Revitalizing Graduate Business Curriculum with Location Analytics Incorporating DEI & ESG

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Abstract

This article explores the revitalization of the graduate business curriculum by incorporating location analytics. Despite the benefits of integrating location analytics in business education, its adoption in business schools is currently limited. By embracing spatial thinking, business schools can better prepare students for informed decision-making in critical areas such as diversity, equity, and inclusion (DEI); environmental, social, and governance (ESG); consumer marketing insights; and supply chain issues, to name a few. The article highlights the importance of effective course design, clear objectives, a learner-centric pedagogical framework, and robust assessment strategies. Additionally, it emphasizes the need for faculty development and collaboration, discusses challenges and future directions, and concludes with a call to action for business schools to prioritize the integration of location analytics, DEI, and ESG in their curricula.

Keywords: Location Analytics, Graduate Business Curriculum, DEI, ESG, Curriculum revitalization

1. Introduction

The evolving landscape of the business world and the expectations placed on the business professional requires revitalizing the graduate business curriculum. Technological advancements, globalization, changing workforce dynamics, increased emphasis on ethics and corporate social responsibility, and sustainability in business are driving forces to develop innovative strategies for organizations striving to create value in a highly competitive marketplace. To navigate this evolving landscape, business professionals require an appropriate knowledge base beyond traditional business disciplines. It can be argued that an interdisciplinary approach to the graduate curriculum incorporating elements of sociology, geography, data science, design thinking, and other relevant fields will enable students to develop a holistic understanding of complex business and societal problems and generate innovative solutions. Recognizing the need to adapt to the demand of modern business decision-making, it is crucial to explore the importance of location analytics and its capability to adopt interdisciplinary studies in the graduate business curriculum. Location analytics involves analyzing and deriving insights from geo-enriched business data using Geographic Information Systems (GIS) technology. It applies analytical techniques and statistical methods to spatial data to understand patterns, relationships, and trends not immediately apparent from raw data.

Businesses ranging from small, entrepreneurial enterprises to multi-national companies can benefit significantly from using location analytics and geospatial data when making decisions impacting product and service offerings. These decisions include tactical questions such as how to price a product or service, how (and whether) to tailor their product or service differently across different geographies, and how to tailor promotional campaigns for different geodemographic market segments. Location analytics can also inform decisions about a firm’s supply chain, resource allocation, and retail outlet expansion. Considering location analytics' extensive and beneficial applications on strategic and technical decision-making within businesses, we are convinced that integrating business-oriented location analytics courses into the conventional business school curriculum is logical and imperative.

As technological change continues to disrupt industries, companies like Walmart are incorporating GIS-guided autonomous vehicles into their supply chain operations. Firms like Starbucks are relying on geographic data to inform their retail growth strategies on a global level. Additionally, a wide variety of industries increasingly rely on location intelligence to make informed decisions that impact various areas, including diversity, equity, and inclusion (DEI) initiatives, as well as environmental, social, and governance (ESG) practices. For example, companies may use location data to identify underserved communities, develop targeted outreach programs, or assess the environmental impact

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of their operations. In today's rapidly changing technological landscape, the demand for business professionals with expertise in location analytics and its industry applications is growing at an unprecedented pace. The global geospatial market is expected to expand to $681 billion by 2025. Geospatial technologies are projected to have a significant economic impact, currently estimated at $2.2 trillion to $5.4 trillion (Geobuiz, 2022). It is critically important the future workforce is adequately trained to embrace this opportunity (Institute for the Future, 2011). In this context, business graduate students will benefit significantly from studying how business leaders can apply location analytics to managerial decision-making.

As higher education adapts to the changing expectations of students and employers, the Association to Advance Collegiate Schools of Business (AACSB) accreditation standards are evolving to emphasize technical expertise and hands-on experiential learning through practicum-based courses and projects. This shift underscores the dynamic nature of the educational landscape. A location analytics course equips students with technical expertise in geospatial data handling and spatial analysis tools, fostering critical thinking, problem-solving, and analytical skills through real-world projects. This aligns with AACSB's emphasis on experiential learning. The course promotes collaboration through group projects, enhancing teamwork and communication skills while analyzing geospatial data. By integrating business with disciplines like geography, data science, and technology, students gain a comprehensive understanding of how spatial data influences business decision-making. This interdisciplinary approach aligns with AACSB's goal of nurturing cross-disciplinary knowledge and skills. Ultimately, the course enhances students' competitiveness in the job market and improves their long-term career success.

