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From Data to Decisions: Designing an AI-Augmented Business Analytics Course for IS Job-Market Readiness

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) into enterprise systems has created a critical skills gap that traditional business analytics curricula are not adequately prepared to address. This paper responds to this challenge by presenting the design and initial evaluation of a novel course, *AI-Augmented Business Analytics*. Grounded in an integrated theoretical framework that incorporates experiential learning, situated learning, and human capital theories, the course leverages the ERPsim simulation on SAP S/4HANA as a dynamic data-generation platform. Within this environment, students manage a virtual company and employ generative AI tools as cognitive partners to analyze operational data through a structured "Data-to-Decisions" workflow. The paper provides a comprehensive description of the course design, including learning objectives aligned with industry frameworks, a multi-faceted assessment strategy, and a detailed 15-week instructional blueprint. Evaluation through student feedback, expert review, and performance metrics offers promising evidence that the course can enhance technical proficiency, AI-assisted collaboration, and strategic decision-making capabilities. Overall, this study offers a detailed, replicable model for information systems educators seeking to bridge the gap between academic preparation and the evolving demands of the AI-augmented workplace.

Keywords: Higher education, Business analytics, Curriculum design & development, Experiential learning & education, Job skills

1. INTRODUCTION

In the era of data-driven decision-making, Business Analytics has become a cornerstone of modern business education. However, the rapid integration of Artificial Intelligence (AI) into analytical workflows is fundamentally reshaping the discipline and necessitating pedagogical approaches that extend beyond traditional methods. Enterprise Resource Planning (ERP) systems have similarly evolved from back-office operational tools into strategic platforms that integrate core business functions, including finance, operations, human resources, and supply chain management (Davenport, 1998). This evolution, combined with the accelerating adoption of AI, has created a growing demand for Management Information Systems (MIS) graduates who can navigate complex enterprise environments while leveraging AI for enhanced decision-making.

The strategic importance of ERP systems is reflected in significant market growth, with the global ERP market projected to increase from $54.76 billion in 2022 to $123.41 billion by 2030 (Grand View Research, 2023). This expansion signals a parallel need for professionals who can manage and analyze the vast amounts of data these systems generate. Yet this demand has revealed a substantial misalignment between AACSB-accredited business school curricula and contemporary workforce requirements.

The integration of AI into enterprise systems has further intensified this skills gap by fundamentally transforming the nature of analytical work. According to recent Gartner research, based on a survey of over 700 CIOs, more than 70% of CIOs reported that their workforce is not ready for AI, highlighting a critical disconnect between technology adoption and human readiness (Gartner, 2025). Looking ahead, Gartner projects that by 2030, 75% of IT work will be performed by humans augmented with AI, while 25% will be done by AI alone, fundamentally reshaping the competencies required for roles involving enterprise resource planning and analytics. These projections underscore the urgent need for educational institutions to prepare graduates who can effectively collaborate with AI tools in enterprise contexts.

For AACSB-accredited business schools, this skills gap presents both a pressing challenge and a meaningful opportunity. AACSB standards call for curricula that "demonstrate a commitment to impact through responsiveness to organizational and societal needs" (AACSB International, 2020). Despite this mandate, recent industry research indicates a substantial gap between workforce capabilities and employer needs in technology roles. Gartner's 2025 CIO survey found that 55% of CIOs cite a lack of skills as their primary challenge in delivering AI value, and more than 70% report that their workforce is not ready for AI (Gartner, 2025). While these figures reflect general IT skills rather than ERP-specific competencies, they underscore the broader challenge of aligning educational outcomes with rapidly evolving technology requirements. This misalignment reflects a long-standing theory–practice gap in IS education, where the rapid pace of technological advancement continually outstrips curriculum development (Leidig & Salmela, 2014).

The roots of this problem lie in traditional pedagogical models that prioritize theoretical instruction over hands-on experience (Cronan & Douglas, 2012) and frequently present business processes in isolation (Seethamraju, 2012). These challenges are amplified in the context of AI, where best practices for instruction are still emerging. This aligns with broader discussions in the literature, as comprehensive reviews have highlighted the transformative yet disruptive role of AI across educational contexts (Zhai et al., 2021).

This paper responds to these challenges by proposing an *AI-Augmented Business Analytics* course that reimagines traditional simulation-based learning through the integration of generative AI as a central analytical tool. This approach prepares students for the realities of human–AI collaborative work while developing the critical thinking and technical skills required by modern enterprises. The course is particularly relevant for AACSB-accredited programs, as it simultaneously addresses multiple accreditation standards: enhancing curriculum relevance (Standard 3), promoting innovative pedagogical practices (Standard 8), demonstrating impact through employability outcomes (Standard 9), and strengthening industry engagement (Standard 4).

To systematically develop and validate this pedagogical model, the paper follows a structured pathway. Section 2 establishes the theoretical foundation and presents the research model that hypothesizes how educational inputs shape career outcomes. Section 3 describes the course design, while Section 4 details the methodology and implementation blueprint that operationalize the theoretical framework. Section 5 presents the evaluation of the model's effectiveness. Finally, the paper discusses the implications of these findings for IS education.

2. THEORETICAL FOUNDATION AND RESEARCH MODEL

The proposed course design is grounded in an integrated pedagogical framework that synthesizes established learning theories and extends them through the incorporation of AI as a pedagogical and analytical partner. This framework directly responds to ongoing calls for more experiential, authentic, and workplace-relevant learning in the IS curriculum (Leidig & Salmela, 2014).

2.1 Core Theoretical Pillars

Our model integrates four foundational learning theories, each contributing a critical dimension to the learning experience. Although these theories have long informed IS education, their integration with generative AI as a cognitive partner represents a novel and timely synthesis aligned with the demands of AI-augmented workplaces.

Experiential Learning Theory (Kolb, 2014) posits that learning occurs through a cyclical sequence of concrete experience, reflective observation, abstract conceptualization, and active experimentation. Traditional applications often progress slowly, as each stage requires significant cognitive effort and time. Recent extensions of Kolb's model to technology-enhanced environments demonstrate that digital tools can accelerate this cycle by offering immediate feedback and extensive data for reflection (Morris, 2020). Within our framework, generative AI acts as a catalyst throughout the cycle. During ERPsim gameplay, students generate rich operational data (concrete experience). AI rapidly analyzes these datasets, surfacing patterns, anomalies, and performance indicators, thereby accelerating reflective observation. AI-generated explanations and hypotheses further support abstract conceptualization, and students subsequently test these insights by adjusting their strategies in later simulation rounds (active experimentation). This human–AI partnership aligns with emerging evidence that AI can function as a "cognitive partner" that offloads routine analytical tasks and frees learners to focus on higher-order reasoning (Dell'Acqua et al., 2023; Mollick & Mollick, 2023). In our model, AI supports learning by (1) reducing cognitive load in data processing, (2) enabling iterative prompt-driven dialogue, and (3) generating testable hypotheses that students must critically evaluate, an increasingly essential skill for mitigating AI hallucination and bias (Emsley, 2023; Farrokhnia et al., 2024; Kasneci et al., 2023; Kshetri et al., 2023).

Situated Learning Theory (Lave & Wenger, 1991) asserts that meaningful learning occurs through legitimate peripheral participation in authentic communities of practice. Rather than acquiring abstract knowledge in isolation, learners develop expertise by engaging in the real practices of a profession. Contemporary scholarship demonstrates that situated learning remains highly relevant in AI-enhanced environments, as authentic, technology-mediated contexts support the development of tacit knowledge and practical skills (Vargas et al., 2024). Our course operationalizes situated learning through the ERPsim Manufacturing Game, where students manage virtual companies using real SAP S/4HANA transactions. Students execute procurement (ME21N), production (CO01), and sales (VA01) transactions under real-world time constraints and cross-functional interdependencies. AI enhances this environment by serving as an always-available analytical assistant, similar to AI copilots adopted in modern ERP-enabled workplaces (Seeber et al., 2020; Wang et al., 2024). Students therefore participate in authentic ERP practices while benefiting from AI support, mirroring the emerging norms of AI-augmented professional work.

