in IS and business education.

Third and finally, a handful of prior studies (Boasson, 2006; King & Arnette, 2011; Miller et al., 2007; Ritchie et al., 2023; Sarkar & Pick, 2012; Wofford & Thrall, 1997) have documented singular instances of GIS and LA being integrated into business curricula in courses spanning real estate, information systems, marketing, supply chain management and logistics. A few studies (Erskine et al., 2024; Ramakrishna et al., 2011) have found that the extent of LA integration in business and IS curricula is limited and advocated that more integration is necessary, considering the relevance of GIS and LA in business and society. Yet, no prior study has systematically documented various paradigms of LA implementation in IS and business curricula across a range of courses at institutions of varying sizes, developed by faculty members with a broad spectrum of academic and professional qualifications. Nor have benefits and challenges arising from these various implementation paradigms been cataloged, compared, and contrasted. This study attempts to fill this gap.

The three paradigms of LA implementation identified and discussed later in this paper are essential because they can:

- inform curriculum design by IS and business educators interested in integrating LA into their courses, by contributing to greater understanding of the nuances that underpin LA integration in terms of curriculum design, resources (faculty time, faculty expertise, hardware and software, etc.) required for curriculum design, student background and preparation, and administrative support;
- guide IS and business educators and faculty on how to integrate LA across a range of courses thereby increasing the maturity of LA integration, and on what factors might catalyze such maturity; and,
- demonstrate to academic administrators (Deans and Department Chairs) in IS and business schools/programs the value of LA implementation by heightening student engagement, improving core competencies of IS graduates as outlined in competency models for IS programs (Leidig & Salmela, 2020; Topi et al., 2017), and possibly increasing enrollments in STEM-designated IS and business programs.

The remainder of this paper is organized into sections on an overview of location analytics in business, methodology, data and findings, discussion of findings, and consequent recommendations.

2. LOCATION ANALYTICS IN IS AND BUSINESS EDUCATION

This study's roots lie in the evaluation of new technologies in education. Many studies evaluating the utility of technologies and methods in education assess the extent to which their use contributes to teaching and learning (Iriti et al., 2016). This study also touches on research that focuses on the effectiveness of technologies in education. Effectiveness is largely determined by how it is evaluated (Phillips et al., 2012). The study also has roots in literature comparing the skills needed by employers to the educational constructs that prepare such employees (Hong, 2015; Wikle & Fagin, 2015). It builds on prior recommendations and studies in the *Journal of Information Systems Education* (JISE) about improving business and technology instruction in innovative ways (Farkas et al., 2022; Zhang et al., 2020).

This study contains linkages to a body of literature evaluating the implementation and effectiveness of GIS in education. Kerski (2008) found that GIS is seen as a key tool and framework in "digital earth education" but that educational and technical challenges hinder its adoption. Konstantakatos and Galani (2023) reviewed 30 articles on GIS in education and found that the use of GIS in geographic and environmental education is heterogeneous, sparse, and fragmented. If these challenges exist in "home disciplines" for GIS, it is reasonable to wonder if IS and business educators can be expected to adopt and implement LA in robust ways.

GIS adoption in higher education began in the late 1980s in earth science and geography departments. By the mid-1990s, GIScience (Geographic Information Science) programs had emerged at many universities, and today most universities and community colleges offer at least one GIS course; some offer GIS certificates, and some offer bachelor's and advanced degrees. Most of this instruction focuses on

teaching GIS as a toolset, an approach, and a branch of geographic information science (Kerski, 2019). Beginning in 2010, with the advent of cloud-based GIS environments, open data portals, and web mapping tools, instructors outside geography, environmental science, planning, and GIS departments began to teach with GIS. This development began in the sciences and planning and spread to health, civil engineering, digital humanities, and business (Ramakrishna et al., 2011).

Since the late 1990s, singular instances of GIS and LA integration in business and IS curricula – in disciplines such as Real Estate (Wofford & Thrall, 1997), IS (Boasson, 2006; King & Arnette, 2011; Sarkar & Pick, 2012), Decision Sciences (Mennecke, 1997), Marketing (Miller et al., 2007), and Supply Chain Management (Ritchie et al., 2023), have been documented. These prior studies often contain rich insights, describe pedagogical approaches, outline the steps by which GIS and LA were integrated into specific courses, and offer teaching tips and practical guidance for the curricular adoption of LA in specific contexts. A major study of the adoption of LA in business education is over a decade old (Ramakrishna et al., 2011). This comprehensive study of GIS in business instruction is based on the findings of a survey that studied the infusion of GIS and spatial analysis concepts in AACSB and non-AACSB business schools. It found that LA in business generates value and competitive advantage, but its infusion in business schools is "substantially lagging." Recently, Erskine et al. (2024) argued that location data analysis can be relegated as a tangential skill in IS education and proposed specific actions to integrate LA into IS education. The authors found that LA remains underrepresented in the core curriculum of IS programs and suggested adding core modules that cover both theoretical and practical aspects of LA, including spatial data visualization, spatial data analysis, and interpretation. Erskine et al. (2024) also argued that, with accreditors requiring business programs to integrate societal impact and companies demanding skilled employees with knowledge of GIS and LA, it would be timely for business schools to incorporate LA into coursework.

In addition to presenting a case study of GIS and LA integration, Sarkar and Pick (2012) also presented a maturity model of such integration in business curricula. Maturity stages range from minimal implementation of LA (in a single course) to program-wide integration, up to and including a program's Capstone course, with each stage of maturity aligned with progressively more advanced and sophisticated teaching methods and their consequent impact on student learning of LA, based on Bloom's taxonomy. Unlike prior studies, this paper identifies, compares, and contrasts three paradigms of LA implementation in IS and business curricula by critically examining successful implementations by 17 faculty members with significant backgrounds and experience in teaching LA in IS and business, as shown in Table 1.

3. METHODOLOGY

A small but dynamic, innovative, and tightly connected cohort of IS and business faculty leads the way by incorporating LA in their courses across a diverse spectrum of colleges and universities. Our study focuses on a subset of these active faculty members. Based on purposive sampling (Battaglia, 2008; Robinson, 2014), we selected 17 active IS and business faculty based on their LA research publications, prior record of curriculum development implementing LA, and participation in a working group described next. We established the interviewee set of faculty from three subsets: (1) Faculty who the authors have been collaborating with since the time of a prior national survey (Ramakrishna et al., 2011); (2) Faculty who have met annually since 2022 in a "Business Location Analytics Symposium" and have been actively engaged in the Special Interest Group on GIS (SIGGIS) of the Association for Information Systems (AIS); and, (3) From the curriculum work that one of the authors supported (Kerski, 2020).