Adopting a location analytics curriculum in graduate programs has been slower due to various factors. These include a focus on traditional curriculum, limited awareness and understanding, resource constraints, pedagogical challenges, and resistance to change. To overcome this resistance, it is crucial to raise awareness about the benefits, provide faculty training and support, allocate resources, and highlight successful case studies.

In this paper, we report a novel design for an introductory location analytics course for graduate students based on our subject matter expertise and teaching experiences at three large business graduate programs in the US. To establish a robust course foundation, we have created a curriculum that draws inspiration from the CRISP-DM framework while incorporating principles of Universal Design for Learning (UDL). Integrating these approaches ensures a comprehensive and inclusive learning experience that caters to diverse student needs and promotes effective location data mining practices.

In the subsequent sections of this paper, we conduct a literature review and thoroughly explore the course design, objectives, and pedagogical framework. This examination provides insights into the rationale behind important decisions and presents our perspectives on faculty development and collaborations in teaching location analytics. The paper concludes by reflecting on avenues for future improvement and a call to action.

2. Literature Review

Incorporating location analytics in the curriculum presents a compelling business case and offers additional benefits by facilitating the exploration of ESG and DEI topics. This integration enables schools to address, teach, and conduct research on these important areas. AACSB advocates understanding diversity as a complex and varied concept that requires a broad lens embedded throughout its accreditation standards. (AACSB, 2021) One of the key issues cited in teaching about diversity is the lack of cases and materials that allow the exploration of topics and business problems faced by small minority-owned businesses (Shinn, 2021) (Adams, 2021). Although some schools use data analytics to understand diversity and equity (Rider & Reagans, 2022), spatial thinking does not appear to be used in those programs.

Business schools are working to respond to challenges from accreditors and other constituents to demonstrate positive societal impacts. (Steidle & Henderson, 2023) There is a push to help students understand the complexities of societal impact and how it can integrate with business strategy for success across stakeholders. (Cadotte & Agrawal, 2022) Sustainability, addressing climate change, global and local health concerns, as well as other social issues lead the list for innovative business schools (De Novellis 1, 2022). Some schools are taking a multidisciplinary approach to teaching and research (De Novellis 2, 2022), but there is little evidence they are using spatial analysis as part of their work.

Business programs need not look far to find examples of how to include DEI and ESG in teaching and research. URISA has long advocated a social justice perspective in GIS and urban planning and supports an emergency/disaster volunteer group (GIS Corps). (Salling, Babinski, & Franklin, 2019) Steinberg advocates using methods from urban design, urban planning, and visual thinking that allow students and faculty to ask richer and more relevant questions in their work. (Steinberg, 2021) By broadening the range of disciplines to include environmental science, public health, geography, engineering, and others, it becomes evident that GIS and spatial thinking emerge as primary approaches for fostering innovation in this business. Some examples from outside of business that model business concepts include the development of spatial equity indices to promote planning and management (Heckert & Megan, 2016), health equity (Ogojiaku, et al., 2020) (Sadler, Hippensteel, Nelson, Greene-Moton, & Furr-Holden, 2019), transportation equity studies (Bruzzone, Cavallaro, & Nocera, 2023), distribution, routing, and logistic problems (Wu, 2022), crisis response (Duval-Diop, Curtis, & Clark, 2010), understanding customers and stakeholders (Roberts, Buckingham, Janke, & Jacobson, 2021).

While business has not entirely disregarded GIS, it is worth noting that despite being a widely utilized research and teaching tool in various academic disciplines since the 1990s, its adoption within business schools has been limited. Over the years, there have been a few proponents (McBane, 2003, Erevelles, Horton, Rolland, and Huntley, 1999, Miller, Mangold, Roach, and Holms, 2013, Gadish, 2006). Others have outlined curriculum (Reames, 2006, Miller 2007a, Rivera & Groleau, 2021) and delivery modalities (Miller, 2007b, Miller et al., 2014, King and Arnette, 2011, Miller et al. 2007, Shepherd, 2009). However, it is still a seldom used technology across business disciplines. This is true, although over 80% of businesses use location analysis in at least one function (Spatial Business Initiative, 2018), while only 9% of business schools offer any exposure to spatial analysis or GIS (Ramakrishna et al., 2011). The value of integrating spatial thinking into business questions is paramount. The responsibility lies in the fact that while numerous disciplines employ location analytics, its utilization often remains isolated within specific departments or programs within colleges and universities. Consequently, there is a pressing demand for increased interdisciplinary and multidisciplinary collaboration (Baker, Battersby, Bednarz, et al., 2015, Rivera and Groleau, 2021). Some schools offer GIS as an add-on certificate through another program (Winkle, 1990), but the curriculum is often technical and not integrated with business or other disciplines. Others have cited that the learning curve is too steep to incorporate into the curriculum. According to Yau (2011), the barrier to entry for regular GIS use is too high, leading users to opt for more straightforward tools.