Gamification Theory (Chugh & Turnbull, 2023; Deterding et al., 2011) demonstrates that incorporating game-design elements can increase engagement, motivation, and learning performance. Meta-analytic research confirms that gamification strengthens learning, particularly in simulation-based and skills-oriented courses, as it enhances intrinsic motivation, extends time-on-task, and provides immediate feedback loops (Kalogiannakis et al., 2021; Sailer & Homner, 2020). Our course embeds gamification through competitive simulation rounds, real-time leaderboards, progressive challenges, and instant performance feedback. ERPsim intensifies personal investment because students compete using the operational and financial outcomes of their own decisions, not abstract datasets. Generative AI further strengthens the gamified environment by enabling rapid, personalized performance insights and supporting continuous improvement (Zainuddin et al., 2020). Simulation environments such as ERPsim are widely recognized as effective tools for achieving meaningful engagement and deep learning in IS courses (Wang et al., 2024).

Human Capital Theory (Becker, 2002; Gillies, 2015) conceptualizes education as an investment that enhances individuals' productivity and market value. From this perspective, curriculum design should intentionally cultivate competencies that employers demand and reward. In today's AI-transformed labor market, valued skills increasingly include those that complement rather than compete with intelligent systems, such as critical thinking, AI oversight, strategic judgment, and collaborative interaction with AI

(Autor, 2022; Felten et al., 2023). Our course develops what we term augmented human capital, the combination of foundational ERP knowledge and advanced AI collaboration skills, including prompt engineering for business analytics, critical evaluation of AI outputs, and strategic human–AI decision-making (Brynjolfsson & McAfee, 2017; Dell'Acqua et al., 2023). By aligning learning objectives with industry certifications (SAP and ERPsim) and well-documented employer needs, the course ensures that students' newly developed capabilities are directly transferable to contemporary enterprise environments characterized by AI-augmented analytics (Moghaddam et al., 2018).

While each theory contributes unique insights, their full value emerges through integration. Experiential learning provides a developmental cycle; situated learning embeds that cycle in authentic contexts; gamification sustains motivation and effort; and human capital theory ensures that learning outcomes are aligned with labor-market relevance. Together, these theories form an integrated framework in which AI functions as the transformative connector that amplifies and unifies these pedagogical pillars. The following section presents this integrated model in detail.

2.2 An Integrated AI-Augmented Pedagogical Framework

The integration of our four core theoretical pillars, with generative AI serving as the central catalyst, is visualized in our Experiential AI Integration Model (Figure 1). This diagram illustrates how AI serves as the connective tissue between theoretical principles, creating a cohesive learning environment where technological augmentation enhances rather than replaces pedagogical foundations.

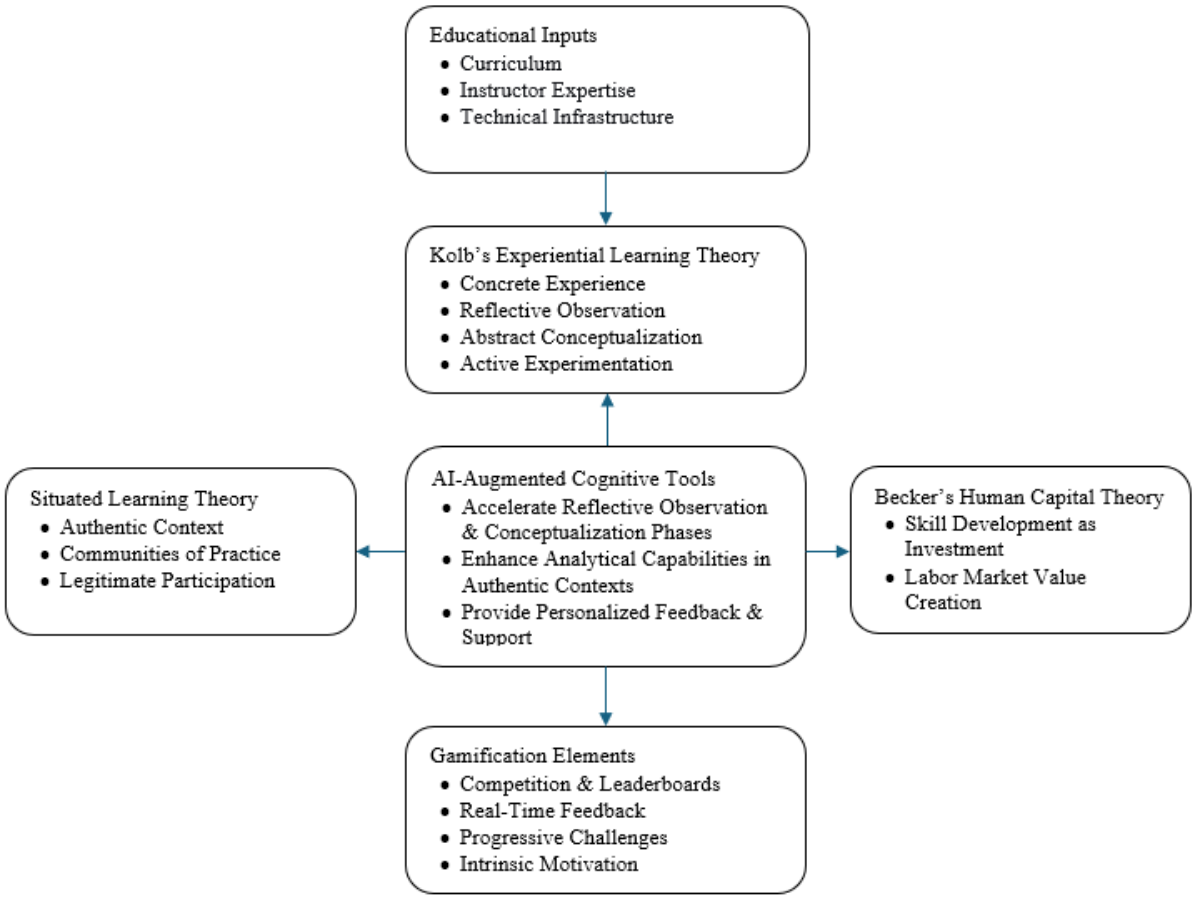


Figure 1. Theoretical Model of Experiential AI Integration

Figure 1 presents our Experiential AI Integration Model, which begins with Educational Inputs, the curriculum, instructor expertise, and technical infrastructure that form the foundation of any effective course (Leidig & Salmela, 2014). These inputs activate the four theoretical pillars surrounding the center of the model, with each pillar contributing an essential dimension to the learning experience.

At the top of the diagram, Kolb's Experiential Learning Theory (2014) provides the core cyclical process that drives skill development. The arrows flowing from the central AI-Augmented Cognitive Tools unit into the experiential learning cycle illustrate how AI accelerates each phase of learning. AI rapidly analyzes data generated during concrete experience, identifies salient patterns to support reflective observation, produces testable hypotheses for abstract conceptualization, and informs strategies for active experimentation (Dell'Acqua et al., 2023; Mollick & Mollick, 2023). In our course, this accelerated cycle is made operational through the ERPsim simulation: each decision round becomes a complete AI-enhanced experiential cycle, compressing the time required for insight generation and strategic refinement.

On the left side of the diagram, Situated Learning Theory (Lave & Wenger, 1991) contributes authenticity and context. The arrows connecting AI to this pillar demonstrate how AI strengthens situated learning by serving as a real-time analytical assistant, mirroring the support provided by AI copilots increasingly used in professional ERP environments (Seeber et al., 2020; Wang et al., 2024). Students execute authentic SAP S/4HANA transactions (ME21N, CO01, VA01) while competing against peer teams, creating legitimate peripheral participation in a realistic enterprise setting.

On the right side, Human Capital Theory (Becker, 2002; Gillies, 2015) frames education as an investment in market-valued skills. The arrows extending from AI to this pillar illustrate how our framework cultivates augmented human capital, a blend of foundational ERP capabilities and advanced AI-collaboration skills that employers increasingly prioritize (Autor, 2022; Felten et al., 2023). This alignment is operationalized through integration with industry certifications and employer-validated competency frameworks.