Prior Study	Objectives	Key Findings and Results	Differences With Current Study
Ramakrishna et al., 2011	Study the extent of GIS and LA infusion in business curricula	● There is not much systematic infusion of GIS and LA in business curricula in AACSB-accredited schools in the US. ● Decision Science & OM faculty are more likely to perceive the need for infusion of GIS and LA as compared to other groups of faculty. ● There does not appear to be a single or a short set of facilitators that will improve the infusion of GIS and LA concepts/tools in their courses.	The objectives of this study are different. Rather than document the current state of LA implementation, it seeks to outline paradigms of LA implementation based on successful instances, with implications for IS and business course design and curriculum development.
Sarkar and Pick, 2012	Develop a model of GIS curricular infusion in business schools and test the model using a single case study	● Maturity of GIS infusion varies along a continuum and depends on student approaches to learning GIS and on teaching methods adopted in business and management school courses. ● The single case study did not provide sufficient evidence that the infusion of GIS with standalone courses will result in better learning and overall improvement in student learning outcomes.	While one aspect of the proposed paradigms concerns the maturity of LA implementation, this study is more expansive, critically examining and dissecting 17 instances of LA implementation across 16 institutions.
Erskine et al., 2024	Document the findings from an AMCIS conference panel on opportunities for LA in IS research and teaching	● The absence of spatial methods – conceptual and analytical, in IS research is striking. ● Integrating LA into IS curricula can prepare students for growing demands for LA skills in the workforce. ● Outlined ways in which gaps in LA integration with IS research and teaching can be addressed.	The objectives of this study are different. It focuses solely on LA implementation in IS and business curricula (not research) and moves the scholarly agenda from opportunities to actual instances of implementation.

Table 1. Scope and Objectives of This Study in Contrast to Three Prior Studies

The reasons we adopted purposive sampling to select faculty experts who incorporate LA into their curricula were twofold. First, based on our collective work over the past 15 years, including the 2011 national survey, we concluded that a national or international random survey of faculty from business schools is unlikely to yield much new insight. It can be argued that since the pool of IS and business instructors incorporating LA is rather limited, most faculty in a random survey would either not respond or would indicate they were not using LA in their courses. Such a large random survey of IS and business faculty would therefore most likely point to the same core group of faculty who were using LA in rigorous ways. Hence, it was most fruitful to start with this very group. Second, we believed that deeper insights could be gained from a semi-structured interview with an active set of faculty experts with prior knowledge

and experience in GIS and LA research and LA curriculum design and delivery in business and IS programs than from a broader random survey of IS and business educators. Our expectation was that each participant would provide unique and rich information relevant to the study. The implications of adopting purposive sampling to select faculty interviewees are discussed later in Section 8.

Sixteen out of the 17 interviewees were faculty members in 16 different institutions listed in Table 2. These 16 institutions are diverse in size and structure, and include 12 universities in the USA, one in the Netherlands, and three in Canada. They include an almost even balance of public and private universities (9 vs. 7), ranging in size from small private colleges enrolling 3,000 students to large state universities with over 50,000 students. Of the U.S. universities, 3 were in the East, 1 was in the Midwest, 2 were in the South, and 6 were in the West. One interviewee was unaffiliated at the time of the interview, having just completed a Fulbright appointment. This faculty member possessed 30 years of prior experience using GIS and LA in business instruction at two U.S. universities. Brief descriptions of faculty interviewees, their institutional affiliations, ranks, tenure status, and academic and professional experience are provided in Table 2. This information was obtained from institutional websites and from the interviewees' LinkedIn profiles.

University	Country	Description	Interviewee Position Title & Tenure Status	Key Discipline(s)	Background/Interests With Relevant Notes
Mount Royal University	Canada	Public, mid-sized	Tenured Associate Professor	Supply Chain Management	Studying the carbon footprints of global supply chains with teaching interests across a range of supply chain and logistics courses.
University of Toronto	Canada	Public, large	Lecturer	Urban-Economic Geography	Interests in urban-economic geography, environment, GIS, and location analysis.
Toronto Metropolitan University	Canada	Public, large	Tenured Associate Professor	Retail Management	Research interests include retail location decision-making, big data analytics, retail planning and location strategy.
Saxion University of Applied Sciences	Netherlands	Public, large	Part-Time Lecturer	GIS	Chief Research Officer at a large GIS company with over 26 years of experience in GIS and GIS education in business schools.
James Madison University	U.S.	Public, mid-sized	Tenured Full Professor (endowed)	Supply Chain Management	Teaching & research interests across strategic supply chain management, supply chain quality standards, nonprofit organization performance

					assessment, and geospatial analytics.
California Baptist University	U.S.	Private, mid-sized	Tenured Full Professor	Marketing and Analytics	Almost 15 years of experience in IT and consumer insights analysis.
West Chester University	U.S.	Public, mid-sized	Tenured Associate Professor	Operations Management, Supply Chain Management	Teaching interests in OM, SCM, project management and MIS; frequent collaborator with faculty from the institution's Department of Geography and Planning.
University of California at Riverside	U.S.	Public, large	Non-tenure track Assistant Professor of Teaching	IS	Teaching focused on applied IS and AI.
University of Southern California	U.S.	Private, large	Non-tenure track Clinical Professor	Marketing	Specializing in multicultural marketing, brand management, and sales management.
Claremont Graduate University	U.S.	Private, small	Adjunct faculty	IS	Over 20 years of technology program & project management leadership experience.
Arizona State University	U.S.	Public, large	Non-tenure track Associate Teaching Professor	IS	25 years of experience as an educator, prolific entrepreneur, technology product design consultant, and researcher.
Middle Tennessee State University	U.S.	Public, mid-sized	Tenured Associate Professor	IS & Analytics	Areas of expertise spanning business decision-making, disaster management, geospatial analytics, IT governance and policy.
University of Potomac	U.S.	Private, small	Adjunct Professor	GIS	12 years of experience in the business field.
Pace University	U.S.	Private, mid-sized	Tenured Full Professor	IS	Research focused on areas of IT value, environmental sustainability, open data, geographic information systems (GIS), and nonprofit organizations.

University of Redlands	U.S.	Private, small	Tenured Full Professor	IS & GIS	Research focused on GIS, analytics, with a track record of curriculum and program development in GIS; director of a center on business GIS.
Texas Christian University	U.S.	Private, mid-sized	Tenured Full Professor (endowed)	Supply Chain Management	Teaching and research interests in SCM; leadership position at an institute focused on supply chain innovation that conducts an annual case competition integrating GIS with business applications focused on supply chain management.
One of the 17 implementers was unaffiliated at the time of the interview, having just completed a Fulbright appointment. This implementer had 30 years of prior experience using GIS and LA in business instruction at two U.S. universities and held tenured full professor appointments at both.					