The lag in adopting spatial thinking in the curriculum has consequences for business schools. Not using it, especially to address ESG and DEI, limits the thoroughness and complexity of questions that need to be asked in these critical areas. It puts business schools behind other disciplines, such as environmental science, geography, urban planning, and sociology, that routinely address ESG and DEI questions with GIS and spatial analysis. Apart from considering ESG and DEI, the delayed adoption of GIS in business schools puts them at a disadvantage when addressing common business challenges, such as:

- Identifying the customer base and potential areas for expansion (Conner, 2015).
- Determining optimal locations for building warehouses (Wisner, 2017).
- Strategizing talented employees' acquisition, development, and retention (Tavis et al., 2018).
- Making decisions about expanding operations and selecting appropriate financing options (Ross et al., 1991).

GIS and location intelligence are highly suitable tools for addressing these questions. From a technical standpoint, spatial analysis can tackle problem areas beyond the reach of other analytical methods. For instance:

- Determining the suitability of a market area for retail site selection through threshold analysis and assessing site calibration using the Huff model (Buckner, 1998).
- Converting point data into a density surface to visualize cost or revenue surfaces more effectively (Mitchell, 2020a).
- Estimating customer quality-of-service coverage using point-in-polygon analysis (Mitchell, 2020a).
- Utilizing map algebra to identify disparities in cost and revenue surfaces enables profitability evaluation (Mitchell, 2020a).
- Calculating distances and mean distances between customers and service providers to assess adequacy for service delivery (Mitchell, 2020a).
- Analyzing the spatial patterns of customer locations for statistical significance (Mitchell, 2020b).
- Evaluating the impact of spatial autocorrelation on regression models on business practices (Mitchell, 2020b).

Businesses frequently raise these questions; however, they are rarely incorporated into the business school curriculum due to the absence of location intelligence and spatial thinking components.

One of the original and primary uses of GIS and spatial analysis was understanding complex environmental problems for decision-making. As businesses continue to expand sustainability practices and mitigate harmful social impacts, GIS will be used more extensively across organizations. Business schools must equip students to tackle intricate spatial inquiries effectively. Graduates will need to understand how GIS can be deployed as a primary tool to understand the interaction of economic forces, the built environment, and the natural environment for the health of the business and the community. A company that neglects these critical questions concerning DEI, ESG, and profitability exposes itself to significant risks. Similarly, business schools need to train students to pose these inquiries, ensuring they are well-prepared to address such challenges in their professional careers.

3. Course Design, Objectives, Pedagogical Framework, & Assessment

In this section, we delve into the principles that underpin effective course design and underscore the significance of establishing well-defined objectives. We present a pedagogical framework tailored explicitly for teaching location analytics in business graduate programs. Furthermore, we examine the best practices in designing and implementing robust learning assessments that gauge the degree to which the learning objectives are accomplished.

3.1 Course Design: Backwards Design, Bloom's Taxonomy, Universal Design for Learning (UDL)

When designing a curriculum for a graduate-level course, our goal is to deliver an optimized learning experience for our students. Two common design frameworks guiding pedagogical choices in curriculum development are Backwards Design and UDL. We will review these two frameworks and discuss when, where, and how, in applying these frameworks, learner-centric pedagogical choices are made.