At the bottom of the diagram, Gamification Elements, including competition, leaderboards, real-time feedback, and progressive challenges, support sustained motivation and engagement throughout the learning process (Deterding et al., 2011; Chugh & Turnbull, 2023). The arrows from AI to this pillar highlight how AI enables dynamic, personalized challenge levels that help students maintain the "flow state" associated with deep engagement and peak learning performance (Zainuddin et al., 2020). Within the ERPsim environment, students analyze data from their own firms, making the competitive outcomes both personally meaningful and pedagogically impactful.

The central placement of AI-Augmented Cognitive Tools in Figure 1 is deliberate and theoretically significant. The outward-radiating arrows indicate that AI does not replace established learning theories but instead enhances the effectiveness of each pillar. The integrated model thereby creates a virtuous cycle: experiential learning provides the process; situated learning provides the context; human capital theory provides the purpose; gamification provides the motivation; and AI serves as the accelerator that enables these components to interact synergistically.

Although each theory has previously been applied independently within IS education, their integration into a unified framework designed specifically to leverage generative AI as a pedagogical catalyst constitutes a novel contribution to IS curriculum design (Seethamraju, 2012; Wiggins & McTighe, 2005). Importantly, this framework is not merely descriptive; it is prescriptive. Each theoretical component maps directly onto specific pedagogical practices described in later sections: Kolb's cycle manifests through the four-stage AI-Augmented Analytics Workflow (Section 3.4); situated learning emerges through students' execution of authentic SAP transactions in competitive markets (Section 3.5); human capital theory guides alignment with industry credentials (Section 3.2); and gamification principles shape competitive structures and real-time feedback (Section 4.4). By making these relationships explicit, the framework creates a clear pathway from educational inputs to career-relevant outcomes (Figure 2).

2.3 Operationalizing the Model: A Blueprint for Course Design

The theoretical model provides the foundational architecture for our course, translating abstract principles into a practical design blueprint. This section explicates how each element of the model is operationalized

within the "Data-to-Decisions" learning experience to create a direct pathway from educational inputs to career success. This explicit mapping ensures that every course component serves a specific theoretical purpose and contributes to the overall pathway from educational intervention to career success. This synthesis culminates in our proposed theoretical model (Figure 2), which illustrates the causal pathway from intervention to career success.

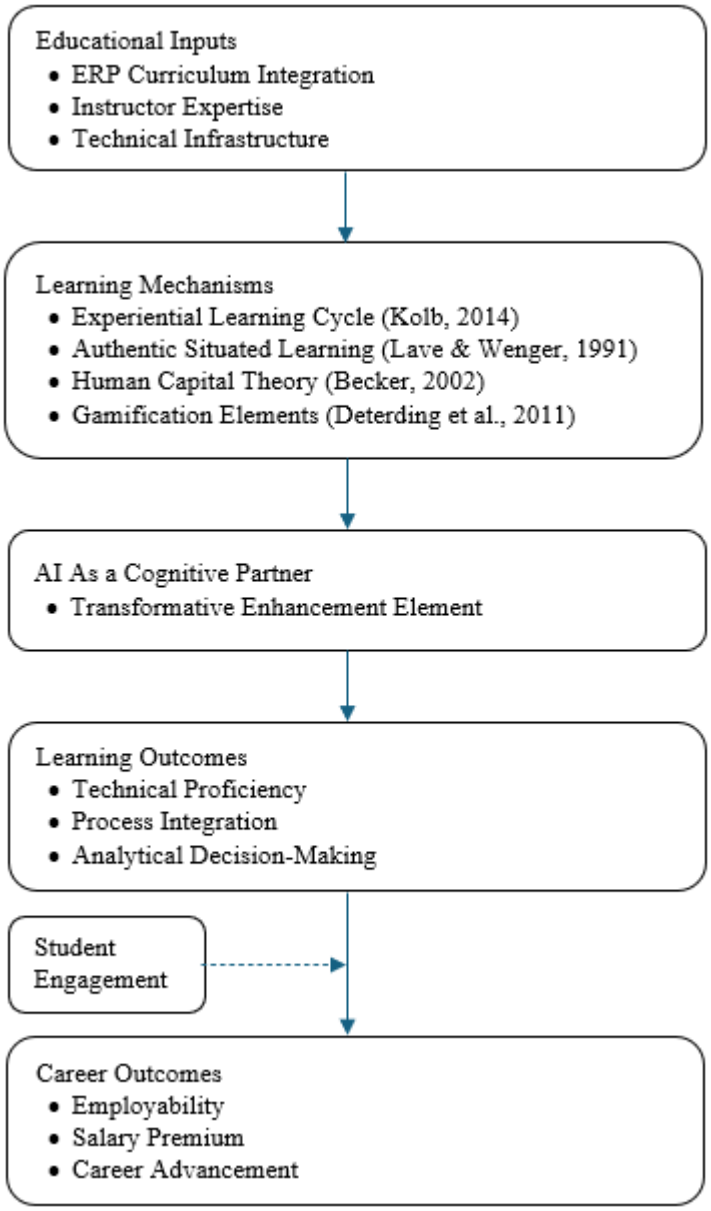


Figure 2. The Proposed Course Design Framework

The model begins with the Educational Inputs that enable the implementation of the business analytics course. These inputs are then transformed through the integration of AI as a Cognitive Partner, which functions as the central catalyst of the model. This AI-augmented process generates enhanced Learning Outcomes, including technical ERP proficiency, process-integration skills, and analytical decision-making capabilities. These competencies, mediated by high levels of student engagement, ultimately translate into

tangible Career Outcomes such as improved employability, competitive starting salaries, and accelerated professional advancement.

2.3.1 Educational Inputs as Foundational Enablers. The model's inputs represent the essential prerequisites for successfully delivering a technology-intensive course, aligning with prior work demonstrating the importance of resourcing and preparation (Leidig & Salmela, 2014). In this course, these inputs are carefully structured:

- *Curriculum:* The course functions as a required MIS capstone, ensuring strong alignment with program-level outcomes and synthesizing knowledge from prerequisite courses.
- *Instructor Expertise:* Faculty complete mandatory training, including an *ERPsim Certification Workshop* and instructional development on AI-enabled pedagogy, preparing them to facilitate both ERP and AI-augmented learning.
- *Technical Infrastructure:* The course relies on stable access to SAP S/4HANA, the ERPsim simulation, and enterprise-grade generative AI tools. Students are supported by cognitive load management materials such as SAP transaction guides and curated AI prompt libraries.

2.3.2 ERPsim Learning Mechanisms as the Pedagogical Core. The central mechanisms of the model capture the active learning processes through which students develop skills. These mechanisms are realized through targeted pedagogical activities:

- *AI-Augmented Experiential Learning Cycles:* Operationalized through the four-stage analytics workflow, where each simulation round constitutes a complete Kolbian cycle, from concrete experience to active experimentation, with AI accelerating each phase.
- *Game-Design Elements:* Implemented via competitive rounds, leaderboards, and real-time simulation feedback, these features maintain engagement and foster the flow state conducive to deep learning.
- *Authentic Situated Learning:* Students execute real SAP transactions in a competitive, market-driven environment, experiencing cross-functional dependencies and time-sensitive decision-making that mirror enterprise practice.

2.3.3 Learning Outcomes as Measurable Competencies. The model's learning outcomes are expressed as specific, assessable student competencies:

- *Technical Proficiency,* measured through SAP transaction accuracy, ERPsim operational metrics, and team performance rankings.
- *Process Integration,* assessed through students' analyses of cross-functional impacts documented in project reports.
- *Analytical Decision-Making,* evaluated through the quality of AI-augmented strategic recommendations in the AI Analytics Portfolio and corresponding improvements in simulation performance.
- *Student Engagement,* a mediating factor supported by intrinsic motivation generated through gamification, competition, and ownership over company performance.