Table 2. List of Faculty Interviewees

Of the 17 interviewees, 9 were tenured at their respective institutions as associate or full professors, with two holding endowed professorships. Seven interviewees held non-tenure-track positions such as Adjunct faculty, Lecturer, Clinical Professor, or Professor of Teaching, at various ranks. Disciplinary affiliation of the interviewees ranged from IS/IT and supply chain management to analytics and marketing. Most of the interviewees possessed a blend of academic and professional qualifications in IS/IT, entrepreneurship, technology management, and in a couple of instances, GIS. In two instances, the interviewees held administrative leadership roles as director of an on-campus center or institute – focused on GIS in business in one instance, and supply chain innovation in the other.

3.1 Interview Questions

These faculty members were interviewed online in Spring 2025. In each interview, the researchers asked each faculty member 11 questions using a qualitative, semi-structured approach, in which respondents answered preset, open-ended questions (Jamshed, 2014). Each interview lasted 30-45 minutes, depending on the depth and specific details of the interviewee's responses. Appropriate follow-up questions were asked for clarity. Institutional Review Board approval was granted by one of the researcher's institutions, and the interviews were recorded with the full knowledge of the interviewee faculty member so that the researchers could review the audio and video recordings and transcribe them for additional insights.

Table 3 lists all interview questions and each question's correspondence to the study's research questions 1 and 2 (RQ1, RQ2) that are stated in Section 1.

Question 1 was asked for due diligence to ensure that the faculty interviewee remained engaged in the adoption and implementation of LA in their teaching at the time of the interview. Questions 2-7 were formulated to gain understanding of the various paradigms in which IS and business faculty interviewees were implementing LA in their coursework, in terms of the extent of implementation across programs and courses, lessons and pedagogical strategies used to implement LA in IS and business, extent of faculty involvement in LA instruction at their institution, and the impact on students, in terms of enrollments in LA courses. Questions 8-11 correspond to RQ2; they were formulated to understand the chief challenges and perceived benefits within the broader context of the motivating factors that led the interviewees to

implement LA in their coursework. In total, these questions aim to gauge the extent of LA implementation in IS and business curricula, the paradigms of such implementation, and the challenges and benefits reported by the interviewees.

Qs #	Question	Correspondence to Research Question
1	Are you currently implementing LA in any course?	N/A
2	If you are currently implementing LA, to what extent are you implementing? Are you using it in one lesson in one course; a few lessons in multiple courses, extensively using LA across multiple courses, do you have LA as a focus in an entire course? Do you have LA as a focus for a certificate program or a degree program?	RQ1
3	In which business program(s) are you implementing LA? Is it in general business, marketing, management, analytics, supply chain management, entrepreneurship, risk assessment, or elsewhere?	RQ1
4	How many faculty are involved in LA implementation in your business school or program (including you)?	RQ1
5	How many students are impacted each semester/year by LA implementation?	RQ1
6	Describe a course in which you integrate LA. How did the course originate and how does it fit within the overall program?	RQ1
7	Could you please describe one lesson in which you use LA? Does LA impact the learning outcomes, assignments, or in any other way? Was this lesson new or did you replace an existing lesson with LA-infused lesson? Would you be willing to share the syllabus in a course where LA is taught?	RQ1
8	What are your chief challenges in implementing LA?	RQ2
9	What are your perceived benefits of implementing LA?	RQ2
10	What was the initial reason for you to implement LA?	RQ2
11	What are your chief questions about the implementation of LA in instruction?	RQ2

Table 3. Interview Questions and Their Correspondence to Research Questions

4. DATA ANALYSIS AND RESULTS

All but one of the 17 faculty interviewed were actively teaching with LA at the time of the interview. The one exception was a faculty member who had recently completed a Fulbright appointment at the time of the interview, as indicated earlier in Section 3.1.

Audio recording of each interview was transcribed using a professional online transcription service. Verbatim transcripts were carefully edited for clarity, and any inconsistencies between the recording and corresponding transcript were reviewed and subsequently removed by the authors. Each author separately compiled responses provided by the 17 interviewees to 11 questions from the edited transcripts. To do this, each interviewee's responses were first compiled by each author separately. Then, the compiled responses were compared and reconciled into a single final set for analysis.

Responses were analyzed per question using a combination of inductive and deductive coding approaches. For example, to gauge the number of courses in which interviewees implemented LA, whether these were graduate versus undergraduate courses, business disciplines in which LA implementation occurred, the extent of faculty involvement, and overall impact on students, deductive coding was applied and frequencies were calculated (reported in Table 4 in Section 4.1). On the other hand, inductive coding

was applied to gain insights into the pedagogical approaches adopted by interviewees engaged in LA implementation, the lessons and course topics in which such implementation occurred, as well as the facilitators and inhibitors. The codes were subsequently grouped into themes from which three paradigms of LA implementation in IS and business curricula ultimately emerged along with their key attributes, as discussed in Section 4.3.

4.1 Extent of LA Implementation

The 17 instances of LA implementation varied in extent, level, and impact (in terms of students' exposure to LA), as shown in Table 4.

LA implement-tation (impl.) in	#	Extent of LA impl.	#	Level of LA impl.	#	Disciplinary courses in which LA was implemented	#	Number of faculty teaching	#	Student Enroll-ment per offering	#
1 course	9	Multiple times in 1 course	4	UG only	9	Business/data Analytics, Data Visualization	7	1 faculty member	7	≤ 25	4
2 courses	6	Multiple times in multiple courses	10	Graduate only	4	Information Systems and Technology	5	2 faculty members	4	26-50	2
>2 courses	2	Extensively in multiple courses	2	Both	4	Marketing	3	3 faculty members	4	51-100	5
		Multiple dedicated courses	1			Supply Chain Management, Logistics	3	≥ 5 faculty members	2	101-200	3
						Retail	2			≥ 200	3
						Business Applications of GIS	2				
						Strategic Management, Real Estate, Accounting Global Business, Entrepreneurship	1 each				

Table 4. Various Aspects and Extent of LA Implementation

The extent of implementation of LA across the business and IS curriculum was found to be rather limited, with 15 of 17 instances of implementation occurring in 1-2 courses, and only two instances of implementation in more than two courses. In one of those two instances, LA was implemented in an undergraduate core course, was part of a 4-course concentration focused exclusively on LA in the School's MBA program, and part of two other graduate programs offered by the School. In the other instance, one faculty champion implemented a three-part method to integrate GIS and optimization-based LA models in an introductory Supply Chain Management course. Colleagues of this faculty champion introduced LA in their courses in business analytics, marketing, accounting, entrepreneurship, and retailing.

Business analytics and related courses, such as applied data analytics and data visualization, were the leading disciplinary area in the business curriculum in which the implementation of LA was reported, closely followed by Information Systems and Information Technology (IS and IT). This was followed by marketing and supply chain management/logistics courses, retail courses, business applications of GIS, or other generic business courses. A single instance of LA implementation was reported in courses such as Advanced Capstone, strategic management, real estate, accounting, global business, entrepreneurship, and a course dedicated to LA and decision-making. In other words, LA implementation was reported to be occurring across a broad spectrum of business disciplines.