Backwards Design (Wiggins and Tighe, 2005) begins curriculum development by addressing the question, "What do we want the students to learn?" In Business Education, this approach aims to determine what knowledge, skills, and abilities students should possess upon completing the course, including their ability to think critically, apply concepts, draw informed conclusions, and effectively communicate their processes and findings to C-Suite executives. To accomplish this, Wiggins and Tighe recommend starting with clearly delineated and measurable learning objectives, written using Bloom's Taxonomy, a common approach for articulating what we want our students to learn. Bloom's Taxonomy, initially formulated by Bloom (Bloom, 1956) and later revised by Krathwohl (Krathwohl, 2002), is widely recognized, and holds substantial influence as an approach to understanding students' learning process. Bloom's taxonomy includes six levels of cognitive processes: (1) Remembering, (2) Understanding, (3) Applying, (4) Analyzing, (5) Evaluating, and (6) Creating. By focusing on these levels, Bloom's Taxonomy assists in creating targeted learning objectives, designing appropriate instructional strategies, and developing practical assessments that align with the desired cognitive outcomes (Armstrong, 2010).

Backwards Design is complemented by UDL, a framework that promotes a range of content representations, engagement strategies, and expressive modes. By incorporating UDL (Rose, 2000), educators strive to create inclusive learning environments catering to diverse learners' needs, ensuring equitable educational opportunities. As such, it is a cornerstone of applying DEI principles to learning. UDL encourages students to interact with the content through varied activities, fostering multiple ways of understanding and various ways of expressing their learning (CAST, 2022). This approach empowers students to leverage their diverse backgrounds and experiences, supported by cultural perspectives, identities, abilities, and learning preferences (Kennette & Wilson, 2019). This learner-centric approach is supported by many learning modalities, such as active, personalized, collaborative, inquiry-based, and authentic. Additionally, the UDL approach provides students with choice and voice.

Creating assessments that effectively measure students' learning is critical. Both Backwards Design and Bloom's taxonomy advocate for assessments that measure the degree to which a student has met the learning objectives. UDL advocates for offering students diverse options for demonstrating their understanding, a core principle of DEI. Bridging the gap between objectives and assessments are the instructional strategies, or pedagogies, that guide students from their initial state upon entering the course to their desired state upon completion.

Table-1 showcases the essential elements of crafting a strong and impactful curriculum. Table 2 establishes a connection between the course design principles and the broader range of pedagogical choices, encompassing both general and specific approaches influenced by Backwards Design and UDL.

3.2 Course Learning Objectives

Defining course objectives provides a clear roadmap for instruction, delineating the intended acquisition of knowledge and skills. Objectives also guide planning, assessment, and evaluation while assisting learners in setting expectations and tracking progress.

Table 1: Essential elements of effective curriculum design and assessment.

Elements	*Description*
1. Clearly defined and measurable learning objectives	Learning objectives are articulated using Bloom's taxonomy, providing clear direction for what students are expected to achieve regarding knowledge and skills.
2. Active engagement of students in learning activities	Creating a learning environment that actively engages students in diverse activities, following UDL principles.
3. Diverse avenues for students to showcase their understanding	Providing students with multiple options and opportunities to express their understanding, embracing the tenets of UDL.
4. Effective assessments aligned with objectives and UDL principles	Designing assessments that accurately measure the degree to which learning outcomes are achieved, linking directly to the objectives and UDL principles.

Table 2: Alignment of course design principles and experimented pedagogical choices.

Course Design Principle	*Pedagogical Choices*
Backwards Design: Learning Objectives & Assessments	• Small Group Analysis of Case Studies (Bloom's Level 3) • Mock Presentation to C-Suite (Bloom's Levels 5, 6)
Backwards Design: Planning of Learning Experiences	• The instructor as a facilitator, Active Learning, Authentic Learning, Student Voice • Students build their learning before the class in Discussion Boards, in class with Peer-to-Peer interactions, and after class in Reflections (Bloom's Levels 2, 3, 4, 5) • Engage in higher level activities during class, guided by the instructor (Bloom's Levels 4, 5, 6) • Hands-on workshops, create and analyze maps that inform and communicate (Bloom's Levels 3, 4, 5, 6) • Executive Summary for C-suite (Bloom's Levels 5, 6)
UDL: Multiple forms of representation	• Inquiry-Based Learning, Authentic Learning, Active Learning (Bloom's Levels 3, 4, 5, 6) • Data can be expressed as a table, a chart, as the output of an analysis, on a map, as a mathematical expression, as an image, in text format, etc. (Bloom's Levels 2, 3, 4)
UDL: Multiple Forms of Engagement	• Personalized Learning, Collaborative learning, Dialog (written and verbal) • Analysis of data in different representations, Discussion Boards, Applying GIS software (Bloom's Levels 3, 4)
UDL: Multiple forms of student expression	• Student Choice, Student voice, Authentic learning (Bloom's Levels 3, 4, 5, 6) • Create an interactive artifact (dashboard or story map, for instance) (Bloom's Levels 5 & 6) • Create a marketing plan (Bloom's Levels 5 & 6) • Prepare a presentation for a C-suite executive (Bloom's Levels 5 & 6)