2.3.4 Career Outcomes as Ultimate Objectives. The model's ultimate objectives center on preparing "T-shaped" professionals with both deep technical knowledge and broad business capabilities (Moghaddam et al., 2018):

- *Employability* is strengthened through hands-on experience with enterprise-level simulations, real-market competitive dynamics, collaborative work in student teams, and the development of a professional AI analytics portfolio.
- *Salary Premium Potential* arises from the rare combination of ERP proficiency and advanced AI collaboration skills cultivated by the course.
- *Career Advancement* is supported by building strategic thinking and data-driven decision-making skills that accelerate professional growth.

Taken together, this blueprint forms the theoretical architecture for the course. The next section, *The Proposed Course Design*, details how the abstract Educational Inputs are translated into a concrete curriculum, how the ERPsim Learning Mechanisms are operationalized through instructional activities, and how the Learning Outcomes are defined as measurable competencies. This design creates a clear and coherent trajectory from theoretical propositions to a teachable, assessable, and career-relevant course.

3. THE PROPOSED COURSE DESIGN

The integrated theoretical framework established in Section 2 provides the architectural foundation for the course design presented in this section. Each pedagogical choice represents a direct translation of a theoretical principle into a concrete instructional component, ensuring that the model operates not only descriptively but prescriptively. The design process followed the Backward Design approach (Wiggins & McTighe, 2005), beginning with the career outcomes identified through the human capital theory lens. To ensure coherence between theory, instructional design, and assessment, we developed a comprehensive alignment framework (Table 1), which served as the master blueprint throughout the design process.

Theoretical Pillar	Industry-Informed Competency Need *	Corresponding Learning Objective	Key Pedagogical Activity	Aligned Assessment Method
Experiential Learning (Kolb, 2014)	Collaborate with AI to make better decisions faster.	LO4, LO6: Utilize prompt engineering for diagnostic & prescriptive analysis.	Four-stage AI-Augmented Analytics Workflow within the ERPsim game.	AI Analytics Portfolio; Simulation Performance.
Situated Learning (Lave & Wenger, 1991)	Bridge the divide between IT and business analysts.	LO1, LO7: Extract data & analyze integrated business processes.	Executing real SAP transactions in a competitive market.	SAP Transaction Accuracy; Team Rankings; ERPsim Performance & Final Exam.
Human Capital Theory (Becker, 2002)	Validate AI outputs & critically assess model recommendations.	LO9, LO10: Critically evaluate AI insights & demonstrate human-AI collaboration.	AI Output Validation workshop; implementing AI-derived strategies.	Reflection Papers; Strategy Presentations.
Gamification (Deterding et al., 2011)	Pedagogical driver for engagement.	Mediates all LOs.	Competitive simulation rounds with leaderboards.	Sustained engagement & performance across all metrics.

Table 1. Master Alignment Framework: Linking Theory and Industry Needs With Pedagogy

***** *Industry-informed competency needs were derived from semi-structured interviews with five senior industry professionals. AI-specific competencies synthesize (1) thematic analysis of interview data and (2) validation against established industry frameworks, including DAMA-DMBOK's Data Operations & Analytics, DCAM's Data Analytics & AI dimensions, and SAP's AI-augmented analytics certification standards. This dual-sourcing ensures competencies are both practitioner-grounded and industry-aligned.*

3.1 From Theory to Classroom: Operationalizing the Framework

The theoretical model presented in Figure 1 and aligned in Table 1 provides the structural foundation for the course; however, its true pedagogical value lies in how its abstract principles manifest in tangible, week-by-week classroom practices. This operationalization ensures that theoretical commitments are not merely articulated but enacted, producing a coherent, intentionally designed, and purpose-driven learning

experience. The following examples illustrate how each theoretical pillar is translated into concrete pedagogical activities, demonstrating a clear line from the design framework to student action.

3.1.1 Experiential Learning (Kolb, 2014). Experiential learning is operationalized through the iterative and cyclical nature of the ERPsim competition. For example, during the Weeks 7–8 Competitive Simulation, students begin with Concrete Experience as they manage their virtual company and observe the financial consequences (e.g., profit/loss) of their decisions. AI tools then accelerate Reflective Observation by providing diagnostic analyses that surface performance patterns and operational bottlenecks. These insights support the development of new strategic hypotheses during Abstract Conceptualization, which students immediately implement and test in the subsequent simulation round (Active Experimentation). Repeating this cycle across multiple rounds ensures that learning is dynamically refined through action, reflection, and AI-supported insight generation.

3.1.2 Situated Learning (Lave & Wenger, 1991). Situated learning is enacted by immersing students in an authentic ERP-enabled community of practice. In Weeks 2–4, students do not merely study ERP concepts; they perform real SAP S/4HANA transactions (e.g., ME21N for purchase orders, CO01 for production orders) to operate their virtual company. The competitive, team-based market environment mirrors real-world pressures and cross-functional consequences, transforming the classroom into a setting for legitimate peripheral participation. Students learn by doing the work of practitioners, supported by the same tools and constraints found in enterprise environments.

3.1.3 Human Capital Theory (Becker, 2002). Human capital theory guides the intentional development of market-valued competencies. This becomes most visible in Weeks 11–12, where course activities deliberately align with employer-recognized certifications, such as ERPsim credentials. The scaffolded development of the AI Analytics Portfolio throughout the semester provides students with a tangible, evidence-based artifact that documents their analytical reasoning, AI collaboration skills, and ERP proficiency, an asset they can directly present to employers to signal their emerging augmented human capital.

3.1.4 Gamification (Deterding et al., 2011). Gamification is integrated across the course to sustain intrinsic motivation and engagement. Continuous leaderboard updates, real-time performance feedback, and team-based competitions convert analytical challenges into a compelling game-like experience. These gamified elements act as a pedagogical mediator across all learning objectives, ensuring students remain invested in the outcomes of their decisions and motivated to iteratively refine their strategies.

3.1.5 AI as a Cognitive Partner. AI functions as the transformative element that enhances each of the preceding pillars. Rather than serving as an answer generator, AI is positioned as a collaborative partner requiring human oversight and judgment. The four-stage AI-Augmented Analytics Workflow (see Table 4) structures this collaboration, guiding students through descriptive, diagnostic, predictive, and prescriptive analyses. The importance of this partnership is underscored during the Week 9 AI Output Validation Workshop, in which students learn to interrogate AI-generated insights for bias, hallucination, and decision quality before integrating them with their own business expertise.

3.2 Aligning With Industry Frameworks: DAMA and SAP

To ensure that the course aligns with modern enterprise expectations and national educational priorities, its design integrates multiple complementary frameworks: the *Data Management Body of Knowledge* (DAMA-DMBOK), the *Data Management Capability Assessment Model* (DCAM), SAP's global certification standards, and national recommendations for data science education reform. Table 2 summarizes this integrated alignment by mapping key DAMA-DMBOK knowledge areas to relevant SAP competencies and corresponding course implementations.

The DAMADMBOK (DAMA International, 2017) serves as the foundational knowledge framework, providing a comprehensive, vendor-neutral body of knowledge that establishes the essential concepts, terminology, and practices needed for effective data lifecycle management. This structure creates a shared lexicon that connects academic instruction to industry-recognized data management standards.

Complementing DAMA, the EDM Council's (2021) DCAM provides a structured maturity model for assessing data management capabilities. Although DCAM is typically applied at the organizational level, we adapt its capability dimensions to benchmark student development over the semester. This enables a rigorous assessment of learners' emerging data management maturity and ensures that competency growth is measurable, transparent, and aligned with industry expectations.

The SAP Global Certification framework provides the technical proficiency benchmarks for the world's most widely adopted ERP platform. Integrating SAP's analytics and process-integration competencies ensures that graduates not only understand theoretical data management principles but can also apply them within enterprise-grade systems used across global industries.