In four instances, LA was implemented multiple times within a single course. In 10 instances, LA was implemented multiple times across multiple courses, and in two instances, LA was used "extensively" across multiple courses. The majority of LA implementation occurred at the undergraduate level, with a handful of instances at the graduate level (MBA and M.S. in Business Analytics). In some cases, LA was implemented in both graduate- and undergraduate-level courses.

A vast majority (15 of 17) of LA implementation occurred in coursework taught by 1-3 faculty members. The remaining two instances involved five or more faculty members. In one of these instances, LA was implemented by a lead faculty member, who engaged other departmental or extradepartmental colleagues to do so in their courses at the undergraduate level only. In the other, LA was implemented by three full-time faculty members, supported by 6-8 part-time, professionally qualified adjunct faculty members who are experts in GIS. Some of them are currently employed at Esri, a global leader in GIS software, location intelligence, and mapping. In short, faculty implementers of LA are sometimes the sole champions at their institutions. Some have successfully gathered a team, but in all cases, this required many years of persistent, dedicated work. The number of students impacted by LA implementation ranged from a minimum of 25 students per year (4 instances) to more than 200 students per year, as shown in Table 4.

What is particularly interesting is that students enrolled in courses that have an LA component are not only business or IS/IT students. In a few instances, such students, particularly undergraduates, may be majoring in GIS, geography, economics, health sciences, criminal justice, or education and have enrolled in courses taught by the business school faculty to fulfill elective requirements. In summary, the number of faculty in this area may be small, but they are impacting a fair number of students. Admittedly, this represents a small proportion of the total number of business graduates each year.

These aspects and extent of LA implementation in business and IS curriculum, along with the practical dimensions discussed next in Section 4.2, are reflected in three distinct paradigms in Section 4.3.

4.2 Practical Dimension of LA Implementation

Interviewees described the courses and lessons in which they implement LA. LA was reported as implemented in introductory IS core courses at the undergraduate level, and also to advance student competencies in topics such as spatial databases (within Data/Information Management), GIS strategy (within IS Management and Strategy), engaging in entrepreneurial thinking and business plan development (within Digital Innovation), and ethical use of location data and technologies (within area of Ethics, Impacts, and Sustainability) in graduate and undergraduate IS coursework, as outlined in MSIS (Topi et al., 2017) and undergraduate IS (Leidig & Salmela, 2020) competency models for IS programs.

In most instances, the implementation of LA was to illustrate the practical relevance and application of a topic in the real world and for a business, IS/IT, SCM, or analytics core topic. For example, interviewee responses indicate that LA was introduced and implemented to determine ideal locations of research and development facilities based on a set of criteria, compare the distribution of different types of businesses in a geographic area, conduct asset management by businesses, study possible reuses for vacant commercial real estate such as shopping malls, analyze food deserts, and more. In a select few instances, LA implementers organized invited guest lectures by GIS industry experts and practitioners. This has been outlined as an initial step to integrate LA into IS programs (Erskine et al., 2024). In one example, a guest lecture delivered by a GIS Manager of one of the largest grocery chains in Texas led to a project on analyzing access to healthy food options in food deserts using LA and developing strategies to improve access to healthy groceries.

Faculty interviewees indicated that LA affected the learning objectives, as the expected outcomes were often a presentation or a paper that included results of analyses conducted using mapping and spatial analytics. The LA assignments often included hands-on activities, with some foundational material provided through readings or lectures. While the LA lessons built on core concepts of the course, such as clustering in data mining, optimization modeling of customer demand in retail with the location set covering problem (LSCP) as the theoretical foundation, and site selection analysis in supply chain management, the lessons were new, taking advantage of the tools and workflows that geotechnologies made possible.

In a couple of instances in which LA was implemented in a Capstone course, students were required to apply LA to analyze the spatial dimensions of a business or societal problem. For example, in one instance, M.S. in Business Analytics students implemented LA in their Capstone course for analyzing spatiotemporal patterns of a very large dataset that compiled all "311" service requests (municipal services requested by citizens) to help city government better allocate its resources in a large, urban U.S. city with a population exceeding 4 million. In another instance, students applied their knowledge of LA gained from IS coursework to build a navigation and wayfinding app for a National Park, integrating augmented reality (AR) as part of an inter-university case competition sponsored by a major multinational investment bank and financial services company. The app would tell park visitors about the two most common plants and the most common animals, help them locate the nearest ranger station, and give users an immersive experience of the National Park's most visited locations. In this instance, the student group that collaborated to build the app with LA components was the runners-up in the case competition. This practical dimension of LA implementation, discussed later in this section, enabling connections to the real world, was repeatedly highlighted by faculty interviewees. This experiential learning advanced students' critical spatial reasoning and thinking skills, added LA to their skill portfolios, and enhanced their subject-matter knowledge and expertise in the respective courses.

The use of software varied, with faculty implementers often arranging access to Esri software for their students. This includes Esri's ArcGIS Online, a cloud-based, Software-as-a-Service (SaaS) platform that provides a complete mapping and analysis solution for creating interactive maps, apps, and data, and sharing them with organizational stakeholders. Esri's Business Analyst webapp is location-based market and community intelligence software that combines demographic, business, lifestyle, spending, and census data with map-based analytics to enable smart decision-making. In one instance, a faculty implementer designed a software tutorial using Esri Business Analyst to map the UN SDGs (United Nations Sustainable Development Goals), specifically to create a bivariate map of poverty and another property-related variable so that "we can see patterns." The faculty member added that using mapping, students learned that "two variables may have a positive relationship, but you may see other patterns which you cannot see in a table format." This showcases the practical value of mapping and LA – the ability to visualize patterns and relationships between variables otherwise hard to discern in tabular format. This value becomes magnified especially when students wrestle with larger datasets with multiple attributes. One faculty member indicated that using Esri's desktop GIS software was challenging for students whose computers lacked sufficient memory to run it. In another instance, a faculty adopter of LA indicated that their business school lacked access to Esri software licenses and did not want to invest in procuring them, since the LA course was an elective. To overcome this issue, the faculty member pivoted to use QGIS, an open-source GIS software that runs on both Windows and macOS, unlike Esri's ArcGIS Pro desktop software.

4.3 Paradigms of LA Implementation

Overall, returning to RQ1, three distinct paradigms of LA implementation in IS and business curricula emerge based upon the findings discussed in Sections 4.1 and 4.2.

4.3.1 First Paradigm. In the first paradigm, LA implementation is led by a sole faculty member at their respective business school/college/department (7 out of 17 instances in Table 4). The "lone wolf" often started LA implementation based on their prior geography or GIS background, or they had a colleague mentor them in spatial and temporal analysis. One implementer indicated that a grant from the department

enabled that faculty member to pursue LA. In one case, a faculty member had previously worked in industry and had already obtained technology-based patents, which increased their familiarity with all aspects of IT.