For a course or program in location analytics in a business school, we have identified seven key questions that serve as the guiding principles. They are:

1) What is the role of location analytics in business?
2) How do we apply location analytics to business problems?
3) How do we evaluate location factors for business decision-making?
4) What analytic techniques should be leveraged with geospatial technologies and tools for various business-related analyses?
5) How do we interpret and integrate location analysis with business strategy?
6) What are effective ways to communicate findings and recommendations derived from location analytics?
7) What ethical considerations in location analytics should managers be aware of?

We linked these questions to theoretical and practical applications of location analytics in business to develop the learning objectives. Using Bloom's taxonomy resulted in 7 learning objectives such as:

1) Articulate and explain the importance of location analytics in making strategic business decisions in areas such as marketing, operations, supply chain management, and real estate.
2) Develop and apply appropriate location analytics methodologies and tools to solve authentic business problems.
3) Assess and evaluate location factors that impact business success, including demographics, market potential, competition, infrastructure, accessibility, and proximity to suppliers and customers.
4) Manipulate and analyze spatial data by choosing geospatial technologies, data visualization tools, and analysis techniques. This includes geospatial

data collection, processing, visualization, statistical techniques, and predictive modeling.
5) Interpret results of geospatial analyses for decision-making, integrating them into the overall business strategy.
6) Communicate insights and recommendations based on geospatial data results succinctly and effectively to business decision-makers.
7) Identify potential ethical concerns with using, analyzing, and interpreting geospatial data for business decision-making.

3.3 Pedagogical Framework

Inspired by the CRISP-DM framework for data mining (Chapman et al., 2000; Jaggia, Kelly, Lertwachara, & Chen, 2020), we propose a pedagogical framework for teaching this course, as outlined in the six steps below. The CRISP-DM (CRoss Industry Standard Process for Data Mining) framework is the ultimate guiding principle for conducting analytics projects and creating analytics curricula in higher education. However, due to our course's specific scope and limitations, we have tailored a modified version of the original CRISP-DM framework. Our adapted framework incorporates most of the CRISP-DM steps, although not all, to align with the objectives of our introductory graduate course.

Step 1: Business Understanding. In this step, students engage with diverse business problems, applying spatial thinking and analytical reasoning to achieve distinct learning outcomes. They explore the role of location analytics in pattern identification, resource optimization, operational efficiency, customer targeting, and informed decision-making. Students learn to gather relevant spatial data from various sources and develop work plans to guide the analysis process effectively.

Step 2: Data Understanding. Students learn to analyze spatial data by exploring its characteristics, evaluating sources, assessing quality, and understanding relevant attributes. This includes identifying relationships, patterns, and potential preprocessing needs.

Step 3: Data Preparation. Spatial data from diverse sources, like GPS devices, imagery, and databases, undergoes integration and preparation for effective analysis. This involves geocoding addresses, merging datasets, and incorporating location-specific attributes. Visualizing the prepared data enhances comprehension, ensures compatibility for spatial analysis, and helps better understand the data quality. The data preparation step ensures that the data is compatible and can be effectively utilized for spatial analysis, given the business problem.

Step 4: Spatial Data Analysis. Students are introduced to GIS software that stores, manages, and analyzes spatial data. There are various techniques and tools used in spatial data analysis, including:

(1) Spatial visualization - involves creating maps and other visual representations of spatial data to identify patterns and spatial relationships.
(2) Spatial clustering - this method groups similar spatial objects or locations based on their attributes or proximity. It helps in identifying spatial patterns and spatially coherent regions.
(3) Spatial Hotspot analysis – this analysis identifies hotspots (areas with high values) and cold spots (areas with low values) in spatial data. This technique is particularly useful for analyzing data that exhibit spatial dependence.
(4) Spatial Auto-correlation – a concept that refers to the tendency of variable values to be spatially related. In other words, values of a variable that are close together in space are more likely to be similar than values that are far apart.