Additionally, this multi-framework alignment responds directly to the National Academies of Sciences, Engineering, and Medicine's (2018) report, *Data Science for Undergraduates: Opportunities and Options*, which emphasizes the need for interdisciplinary curricula that integrate computational thinking, contextual domain knowledge, and ethical reasoning. Our course embodies these recommendations by embedding analytics and AI competencies within the authentic enterprise context of the ERPsim simulation. It also incorporates explicit instruction on the ethical evaluation of AI outputs, ensuring students understand the implications of bias, hallucination, and model governance.

Taken together, these frameworks ensure that graduates develop the hybrid skillset increasingly demanded in AI-augmented business environments, combining DAMA-DMBOK's conceptual foundations, DCAM's measurable capability structure, SAP's technical proficiency standards, and national priorities for ethical and contextualized data science education.

DAMA-DMBOK Knowledge Area	Relevant SAP ERP Competency	Course Implementation & Learning Outcomes
Data Operations & Analytics	SAP Analytics Cloud (SAC); Embedded AI in S/4HANA	Operationalized through the 4-stage AI-Augmented Analytics Workflow, where students use generative AI and SAP tools for descriptive, diagnostic, predictive, and prescriptive analysis (LOs 3-6).
Data Integration & Interoperability	ERP Process Integration (e.g., Order-to-Cash, Procure-to-Pay)	Experienced directly in ERPsim as students execute transactions across modules (MM, SD, PP, FI), generating and analyzing integrated data flows (LOs 1, 7).
Data Governance	SAP Governance, Risk & Compliance (GRC); Master Data Management (MDM)	Discussed in the context of data extraction and the critical importance of relying on clean, governed, transactional data from a system like SAP for accurate AI analysis (LO 2).
Data Architecture & Modeling	SAP S/4HANA Data Model; Core Data Services (CDS) Views	Students engage with the SAP data model by running standard reports and extracting data, understanding the link between business transactions and underlying data structures.

Table 2. Mapping Course Competencies to Industry Frameworks

This integrated approach ensures that students not only learn data management concepts but develop measurable capabilities aligned with how organizations assess data management maturity in practice, while simultaneously addressing national priorities for modern data science education.

3.3 Industry Needs Analysis and Expert Interviews

To anchor the course objectives in current labor-market expectations, we conducted a comprehensive analysis combining recent industry reports with semi-structured interviews involving five senior professionals representing diverse organizational contexts. The participating experts included:

- A Chief Information Officer from a Fortune 500 manufacturing enterprise
- An ERP Implementation Director from a mid-sized healthcare system
- A Business Analytics Manager from a large financial services firm
- A Digital Transformation Lead from a small-to-medium enterprise (SME) technology company
- An SAP Solutions Architect from a global consulting practice

This intentional diversity, in organizational size, sector, and ERP maturity, ensured that the identified competency needs would generalize across different enterprise environments. Each interview lasted approximately 45–60 minutes and followed a structured protocol focusing on (1) current skill gaps, (2) emerging analytics and AI competency requirements, and (3) challenges associated with AI-augmented decision-making in enterprise systems. Interviews were conducted via video conference, audio-recorded with participant consent, and transcribed verbatim to ensure accuracy.

The qualitative data were analyzed using inductive thematic analysis following Braun and Clarke's (2006) six-phase framework: (1) familiarization, (2) initial coding, (3) theme generation, (4) theme refinement, (5) theme definition, and (6) final reporting. To ensure analytical rigor, two members of the research team independently coded the first two transcripts and developed a preliminary codebook. Inter-coder reliability, calculated using Cohen's Kappa, yielded a score of 0.84, indicating strong agreement. After discrepancies were resolved and the codebook refined, the remaining transcripts were coded. A final reliability check across the full transcript set produced an improved Kappa score of 0.87, confirming the robustness of the coding structure. This two-stage reliability procedure supports the trustworthiness of the themes presented in Table 3, ensuring that findings reflect the expert data rather than researcher interpretation.

The thematic analysis revealed high consistency across the interviews, with experts frequently emphasizing the same critical skill needs, particularly those aligned with the competencies developed through the proposed course. Specifically, experts stressed the need for graduates capable of bridging the traditional divide between ERP technical teams and business analysts, collaborating effectively with AI tools, and critically validating AI-generated recommendations.

Across organizations of all sizes, three competency domains emerged as especially urgent:

1. *Technical Integration Skills:* The ability to navigate SAP S/4HANA environments while leveraging AI tools for data analysis, operational insight, and process optimization.
2. *Critical Evaluation Capabilities:* Competence in validating AI-generated insights, identifying potential biases, and ensuring that recommendations align with business rules and process realities.
3. *Strategic AI Implementation:* Skill in translating AI outputs into actionable, context-aware business strategies within integrated enterprise systems.

These insights directly informed the course's learning objectives, instructional activities, and assessment design. Moreover, representation from both SMEs and multinational corporations highlighted how AI-augmented analytics competencies scale across contexts, from resource-constrained organizations with emerging AI capabilities to large enterprises deploying advanced ERP and AI-integration strategies.

Interview Topic	Answers Summary
Current Organizational Needs	"We are drowning in data from our SAP system but lack graduates who can not only run reports but also ask the right questions and use modern tools to find insights." "The biggest gap we see is between the IT team that manages the ERP and the business analysts who use the data. We need people who can bridge that divide." "Everyone is trying to integrate generative AI. We don't need AI experts; we need business analysts who know how to collaborate with AI to make better decisions faster."
Future Organizational Needs	"The ability to validate AI outputs is becoming non-negotiable. We need hires who can critically assess a model's recommendation, not just blindly implement it." "As AI handles more routine analysis, we will value strategic thinking and business acumen even more. The human in the loop needs to understand the 'why' behind the business process." "In two years, I expect every business analyst to be using AI co-pilots for 80% of their analytical work. The differentiator will be their ability to ask better questions and interpret the results in our specific business context."
Knowledge & Skills for New Hires	What do you look for? "Hands-on ERP experience, storytelling with data, understanding of integrated business processes." Technical skills? "Prompt engineering for business analytics, data governance." "Beyond technical skills, I need people who understand data lineage in ERP systems. Where did this number come from? What business process created it? Is it reliable?"
What Makes a Candidate Stand Out?	"A candidate who can walk me through a complex business problem, explain how they used SAP to get the data, and then demonstrate how they used an AI tool to analyze it and inform a decision; that candidate gets the job." "Any industry-recognized certification... shows initiative and foundational knowledge."

Table 3. Summary of Industry Expert Interviews

3.4 The AI-Augmented Analytics Workflow

A central learning mechanism of the course is a structured four-stage workflow that formalizes the progression from data to decisions, integrating generative AI at each stage. This workflow, summarized in Table 4, provides the scaffolding necessary to ensure that students engage in deep, reflective, and analytically rigorous use of AI tools. Prior research demonstrates that without explicit structure, students often default to superficial AI usage, limiting meaningful learning (Baidoo-Anu & Ansah, 2023). The workflow supports deliberate prompt engineering, evidence-based reasoning, and critical evaluation of AI outputs, skills essential for mitigating hallucination, bias, and overreliance on automated recommendations (Farrokhnia et al., 2024). This scaffolded approach reflects a long-standing principle in IS pedagogy: technology enhances learning only when paired with intentional instructional design.

3.4.1 AI Tool Implementation. Students gain hands-on experience with a curated set of AI tools that mirror those used in contemporary organizations:

- *SAP Embedded AI:* Students use SAP Analytics Cloud (SAC) for predictive analytics and SAP's Generative AI copilot for natural-language querying of operational data.
- *Enterprise Generative AI:* Microsoft Copilot for Microsoft 365 supports advanced Excel analysis, automated presentation generation, and business reporting; ChatGPT Enterprise is used for complex prompt engineering and strategic reasoning tasks.
- *Specialized Analytical AI:* Tools such as RapidMiner allow students to build and validate predictive models without requiring substantial programming knowledge.

These tools collectively expose students to the evolving ecosystem of AI-enabled enterprise analytics.