In this paradigm, LA was usually implemented in a single course, typically an elective, in the faculty member's core area of expertise, including supply chain management, analytics, marketing, IS, real estate, or retail. This exposed 20-100 students per year to location analytics concepts and applications, such as site selection, trade area analysis, routing, spatial databases, and data visualization. LA is implemented in one or two major topics in each course, for example, in exploring spatial attributes with geodatabases, conducting clustering in analytics with and without geographic attributes and observing differences between clusters, or data extraction, preprocessing, integration, and statistical analysis. In other words, in this paradigm, location analytics was not the major topic of the course; instead, it was integrated into major course topics with a geographic underpinning. LA manifested as curated lessons, tutorials, exploratory data analysis, and course projects within this paradigm.

4.3.2 Second Paradigm. In the second paradigm, LA is implemented by 2-3 faculty members (8 out of 17 instances in Table 4), led by a faculty champion, also the interviewee for this study. The others were departmental colleagues of the faculty champion. The faculty champion, a full-time faculty member, led and shepherded the implementation of LA in their core teaching area, such as logistics and transportation, marketing, retail geography, and IS. In some of these cases, the course in which LA was implemented was initially an elective. As enrollments grew, additional sections were usually taught by a departmental colleague of the faculty champion or by part-time, usually adjunct instructors with prior knowledge or industry expertise in GIS. In one instance, at a smaller institution, a dedicated course on geospatial intelligence in business is offered. In this course, LA is not an add-on; in fact, it is the major course topic, with concepts and LA technology woven into assignments that include a major course project.

In this paradigm, 50-300 students per year were exposed to LA at both graduate and undergraduate levels. While LA lessons in this paradigm were not significantly different from the previous one, in one instance, LA implementation takes the form of a canned, prearranged case in which students follow steps to use GIS to analyze the geographic dimensions of a supply chain. In this same instance, LA implementation has gradually increased due to the presence of a Center on Supply Chain Innovation in the School of Business. The Center is funded by the institution as well as by private sector sponsors. Three faculty members affiliated with the Center have implemented LA, including in the Master of Business Analytics program. Additional LA implementation in a Graduate Certificate in Sustainable Business was forthcoming at the time the faculty champion was interviewed. In other words, in this paradigm, the role of a faculty champion is instrumental in infusing LA in additional disciplines and courses. The presence of a center or institute can catalyze the implementation of LA in IS and business coursework.

4.3.3 Third Paradigm. In the third paradigm, LA is implemented by at least 5 faculty members (2 out of 17 instances in Table 4). LA implementation initially started with one full-time faculty member with expertise in supply chain management in one instance and IS and GIS in the other. In both instances, LA implementation gradually spread across the business school into disciplines beyond supply chain management and IS, including business analytics, marketing, accounting, entrepreneurship, retail, global business, strategy, and project management, to name a few. In one of the two instances, LA is part of a dedicated undergraduate core course titled "GIS for Business." The same institution also offers a small, niche MBA concentration in location analytics, comprised of four courses. In both instances, at least 2 other full-time faculty members teach dedicated LA courses or courses that infuse LA to varying degrees. LA lessons in this paradigm are quite varied. Students are exposed to GIS and LA theories and concepts, software, case studies, and course projects. These deliverables often require spatial analysis and modeling, synthesizing GIS and LA with theories and concepts from other business disciplines. A common feature of both instances in this paradigm is the faculty champion's close partnership and collaboration with Esri. Another notable aspect is an institutional focus on GIS and LA at one institution, supported by academic administrators and commensurate resources and incentives for LA implementation.

4.3.4 Comparing and Contrasting the Three Paradigms. Overall, the three paradigms of LA implementation in IS and business differ significantly in maturity, as described by Sarkar and Pick (2012). LA implementation ranges from curated exercises and tutorials in a single course (often an elective) in most instances to a broader range of graduate and undergraduate courses, including core IS and business courses or courses dedicated to LA. The 17 interviewees, leaders in this field, by and large, seemed comfortable with the LA analytical and software tools and with their knowledge of GIS and location data, which underpins LA. The main questions and concerns seemed to revolve around pedagogy — the actual teaching practice of LA in IS and business. The interviewees consequently were quick to point out that the use of LA in IS and business instruction was far from mature (Sarkar & Pick, 2012).

The paradigms also differ in terms of faculty involvement, ranging from a motivated lone wolf to a small, dedicated group of full-time faculty supported by adjuncts. The adoption of LA in IS and business curricula follows the diffusion of innovations curve documented in the educational literature (Buabeng-Andoh, 2012; Rogers, 2003). At the time of this research, the state of LA in business education is largely led by the innovators, with some early adopters, but has not advanced to what Rogers calls the "early majority" or the "late majority" of instructors. Indeed, most instructors still consider geotechnology to be the purview of geography faculty.

With additional faculty capacity and a broader spectrum of intellectual expertise, a range of IS and business courses integrated LA to varying degrees. One caveat is that more faculty involvement does not automatically mean more students being exposed to LA. In the first and second paradigms, a smaller number of faculty often exposed more students to LA than in the third paradigm, since LA was implemented at the undergraduate level, with larger class sizes. However, the extent of LA integration is certainly deeper and richer in the third paradigm than in the first two. Based on the discussion in this section, the key attributes of the three paradigms are summarized in Table 5.

Key Attribute	Paradigm 1	Paradigm 2	Paradigm 3
Extent of faculty involvement	1 "lone wolf"	2-3 faculty led by a full-time faculty champion	At least 5 faculty led by a full-time faculty champion with strong connection to Esri, supported by other full-time faculty
Courses with LA implementation	1, usually an UG elective	1-2 UG courses, maybe multiple sections	Multiple core UG and graduate courses
Students impacted per year	20-100	50-300	50-150
Extent of LA integration with IS & business topics	Limited to 1-2 major topics	More expansive, with LA itself being a major topic	LA integrated into multiple required disciplinary courses in IS and business
Availability of incentives for faculty	Not reported	Yes, mini-grants provided by an institute or center	Yes, institutional support aided by mini-grants provided by an institute or center
Executive sponsorship of LA implementation by academic administration	Not reported to be present	To a certain extent	Strong support
Maturity level of LA implementation	Early adopter with limited focus on LA concepts and theories	Somewhat mature, marked by some LA concepts and theories tied to practical applications	Very mature, with significant focus on LA concepts, theories, and applications, often tied to industry partnerships

Table 5. Key Attributes of Three Paradigms of LA Implementation

5. CHALLENGES AND BENEFITS OF LA IMPLEMENTATION

5.1 Challenges of LA Implementation

In relation to research question RQ2 stated in Section 1, the key challenges of LA implementation are the following:

Faculty capacity constraints: The chief challenge reported by ten LA implementers is "bandwidth." Traditional business analytics instruction has become established in business and IS curricula over time. It is often supported by experienced faculty experts in analytics and data science programs who are invested in curriculum design, revisions, assessment, and the development of best practices. In contrast, LA instruction is much less established and integrated in IS and business coursework. Implementers reported that developing LA instructional resources, maintaining their currency as LA software and datasets evolve, and developing best practices all require substantial time. Some implementers reported that while a colleague or two at their respective institutions might be interested in LA implementation, they were often constrained by time to do so even in a limited manner. In at least two instances, faculty implementers reported that they possess sufficient knowledge to develop additional courses that integrate LA but are unable to do so due to the packed curriculum and/or constraints in hiring faculty at this time. A faculty interviewee stated that since their current undergraduate elective course has been offered successfully for at least five years, "I've been asked to create a graduate version of it, and I just have not had time. And even if I created it, I can't teach. I don't have capacity to teach another class." Faculty resource constraints have recently been identified by Erskine et al. (2024) as a challenge to teaching LA in IS.

Significant variation in student preparation: Several faculty implementers lamented that students often had little to no background in spatial or geographic thinking, requiring substantial time in the already crowded curriculum to cover the fundamentals of GIS, which is the foundation of LA. This is another contrast to traditional analytics instruction. However, LA implementers who also teach traditional business analytics courses acknowledged that students express anxiety about analytics coursework in general due to its quantitative and technical demands. The lack of rigorous statistical or data analysis background and preparation was identified as an impediment for more advanced LA implementation.

Software-hardware limitations: Five faculty implementers reported that LA software licensing cost has been somewhat of a hindrance when their academic unit did not have access to the institutional site license for Esri's ArcGIS suite of LA software. Relatedly, a faculty member at a large public university was challenged by how to conduct lab work with hundreds of students. Another implementer reported that his approach to LA instruction is software-agnostic. Consequently, the implementer integrates LA into Python and also uses QGIS, a free and open-source desktop GIS software. Software-related constraints have also been identified by Erskine et al. (2024) as a potential hindrance for the integration of LA in IS.

Lack of executive support from academic administrative leaders: Two implementers reported that academic leadership's support of LA implementation in business coursework was tepid at best. In one case, departmental colleagues of an LA implementer were initially skeptical whether LA is truly part of information systems or analytics. While traditional analytics instruction has now proliferated across business programs, we reason that inadequate knowledge of GIS and understanding of LA and the assumption that GIS and LA belong in the social sciences domain may be responsible for the lack of executive support. During their interview, the faculty member also added that obtaining faculty governance approval for a course with a GIS component can be tricky since administrative leaders of academic units that house GIS or the Geography Department on campus can be "protective of their turf." To overcome such an obstacle, the faculty implementer advocated a collaborative spirit and broached conversations with faculty members in those departments to convey that a new course is not being designed to intrude on the disciplinary territory of another department. Such a spirit of collaboration can dispel fears and may in fact forge collaborations across academic units or departments. This was certainly the case at West Chester University, where the University's College of Business and Public Management introduced its students to LA in collaboration with the Chair and Professor of the Department of Geography and Planning.

In another case, an implementer reported that their School's academic leadership and the institution overall are heavily invested in Artificial Intelligence (AI) and related topics, but support for increasing LA

implementation within the business school has been somewhat limited. This faculty member stated, "… biggest challenge is the buy-in; people think location analytics belongs to geography; it's not being promoted like other subjects like accounting and finance." Consequently, the LA course, in this instance, an elective, is not heavily promoted, yet it draws 20-25 enrollments per semester.

Student use of generative AI platforms: Last but not least, two implementers reported that the use of generative AI platforms such as ChatGPT can stymie LA implementation. In one case, a faculty member reported that in a course module on data collection using remote sensing technology, students would routinely produce the same answers to an exercise when using ChatGPT. The faculty member reported that "from an educator standpoint, it is very, very frustrating because I think the students are at that point not thinking; they actually are missing out on the whole point of this course, which is them thinking spatially, but not just regurgitating something generic." However, the same faculty member pointed out that AI can in fact be a blessing in disguise when implementing LA in IS and business courses. For business students untrained in the fundamentals of GIS and geography, AI could conceivably help alleviate the learning curve for topics such as coordinate systems and map projections.

5.2 Benefits of LA Implementation

The key benefits of LA implementation are the following:

Improvement in student learning outcomes: The most frequently reported benefit, by nearly all respondents, was experiential learning stemming from hands-on work that LA offers, linkages to career pathways, the engagement and motivation that it fosters, and the use of real-world problems, data, and workflows, described by one faculty member as "linkages to reality." Several implementers stated their belief that LA "differentiated their graduates," because they possess knowledge of an area of contemporary technology few business graduates learn about in a meaningful way. Implementers argued that spatial reasoning, digital mapping, and LA skills enhance students' overall knowledge of databases, analytics, and contemporary issues in supply chain management such as supply chain traceability, transparency, and resilience, and improve their overall analytical competencies and decision-making skills. This positions them at a competitive advantage for various analyst roles compared to peers not exposed to LA.

Linkage to career pathways: One implementer provided examples of students exposed to LA in their course who now hold positions with decision-making authority at major organizations such as McDonald's, the Toronto Police Department, and Walmart in Canada. Another implementer provided illustrative examples of their alums now leading location intelligence departments in a director capacity at a major U.S. retail pharmacy (Walgreens), while another provided an example of their alum who is now Manager of Geospatial Analytics and Insights at a major retail grocery chain (H-E-B). Implementers uniformly agreed that by providing connections to the real world, LA helped improve student engagement, fostered intellectual curiosity among students to learn more about their own communities as independent learners, and encouraged those with an entrepreneurial mindset.

Increased enrollments and societal impact mission: In a few instances, implementers also argued that LA implementation, particularly in a STEM-certified program in their School/College, could potentially attract new enrollments, particularly international students. Last but not least, in one instance, an implementer reported that LA implementation in their programs is often tied to societal impact, allowing the School to lean more into such a related mission.

Implications stemming from the three paradigms of LA implementation along with their challenges and benefits are discussed next.

6. IMPLICATIONS OF FINDINGS

6.1 Faculty Motivations

The implementation of LA in IS and business curricula appears to be a mixture of top-down, mandated from a dean or department chair, and bottom-up, championed by an individual faculty member who spreads it to colleagues and students, with the bottom-up model as the majority. In a couple of universities, a dean was the champion and "executive sponsor." A dean's influence hastened the adoption among faculty

members in that school or department. In one instance, the professor previously served as provost at another university and thus had some influence in convincing the entire business faculty to use LA.