Step 5: Spatial Data Modeling. Next, fundamental problem-solving techniques are introduced, using spatial data that involves the development of statistical or predictive models that aim to understand and predict spatial patterns, relationships, and phenomena. Here are some common approaches for building models using spatial data.

(1) Spatial regression models extend traditional regression models by incorporating spatial dependence or autocorrelation.
(2) Geostatistical models, also known as spatial interpolation models, estimate values at unobserved locations based on observed data and spatial relationships.
(3) Network models – are used for closest facility analysis, service area analysis, and location-allocation analysis.
(4) Machine learning models – are applied to spatial data to build predictive models. Techniques such as decision trees, random forests, support vector machines (SVM), and neural networks can be adapted to handle spatial data. Spatial features and relationships can be incorporated into the model as input variables to improve predictive accuracy.

Step 6: Knowledge Evaluation. Evaluating student knowledge acquisition involves systematically assessing and validating their ability to study outcomes in spatial analysis. This includes utilizing relevant data sources, applying spatial analysis techniques, interpreting results, and producing a comprehensive report. Ethical considerations such as privacy, security, transparency, and fairness are also reviewed to ensure the reliability and usefulness of the analysis. The knowledge evaluation process ensures the spatial analysis results' robustness, reliability, and suitability.

Table 3: Summary of Course Objectives, Design Principles, Bloom's Levels, CRISP-DM Steps, and Assessments in Location Analytics Curriculum

Learning Objective	Design Principles	Bloom's Levels	CRISP-DM Steps	Assessment Possibilities
#1:	Backwards Design & UDL	1 & 2	Step 1	Quizzes or short-answer questions to assess recall, multiple-choice
#2	UDL	3	Step 2	Case study analysis tasks to evaluate understanding in real-world scenarios
#3	UDL	3 & 4	Steps 2, 3, 4	Practical assignments or hands-on projects, interactive in-class exercises
#4	UDL	3 & 4	Steps 3, 4, 5	Data analysis assignments, critical thinking tasks
#5	UDL	5	Steps 5, 6	Case study evaluations, peer reviews, or group discussions
#6	Backwards Design & UDL	6	Step 6	Final group projects or research papers on location analytics solution design and implementation
#7	UDL	1 & 2	Steps 1, 6	Quizzes, multiple-choice or true/false questions, case study analysis tasks

3.4 Course *Assessment*

The last consideration is to provide diverse ways for students to demonstrate their understanding by utilizing assessments that measure the degree to which learning objectives are met.

Table 3 summarizes the approach we adopt in designing our curriculum. It captures the key elements of our instructional strategy, including the learning objectives aligned with Bloom's Taxonomy and the related assessment activities that comprehensively evaluate students' knowledge and skills across all six levels of Bloom's Taxonomy. This approach ensures a rigorous and comprehensive educational experience. By aligning assessment activities with different levels of Bloom's Taxonomy, our strategy facilitates a thorough evaluation of students' abilities in knowledge acquisition, understanding, application, analysis, evaluation, and synthesis. Furthermore, it provides diverse opportunities for students to express their learning within location analytics.

4. Faculty Development & Collaboration

Faculty need comprehensive training and professional development in various areas to develop a successful location analytics curriculum. This includes expertise in instructional design, spatial thinking, and practical industrial applications of location analytics. To achieve this, collaboration and knowledge-sharing among different disciplines and departments within a university are essential, as is the involvement of external stakeholders.

Drawing on our extensive teaching experience and subject matter expertise, we present the following highly effective collaboration methods that ensure a superior educational experience for students.

- Conduct professional development workshops to enhance faculty members' location analytics knowledge and skills.
- Foster collaborative curriculum design through regular meetings, encouraging idea sharing and resource exchange.
- Promote interdisciplinary collaboration among faculty members with expertise in location analytics.
- Invite guest lecturers and establish industry partnerships for real-world insights and case studies.
- Encourage faculty engagement in research and scholarship related to location analytics.
- Support continuous learning through access to resources and professional networks.
- Organize peer-led workshops for sharing teaching strategies and assessment methods.
- Implement quality assurance processes to evaluate and improve course effectiveness.

- Establish a community of practice in collaboration with industry for ongoing interaction, resource sharing, and research collaboration.