Stage	Analytical Goal	Student Action & AI Tool Used	Example Prompt & Output Validation	Theoretical Link
1. Descriptive	"What happened?"	Export data from SAP. Use SAP Analytics Cloud to auto-generate performance dashboards and Tableau AI for automated visualization.	Prompt (to SAC): "Analyze our sales transaction data from Round 2. Create a time-series plot of daily sales volume and a table showing total revenue by product and region." Validation: Cross-reference AI-generated totals with SAP's standard financial reports (S_ALR_87012296).	Concrete Experience
2. Diagnostic	"Why did it happen?"	Formulate hypotheses. Use ChatGPT Enterprise to perform root-cause analysis across integrated datasets from multiple SAP modules.	Prompt: "We experienced a stock-out for Product X in Week 4. Using our sales (VA01), inventory, and production (CO01) data, identify the most probable root cause and provide evidence." Validation: Trace the AI's logic back to specific transactions (e.g., a missed purchase order in ME21N) to confirm the diagnosis.	Reflective Observation
3. Predictive	"What will happen?"	Use historical data. Use RapidMiner to build a forecasting model and SAP SAC for trend analysis and demand forecasting.	Prompt (in RapidMiner): "Using our sales data from Rounds 1-3, build a time-series forecast for demand for each product for the next round. Highlight key assumptions and confidence intervals." Validation: Compare forecasts from both tools and assess the reasonableness of the underlying assumptions using statistical validation metrics.	Abstract Conceptualization
4. Prescriptive	"What should we do?"	Synthesize AI insights. Use Microsoft Copilot in PowerPoint and Excel to generate strategic recommendations and optimize business decisions.	Prompt (to Copilot in Excel): "Based on the demand forecast from RapidMiner and our current cash flow from SAP FI, recommend optimal production quantities and raw material order quantities to maximize profit while minimizing stock-outs." Validation: Role-play a management decision committee to debate the AI's proposed strategy, challenging its	Active Experimentation

Stage	Analytical Goal	Student Action & AI Tool Used	Example Prompt & Output Validation	Theoretical Link
			conclusions against business constraints.	

Table 4. The AI-Augmented Analytics Workflow

3.5 The ERPsim Manufacturing Game: A Dynamic Data Engine

The core experiential learning component of the course is the ERPsim Manufacturing Game (HEC Montréal, http://erpsim.hec.ca), a real-time simulation executed on a live SAP S/4HANA environment. Using an operational, industry-standard ERP system, rather than a simplified simulation, is central to the situated learning principles underpinning the course. The authentic cognitive load, transactional complexity, and fidelity of the SAP S/4HANA data model create an environment in which students develop human capital that transfers directly to workplace practice (Becker, 2002). By placing students in managerial roles within competing bicycle manufacturing companies, ERPsim transforms the ERP system from a static tool into a dynamic data-generation platform capable of supporting AI-augmented analytics.

3.5.1 The Simulation Environment: Core Materials and Processes. Students are required to master a set of foundational materials and operational processes, each of which generates the raw data used in the AI-augmented analytical workflow.

- *Company and Market Structure:* Each student team manages a bicycle manufacturing company producing three product types, Standard, Mountain, and Racing, within a shared competitive market. The simulation unfolds over multiple "years" (rounds), with each decision cycle representing one month. This structure introduces intrinsic motivation, time compression, and market dynamics that mirror real-world enterprise environments.
- *Key Master Data and Parameters:* Students begin by analyzing core master data that define the operational constraints of their firm:
  - Bill of Materials (BOM): Recipes defining the components required for each finished good (e.g., 2 wheels, 1 frame, 1 handlebar for a Standard bicycle).
  - Production Capacity: Fixed production hours per period, creating a bottleneck that forces strategic prioritization.
  - Storage Capacity: Limited warehouse space for raw materials and finished goods, requiring disciplined inventory management.
  - Supplier Lead Times: Defined waiting periods for raw materials (e.g., wheels: 1 period; frames: 2 periods), introducing supply chain risk and forecasting challenges.
- *Core Operational Transactions and Data Generation:* Students execute authentic SAP S/4HANA transactions, each of which generates integrated, cross-functional data used in subsequent AI analyses:
  - Procurement (Materials Management): *ME21N* is used to create purchase orders based on forecasts and supplier lead times, generating raw-material inventory data, purchase order histories, and supplier metrics.
  - Production (Production Planning): *CO01* is used to create production orders, consuming raw materials and production capacity. This produces WIP data, capacity utilization, and finished-goods inventory.
  - Sales and Marketing (Sales and Distribution): *VA01* supports sales order creation, pricing decisions, and marketing strategies in a dynamic marketplace. Resulting data include demand patterns, pricing histories, and market share.
  - Financial Reporting (Financial Accounting): Students run SAP reports (e.g., Profit and Loss via *S_ALR_87012296*) to assess revenue, COGS, expenses, and profit margins.

3.5.2 From Gameplay to AI-Augmented Analytics: Transforming Data into Insight. Although ERPsim has traditionally been recognized for generating authentic transactional data, the pedagogical innovation of this course lies in integrating generative AI to transform those data into strategic insight. ERPsim provides the *context* and the *data*, while AI acts as a cognitive partner that accelerates reflection, diagnosis, forecasting, and decision-making.

Because students analyze the outcomes of their own operational decisions, the simulation creates personal ownership over the data. A stock-out of Racing Bicycles or a sudden inventory surplus becomes a real financial problem that students must understand and address, making the subsequent AI-augmented analysis essential, not abstract.

3.5.3 Pedagogical Innovations Enabled by AI. Our AI-enhanced approach advances traditional analytics pedagogy through three key innovations:

1) *Advancing Students From Descriptive to Strategic Analytics.* Where typical courses end with descriptive reports, our workflow guides students through diagnostic, predictive, and prescriptive analytics. AI accelerates these processes, enabling rapid iteration that mirrors real business decision cycles.
2) *AI as a Cognitive Partner.* AI copilots provide instant, cross-functional analytical insight. When a team asks, *"Why did our profit margin decline in Period 3?"*, AI tools immediately correlate sales, production, and procurement data, work that would otherwise require time-consuming manual analysis. This instantaneous insight transforms analytics from theoretical to experiential.
3) *Developing AI Management Competencies.* Students learn not only to use AI but to manage it responsibly, validating outputs, identifying bias, refining prompts, and integrating recommendations into strategic decisions. These competencies map directly onto employer demands for AI-augmented business roles.

3.5.4 Capstone Value and Holistic Skill Development. Unlike courses that rely on pre-packaged datasets, this course immerses students in the full data value chain, from generating transactional data, to interpreting integrated processes, to leveraging AI for strategic advantage. This holistic experience directly develops competencies aligned with Learning Objectives 1, 3, 4, 7, and 8, offering an authentic and rigorous capstone experience.

Students completing the course demonstrate a modern, integrated skillset: navigating enterprise systems, understanding cross-functional processes, and orchestrating AI-enabled analytics to solve real business problems. They exit not as traditional analysts, but as AI-augmented business professionals capable of creating strategic value within digital enterprises.

3.6 Competency Matrix and Assessment

The course design is explicitly aligned with industry-identified competency gaps, ensuring that graduates develop the "augmented human capital" required in an AI-driven job market. Table 5 summarizes this alignment by mapping each competency domain to its corresponding industry requirement, theoretical foundation, and learning activity. A central pillar of this competency development is the ability to critically evaluate AI outputs, a skill that has become a core dimension of modern digital literacy. Students learn to question, verify, and contextualize AI-generated insights, enabling them to function as responsible and effective knowledge workers (Farrokhnia et al., 2024).

Competency Domain	Industry Requirement	Theoretical Basis	Learning Activity & Assessment
Technical ERP Proficiency	Hands-on SAP experience (95% of employers)	Kolb's Concrete Experience	ERPsim gameplay & data extraction; SAP transaction accuracy metrics.
AI Collaboration & Prompt Engineering	AI-augmented analytics capability (78%)	Lave & Wenger's Situated Learning	Formulating prompts for diagnostic/predictive analysis; AI Analytics Portfolio.
Critical Evaluation & Bias Detection	Validation of AI outputs (67%)	Critical Pedagogy	Critiquing AI-generated forecasts and root-cause analysis; reflection papers.
Strategic Synthesis & Decision-Making	Human-AI decision integration (82%)	Becker's Human Capital Theory	Implementing and testing AI-prescribed strategies in the simulation; simulation performance (40% of grade).