In the case of one university, an enduring relationship with a major GIS software company has accelerated the implementation of LA in IS and business curricula. Faculty at this institution are motivated to teach LA, and graduates are often hired by the GIS software company in analyst and other specialist roles. One of the schools of business has embraced a "business & society" mission, which guides LA implementation to lean heavily into societal issues such as businesses delivering value to their customers, dealing ethically with suppliers, and investing in communities in which they operate and their employees live. Given the wide variety of universities, histories, and faculty represented, it is difficult to say which of these factors hastens adoption, but a "spatial" focus in a business school and executive sponsorship from academic administration are two significant factors.

The interviews made it clear that these faculty implementers would find a way to teach LA no matter which institution or department they were in. Indeed, some of them had moved to new programs or institutions in the past and "took LA with them" to their new program. In one case, a professor moved it from geography to business; in another, a professor moved it from a large public university in one state to an even larger one in another. In yet another instance, a geography professor became a university provost and then returned to a faculty role in a school of business, in part because the professor was convinced of LA's value in elevating student learning.

In over two-thirds of the instances, the professor was not only teaching with LA but also conducting research with it. The research included topics such as sustainability (LA approaches to the adoption of the UN Sustainable Development Goals in developing countries), digital equity (geographic patterns of internet access and use), retail analytics (for the adaptive reuse of vacant shopping malls), and supply chain innovation. These faculty thus viewed LA as a viable way for them to demonstrate innovative practice in their profession and as a research pathway with publication potential, often in mainstream IS and Decision Sciences journals. They gave presentations at conferences and symposia about their research and their educational journey. Indeed, a "Business Location Analytics Symposium" was initiated in 2023 as a grassroots effort by this community of professors to bring IS and business academics passionate about LA together with practitioners from industry and government. Even if they were not using LA for research, implementers commented that they felt it was their duty to share their work with fellow IS and business faculty and socialize why and how they were using LA tools and perspectives. They added that helping other faculty colleagues to use these tools brought them personal and professional satisfaction. From the interviews, it was evident that the professors valued teaching with LA for reasons that extended beyond the perceived advantages in teaching and research. They enjoyed implementing LA; it was often cited as a source of inspiration in a sometimes-frustrating professional and institutional environment.

6.2 Foundational Competencies for Students

The interviewees made it clear that they see the benefits of teaching with LA as extending beyond teaching software skills, into required and elective IS competency areas such as data and information management, data visualization, and business analytics, including BI and AI (Leidig & Salmela, 2020). Through LA, students learn additional competencies such as learning about computer systems and architecture, and how to build apps. Beyond technical skills, professors cite written, oral, and analytical communication, including the creation of data visualizations such as map-based infographics and digital story maps. Students deepen their understanding of issues such as crowdsourcing, data quality, data ethics, and the responsible use of LA. They learn how to critically evaluate and make ethical use of location data while recognizing its pitfalls. They learn problem-solving, gain perspective through collaboration, and understand the value of building partnerships and developing their own professional network.

In a handful of instances, interviewees attested that LA sparked intellectual curiosity among students to learn about communities around them, explore business opportunities, and analyze market gaps. This, in turn, spurred students to apply their LA knowledge and skills to launch startups or pursue other entrepreneurial initiatives. Many of the cited benefits were mentioned by faculty in other disciplines (Ritchie et al., 2023). These skills, along with critical thinking, teamwork, collaboration, and problem-

solving, are cited by the National Association of Colleges and Employers (2025) in its annual surveys of job recruiters. Critical thinking, collaboration and teamwork, ethical analysis, analytical competencies, creativity, written and oral communication, and problem-solving are also highlighted as individual foundational competencies for IS graduates in the MSIS 2016 (Topi et al., 2017) and IS 2020 (Leidig & Salmela, 2020) competency models.

Professors are also drawn to teaching with LA because the tools allow them to continue teaching core business content—IS, supply chain, business analytics, marketing, entrepreneurship, management, and more—through this analysis. LA was thus seen as an effective content delivery mechanism, beyond its technological attractions. This aligns with the research by Wikle and Fagin (2015), who found that data editing and GIS analysis were in demand, as were "soft skills," including problem-solving and adaptability. This is also consistent with Hong's (2015) analysis of 946 GIS job advertisements over seven years, where GIS job applicants "need to possess high levels of GIS analysis and modeling skills (e.g., database development)" but also "personal and social skills (e.g., communication) to obtain employment." The interviews made it clear that these faculty are not just teaching the tools, nor are the tools the main attraction for them. The main attractions are (1) the critical, holistic, and spatial thinking skills that transfer well to the workplace, and (2) the utility of LA in enabling faculty to achieve their educational objectives, whether related to sustainable business strategy, demographic analysis, site selection, or other topics.

Instructors see value in students acquiring geographic perspective in their business decisions. As students grapple with the "what's where," "why is it there," and "why should we care" questions—they see maps no longer as simply reference documents (where something is located), but rather as essential tools for data visualization, analysis, planning, decision-making, and effective communication.

This study confirmed that location analytics is part of a geographic information system that contains many interlocking components. Deciding which of the components to use in teaching—and in what manner to do so—takes effort. However, this study makes it clear that these faculty members are adamant and tenacious about using inquiry-driven approaches and tools that help students learn. And some of them are turning their efforts into research studies showing that when students learn through location analytics, they become more marketable, no matter which aspects of business they choose to pursue (Ritchie et al., 2023).

7. PRACTICAL RECOMMENDATIONS

Adhering to this Special Issue's theme, "Location Analytics: Shaping the Future of IS Education," we offer four practical recommendations to move the LA agenda forward in IS and business education communities.

Creation of a consortium of business schools to support LA instruction: As this study shows, due to the demands on IS and business faculty and the rapidly changing nature of geotechnologies, a chief challenge in teaching with LA is limited faculty capacity, as discussed in Section 5.1. To alleviate this challenge, we recommend the creation and maintenance of an LA lesson and project library, possibly under the auspices of a consortium, similar to the Teradata University Network (TUN), an academic-led university alliance program that offered free BI teaching software and materials through a website to faculty and students around the world in the early and mid-2010s (Wixom et al., 2014).

Similar to Alavi and Gallupe's (2003) discovery that educational institutions are reinventing the wheel each time they implement technology-mediated education programs, a consortium of business schools and colleges can be the custodian and catalyst for the continued development, curation, and dissemination of LA teaching resources. Such a consortium can keenly track initiatives such as AR, VR, and GeoAI, which are already having an enormous impact on geospatial technology and on location analytics, and provide LA teaching resources to business and IS faculty. This will reduce the learning curve for new faculty entrants to the field of LA instruction while providing support to continually update existing resources for teaching LA. Some of the universities that interviewees in this study are affiliated with would be prime candidates to lead such a consortium.