5. Challenges and Future Directions

One of the challenges faced in implementing location analytics in business schools is the perception of a steep learning curve associated with the tools and the notion that other departments predominantly own GIS. Implementing web-based GIS tools, large public data sets, and practical case studies/tutorials accessible for lower-division undergraduate and graduate courses have significantly reduced the learning curve. Arguably these are easier for students to navigate than many of the technical pieces we ask students to work on in the curriculum (spreadsheets, statistical packages, programming, etc.), and excellent online help systems are available that alleviate the burden of faculty. GIS and spatial thinking are sometimes “claimed” as the property of some disciplines. At best, this is wishful thinking, and at worst, it encourages academic silos and stifles interdisciplinary projects. GIS is not exclusively “owned” by any discipline, just as statistics are not exclusively owned by mathematics.

Businesses can further enhance spatial thinking and analysis with their own set of problems that bridge the economy and the environment and delve into the supply chain, marketing analysis, site selection and real estate, human resources, and beyond. This is a moment for business schools to engage academic partners in other disciplines with a long history of working on complex problems that require spatial and quantitative thinking to address. Businesses cannot afford to view spatial thinking as part of a different academic silo. What matters is that we engage students to ask important business questions that are spatially driven so they can do so professionally.

Looking toward the future, there are numerous exciting avenues for research and innovation in teaching location analytics. A significant area of interest lies in exploring advanced analytical techniques like machine learning, deep learning, and predictive modeling to evaluate their efficacy in addressing intricate location-based challenges. Additionally, investigating the integration of real-time and streaming data into location analytics processes presents new challenges and opportunities, particularly in domains like transportation, emergency management, and retail. Enhancing spatial data visualization techniques, including virtual reality (VR) and augmented reality (AR), can facilitate effective communication of complex location analytics results to diverse stakeholders. Ethical and privacy considerations are also crucial, prompting the examination of best practices for handling sensitive location data and ensuring transparency, fairness, and accountability in location analytics technologies. Exploring location analytics solutions' social and environmental impact is essential, assessing their potential to address social equity, environmental sustainability, and community well-being.

Collaboration with industry partners through case studies and projects allows students to gain hands-on experiences and propose innovative solutions to real-world location analytics problems. Interdisciplinary applications of location analytics in public health, urban planning, environmental science, and social sciences open opportunities for cross-disciplinary collaboration and addressing complex societal challenges. Data ethics and governance frameworks for location data collection, storage, and usage should be examined to ensure responsible and ethical location analytics practices. Lastly, providing continuous professional development opportunities for educators, such as training programs, workshops, and conferences, keeps them updated with the latest advancements, teaching methodologies, and industry trends, ensuring the delivery of cutting-edge location analytics education.

6. Conclusion

In conclusion, designing a location analytics curriculum requires careful consideration of effective course design principles, clear objectives, a learner-centric pedagogical framework, and robust assessment strategies. By incorporating Backwards Design, Universal Design for Learning, and the modified CRISP-DM framework, educators can create an inclusive and rigorous learning experience. This approach ensures students engage in diverse activities, aligns learning objectives with Bloom's Taxonomy, and offers various assessment methods to evaluate their knowledge and skills. This comprehensive approach equips students with the necessary competencies to apply location analytics in real-world business scenarios.

Integrating GIS and location intelligence in the business school curriculum offers numerous benefits, including addressing ESG and DEI topics and promoting multidisciplinary collaboration. However, its adoption in business schools has been limited, hindering the thoroughness of questions in these areas. By incorporating spatial thinking and GIS, business schools can better address common challenges and equip students with essential skills for informed decision-making. Neglecting these critical questions exposes businesses to risks, highlighting the importance of training students in spatial analysis and GIS for sustainable practices.

We believe it is time for educational institutions to seize the opportunities presented by location analytics and integrate these concepts into their business programs. By doing so, institutions can equip students with the skills and knowledge they need to thrive in the digital era and contribute to the success of businesses worldwide. Embracing advanced analytical techniques, real-time data integration, spatial data visualization, ethical considerations, social and environmental impact assessments, industry partnerships, interdisciplinary applications, data ethics and governance, and continuous professional development is essential. Let us collectively embrace these concepts, update our curriculum frameworks, and provide students with a comprehensive and forward-thinking education. By doing this, we can empower the next generation of business leaders to leverage location analytics for informed decision-making, innovation, and sustainable growth. Together, we can shape the future of business education and positively impact industries and society.

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