Table 5. AI-Augmented Business Analytics Competency Matrix

4. METHODOLOGY

The course is designed using the Backward Design model (Wiggins & McTighe, 2005), a systematic approach that begins by defining desired outcomes before determining assessment methods and instructional content. This methodology aligns with our theoretical model's pathway from educational inputs to career outcomes, creating a coherent and purposeful learning experience where all components are explicitly linked, as detailed below.

The three-stage process was applied as follows:

- *Stage 1: Identify Desired Results.* The ultimate objectives were defined as the Career Outcomes in our theoretical model. These were translated into specific learning outcomes (technical proficiency, process integration, analytical decision-making) informed by direct industry input and aligned with industry frameworks.
- *Stage 2: Determine Acceptable Evidence.* A multi-faceted assessment framework was developed to collect credible evidence of student learning, including the AI analytics portfolio (30%), simulation performance metrics (40%), and quizzes and exams (30%).
- *Stage 3: Plan Learning Experiences and Instruction.* The 15-week instructional blueprint, the AI-Augmented Analytics Workflow, and the ERPsim simulation activities were all developed to equip students with the skills necessary to succeed in the assessments and achieve the target outcomes.

This backward design process ensures a direct connection between course learning objectives, assessment methods, and instructional activities, providing clear evidence that students have achieved the target competencies required for success in AI-augmented business environments. The methodology aligns with our theoretical model's pathway from educational inputs to career outcomes, creating a coherent and purposeful learning experience.

4.1 Stage 1: Course Learning Objectives Aligned With Industry Frameworks

The first stage of our backward design process establishes the desired results by defining learning objectives grounded in industry standards and contemporary business needs. Based on the DAMA Data Management Body of Knowledge (DAMA-DMBOK), EDM Council's DCAM framework, SAP certification requirements, and ERPsim learning objectives, we developed specific learning outcomes that ensure graduates possess the precise combination of technical ERP skills, AI collaboration capabilities, and business acumen demanded by modern organizations implementing AI-augmented enterprise systems.

Learning Objective Category	Learning Outcomes	DAMA-DMBOK Knowledge Area	DCAM Capability	SAP/ERPsim Alignment
DATA MANAGEMENT FOUNDATIONS	LO1: Demonstrate proficiency in extracting and managing transactional data from SAP S/4HANA using standard reporting tools and data extraction methods	Data Integration & Interoperability Data Architecture	Data Architecture Data Integration	SAP S/4HANA Fundamentals ERPsim Data Management
	LO2: Apply data governance principles to ensure data quality, integrity, and security throughout the analytics lifecycle	Data Governance Data Quality	Data Governance Data Quality	SAP Governance, Risk & Compliance
AI-AUGMENTED ANALYTICS	LO3: Employ generative AI tools to create descriptive analytics including automated summaries, visualizations, and performance dashboards	Data Operations & Analytics Data Visualization	Data Analytics & AI Business Intelligence	SAP Analytics Cloud AI Business Analytics
	LO4: Utilize prompt engineering techniques to perform diagnostic analysis for root cause identification and business process optimization	Data Operations & Analytics Data Quality	Data Analytics & AI Data Quality	ERPsim Analytics
	LO5: Develop and validate predictive models using AI tools to forecast business outcomes and market trends	Data Operations & Analytics Data Modeling & Design	Data Analytics & AI Data Architecture	SAP Predictive Analytics
	LO6: Create prescriptive analytics recommendations using AI optimization techniques for strategic decision-making	Data Operations & Analytics Data Strategy	Data Analytics & AI Business Intelligence	ERPsim Strategy
BUSINESS PROCESS INTEGRATION	LO7: Analyze and optimize end-to-end business processes (Order-to-Cash, Procure-to-Pay)	Data Integration & Interoperability Data Architecture	Data Integration Business Process Alignment	SAP Business Process Integration

Learning Objective Category	Learning Outcomes	DAMA-DMBOK Knowledge Area	DCAM Capability	SAP/ERPsim Alignment
	through integrated ERP transaction execution			
	LO8: Evaluate cross-functional business impacts and make integrated decisions that balance operational constraints and strategic objectives	Data Operations & Analytics Data Strategy	Business Intelligence Data Strategy	ERPsim Supply Chain Management
HUMAN-AI COLLABORATION	LO9: Critically evaluate AI-generated insights for bias, accuracy, and business relevance using validation frameworks	Data Governance Data Quality	Data Quality Data Governance	AI Ethics & Validation
	LO10: Demonstrate effective human-AI collaboration by integrating AI recommendations with human judgment in business decision-making	Data Operations & Analytics Data Strategy	Data Analytics & AI Business Intelligence	Human-AI Collaboration Framework
STRATEGIC IMPLEMENTATION	LO11: Develop and present data-driven business strategies supported by AI-augmented analysis and ERP system insights	Data Operations & Analytics Data Visualization	Business Intelligence Data Strategy	ERPsim Business Strategy
	LO12: Create comprehensive analytics portfolios that document the complete "Data-to-Decisions" workflow from data extraction to strategic implementation	All DMBOK Knowledge Areas (Comprehensive)	All DCAM Capability Dimensions (Comprehensive)	Industry Analytics Portfolio Standard

Table 6. AI-Augmented Business Analytics Course Learning Objectives

These learning objectives form the foundational "desired results" for our backward design approach, comprising three key elements:

- Enduring Understandings: Students will understand that effective modern business analytics requires synthesizing technical ERP proficiency with AI collaboration skills and critical business judgment, rather than treating these as separate competencies.

- Essential Questions: How does AI fundamentally transform the value proposition and methodology of business analytics? What professional and ethical responsibilities emerge when validating and implementing AI-augmented decisions in enterprise contexts?
- Targeted Competencies: The 12 specific Learning Objectives (LOs 1-12) provide concrete, measurable targets that directly align with industry frameworks and certification requirements.

This foundation ensures that all subsequent course design decisions, from assessment strategies to instructional activities, are purposefully aligned toward developing industry-relevant competencies that bridge the gap between academic preparation and workplace requirements in AI-augmented business environments.

4.2 Stage 2: Assessment Framework: Measuring AI-Augmented Competencies

In the second stage of the backward design model, we determined the acceptable evidence required to demonstrate student achievement of the learning objectives (Wiggins & McTighe, 2005). A multi-faceted assessment framework was designed to collect valid and reliable evidence of competency across all learning domains, ensuring direct alignment between our defined objectives and the methods used to evaluate them.

Our assessment framework addresses these key design questions:

- Direct Evidence: What will count as evidence of success for learners?
- Indirect Evidence: What additional indicators demonstrate progress and impact?

The resulting assessment strategy employs multiple measures to triangulate evidence of learning, as summarized in Table 7.

Assessment Type	Specific Methods	Learning Objectives Measured	Weight
Performance Tasks	AI Analytics Portfolio	LOs 3-6, 9-12	30%
Simulation Performance	ERPsim competition metrics, Strategy presentations	LOs 7, 8, 11	30%
Technical Competency	ERPsim exams, SAP proficiency tests	LOs 1, 7, 8, 11	15%
Foundational Knowledge	Quizzes, Case analyses	LOs 1-2, 9	20%
Reflection	Reflection Papers	LOs 9, 10	5%

Table 7. Multi-Dimensional Assessment Framework

Direct Evidence Collection:

- Performance Tasks: The AI Analytics Portfolio serves as the cornerstone authentic assessment, documenting students' progression through the complete "Data-to-Decisions" workflow and providing evidence of their ability to integrate AI tools with business analysis.
- Simulation Performance: Real-time ERPsim competition metrics and strategy presentations evaluate students' capacity to apply technical skills in dynamic business scenarios, measuring cross-functional decision-making and strategic thinking.
- Technical Proficiency: ERPsim exams and SAP proficiency tests provide direct, objective measurement of students' hands-on ability to execute core transactions and navigate enterprise systems.
- Foundational Knowledge: Quizzes and case analyses assess comprehension of data governance principles, data quality concepts, and ethical considerations in AI-augmented analytics.