Despite this recommendation to include an LA lesson library in the work led by a consortium, we add a cautionary note. The demand for LA lessons will always outpace the supply, especially in rapidly evolving toolsets such as geotechnologies. The new modality of learning, however, means that the way we think

about lessons and curriculum needs to change (Kerski, 2024a; Kerski, 2024b). Given the user-friendly interfaces that LA offers, the wide array of help documents and lessons in a variety of multimedia formats, and the advancements in GenAI that reduce the need to memorize graphical user interfaces, the step-by-step lessons that faculty need to create are rapidly diminishing in importance.

Forging industry collaborations: Erskine et al. (2024) have recently highlighted the importance of collaborations between IS/business schools and industry partners, through teaching cases and research projects, to close LA competency gaps. A few interviewees similarly stated that connections and collaborations with industry partners, notably Esri, enabled them to spread LA across the business curriculum, beyond just IS (as discussed earlier in Section 4.3, for the third paradigm of LA implementation). At Texas Christian University's Neeley School of Business, the annual supply chain case competition has featured cases contributed by major corporations such as CSX, Chick-fil-A, and Frito-Lay over the years. Such partnerships offer multiple benefits, from providing student internships, pathways for student employment, case studies for courses, and real-world problems and data that can be used for LA curriculum development.

We recommend that business schools/colleges connect with local companies and align their LA curricula with those companies' business needs and goals. Industry partnerships will fortify connections of LA curriculum with the real world, heighten experiential learning, improve decision-making skills, data and analytical competencies of students, and provide a direct linkage to career pathways – all of which were identified as the benefits of LA implementation earlier in Section 5.2.

Connect IS research and teaching with LA: This paper focuses on teaching and learning with LA. However, LA is increasingly providing avenues for IS researchers to add a location dimension to their research or analyze existing ones (Erskine et al., 2024). We encourage faculty to connect these two uses of LA. At one of the interviewee's home institutions, a Center for Supply Chain Innovation offers researchers an avenue to integrate LA into supply chain research projects. The Center funds mini-grants and offers stipends to faculty to develop teaching modules that are ultimately integrated into appropriate courses. As this interviewee suggests, IS and business programs are often home to centers and institutes focused on analytics, entrepreneurship, cybersecurity, social impact, etc. LA can be organically integrated into a center's projects – either research initiatives, community partner projects, or curricular innovation projects. This can lead to LA becoming integrated with a center's mission and ultimately being implemented in the curriculum.

Advance the use of webGIS among early adopters: For many years, incorporating LA into business instruction was arduous from a technological point of view, requiring advanced hardware and complicated software. With the advent of spatial data and software-as-a-service (for example, Esri's ArcGIS Online), barriers to the adoption and implementation of LA in IS and business curricula have lessened. We recommend that early adopters among IS and business faculty (paradigm 1 in Table 5) leverage webGIS software and available training to implement LA in their coursework. With webGIS, it is no longer necessary to teach learners how to use GIS before teaching the disciplinary content of interest (Baker, 2015). Not only does this alleviate the burden of providing costly instructional facilities such as computer labs, but it also enables students to consume LA using their own devices at their own pace, allowing deeper exploration, meaningful collaboration and engagement using real-time and distributed data, and a likelihood of actually using LA concepts and tools in new and novel ways (Baker, 2015).

These practical recommendations – derived from the findings of this study – are likely to not only increase LA implementation among IS and business educators overall but also help early adopters increase the level of maturity and move from paradigm 1 to paradigms 2 and 3 of LA implementation.

8. CONCLUSIONS AND LIMITATIONS

This paper identifies three paradigms for implementing location analytics in IS and business curricula by carefully analyzing 17 successful implementations of LA across a diverse range of business schools and IS programs in North America. The paradigms are compared and contrasted in terms of the extent of LA implementation, faculty involvement and motivations, student impact, pedagogical approaches, and overall

maturity of LA implementation in IS and business coursework, along with challenges and benefits of such implementation. In doing so, it provides a contemporary update about the extent of LA implementation in IS and business education. For graduates of such programs, the skills and competencies employers demand are evolving rapidly, and LA is poised to help them keep pace and distinguish themselves from their peers.

A purposive sampling approach was adopted to select the faculty participants who are leading adopters of LA in IS and business instruction. We recognize that there may well be other adopters in institutions around the world, including in the United States. One such institution not part of this study is the business program at California State Polytechnic University-Pomona. We acknowledge that, due to the adoption of purposive sampling, the paradigms of LA implementation proposed in the study, along with their challenges and benefits, should be generalized with caution (Robinson, 2014; Tajik et al., 2025).

We propose expanding the scope of our study by identifying additional implementers in the academy of IS and business educators. The design of a community web-map that exhaustively catalogs instances of LA implementation in business and IS programs worldwide is outlined as an aspiration and a direction for future research.

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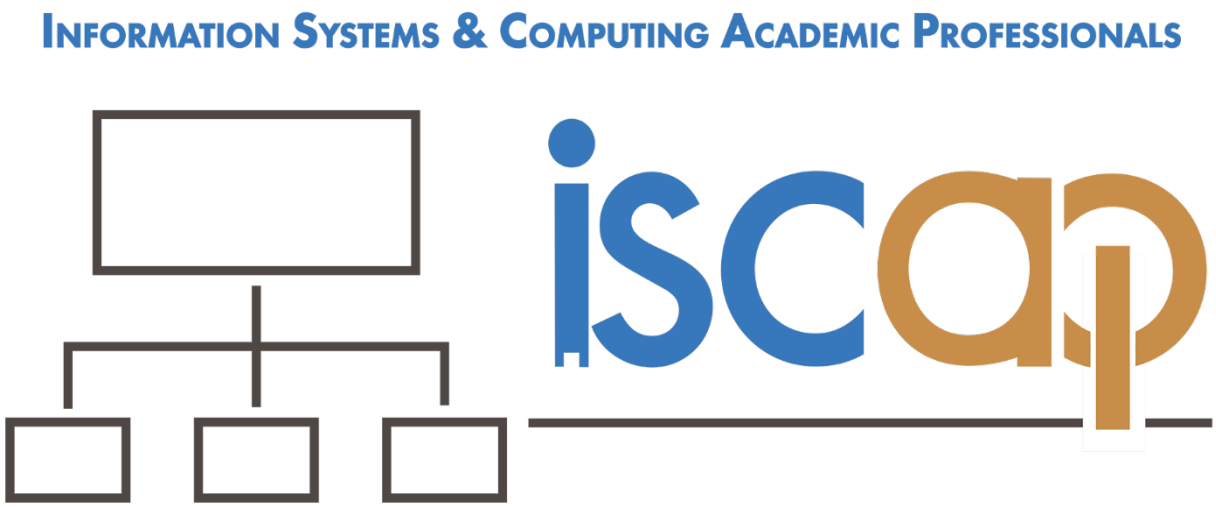

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