Indirect Evidence Tracking:
- Employer feedback on student capabilities
- Interview request and job placement rates
- Longitudinal career outcome tracking

This comprehensive framework ensures that success in each assessment directly corresponds to mastery of specific course learning objectives, providing robust evidence that graduates have developed the AI-augmented business analytics competencies demanded by contemporary organizations. A detailed mapping of how specific assessment methods align with individual learning objectives across all competency categories is provided in Table 8.

Learning Objective Category	Learning Objectives Measured	Assessment Methods	Weight	Evidence Type
Technical Proficiency & Data Management				
Foundational Knowledge	LO1, LO2, LO7	Online quizzes, Case analysis	20%	Direct
Technical Skills	LO1, LO7, LO8	ERPsim final exam	15%	Direct
AI-Augmented Analytics Capability				
Descriptive & Diagnostic Analytics	LO3, LO4, LO9	AI analytics portfolio (Part 1)	15%	Direct
Predictive & Prescriptive Analytics	LO5, LO6, LO10	AI analytics portfolio (Part 2)	15%	Direct
Strategic Integration & Human-AI Collaboration				
Business Process Integration	LO7, LO8, LO11	Simulation performance	20%	Direct
Strategic Decision-Making	LO10, LO11, LO12	Strategy presentation, Reflection papers	15%	Direct
Indirect Evidence Collection				
Career Outcomes	All LOs (Comprehensive)	Interview requests, Job placement rates, Employer feedback	N/A	Indirect
Certification Achievement	LO1, LO7, LO8, LO11	ERPsim and SAP certification rates	N/A	Indirect
Longitudinal Impact	All LOs (Comprehensive)	Six-month follow-up surveys, Promotion tracking	N/A	Indirect

Table 8. Multi-Dimensional Assessment Framework

The course assessments are designed to cover both technical AI-ERP integration skills and essential soft skills required by industry. As suggested by research, hands-on analytics learning opportunities help students develop both analytical capabilities and professional competencies such as problem-solving, communication, and critical thinking (Dell'Acqua et al., 2023; Deming, 2017). The designed assessments not only examine students' technical skills but also help them develop important professional competencies through team collaboration, strategic presentation, and AI output validation exercises.

This comprehensive assessment framework ensures that we collect robust evidence of student learning across all dimensions of our AI-augmented business analytics competencies, from foundational technical skills to advanced strategic decision-making capabilities in human-AI collaborative environments.

4.3 Stage 3: Instructional Methodology: The AI-Augmented Learning Cycle

In the final stage of backward design, we developed instructional strategies and learning experiences to equip students with the necessary skills to succeed in the assessments and achieve the target learning objectives. Our instructional methodology adapts Kolb's experiential learning cycle to incorporate AI as a transformative element, creating a seamless bridge between theoretical foundation and practical application while implementing the WHERETO framework (Wiggins & McTighe, 2005) throughout the course design.

Phase 1: AI-Assisted Concrete Experience

- Students engage in ERPsim business scenarios, managing virtual companies in competitive markets
- Generate rich, personalized operational datasets through authentic SAP transactions
- Experience the cognitive load of manual data analysis and decision-making in complex environments

Phase 2: AI-Augmented Reflective Observation

- Use generative AI to analyze simulation data and identify patterns, trends, and anomalies
- Compare manual vs. AI-augmented insights to understand analytical trade-offs
- Develop metacognitive awareness of analytical processes and AI capabilities

Phase 3: Collaborative Abstract Conceptualization

- Facilitate team discussions on AI-generated insights and recommendations
- Develop theoretical framing of AI-business integration and ethical considerations
- Engage in critical evaluation of AI implementation challenges and opportunities

Phase 4: AI-Informed Active Experimentation

- Implement AI-derived strategies in subsequent simulation rounds
- Measure performance improvements through quantitative metrics and KPIs
- Refine AI collaboration approaches based on experimental results

4.3.1 Multi-Modal Instructional Strategies. We leverage three main types of instructional methods to support this learning cycle:

Direct Instructional Methods

- Traditional lectures and presentations on ERP architecture and AI concepts
- Flipped classroom methodology using the university's LMS for foundational knowledge
- SAP Learning Hub and ERPsim Learning Academy resources for technical skill development
- Curated educational videos on AI prompt engineering and SAP transaction workflows

Facilitative and Constructive Methods

- Cooperative learning through team-based ERPsim competitions and leaderboards
- Case studies analyzing real-world AI implementation successes and failures in enterprise systems
- Experimental inquiry through hands-on simulation labs with integrated AI analysis
- Problem-based learning using authentic business scenarios from industry partners
- Writing process development through iterative AI analytics portfolio creation

Coaching Methods

- Traditional and virtual office hours for personalized technical support
- Guided practice and real-time feedback during simulation decision rounds
- Industry mentor sessions with Fortune 500 executives and SAP practitioners
- Peer mentoring programs pairing advanced and novice students

Recent implementations at other institutions validate this pedagogical approach. Du et al. (2024) describe a University of Illinois business analytics course that shares key principles with our method. Their "AI Mashup" approach integrated Mathematica with a GPT-powered chatbot to reduce technical barriers while maintaining analytical rigor, enabling students to focus on data analysis and storytelling. Student

feedback showed strong appreciation for AI tools that simplified technical complexity while supporting sophisticated analysis.

4.3.2 Flipped Classroom and AI-Augmented Experiential Learning. The flipped classroom approach serves as the foundational pedagogical structure, enabling students to acquire basic knowledge (SAP navigation, AI tool fundamentals, analytical frameworks) outside class time, while reserving classroom sessions for higher-order cognitive activities. Recent meta-analyses confirm flipped classrooms significantly enhance student learning compared to traditional methods (Galindo-Dominguez, 2021).

In our implementation, this approach allows classroom time to be dedicated to hands-on ERPsim sessions, AI collaboration exercises, and strategic decision-making scenarios that would be impossible in traditional lecture formats. When students gain foundational knowledge through pre-class materials, their in-person time can be optimized for deepening understanding and developing practical skills using SAP transactions and AI analytical tools.

This methodology is particularly effective for business analytics education, where AI-augmented experiential activities help students organize conceptual knowledge in ways that facilitate retrieval and application in real-world contexts. The cyclical nature of this approach ensures students progress from basic data generation to sophisticated AI-human collaboration, developing increasingly advanced analytical capabilities throughout the 15-week course.

This rigorous application of backward design ensures all instructional elements are purposefully aligned to develop the precise combination of technical ERP skills, AI collaboration capabilities, and business acumen demanded by modern organizations implementing AI-augmented enterprise systems.

4.4 Course Implementation Blueprint

To translate the theoretical design into an actionable syllabus, we developed a 15-week implementation blueprint (Table 9). This blueprint operationalizes the AI-augmented learning cycle by sequentially scaffolding competencies, moving from foundational data management to advanced strategic synthesis. As detailed in the table, each week's activities are direct implementations of the learning activities and assessments mapped in our comprehensive framework.

Phase-Based Learning Outcome Development:

- Weeks 1-4: Technical Foundation & Data Management - Develops LOs 1, 2, 7 through foundational SAP transactions, data governance principles, and cross-functional process mapping
- Weeks 5-11: AI-Augmented Analytics Capability - Cultivates LOs 3, 4, 5, 6, 9 through iterative application of the AI-Augmented Analytics Workflow across increasingly complex business scenarios
- Weeks 12-15: Strategic Integration & Career Readiness - Masters LOs 8, 10, 11, 12 through exam preparation, capstone projects, and career integration activities
- Mediated by Student Engagement: The competitive, game-based nature of ERPsim and the novelty of AI collaboration maintain high student engagement throughout all phases

This comprehensive mapping ensures that every course component directly contributes to building the specific competencies required for industry and career success, while maintaining the theoretical integrity of our AI-augmented experiential learning model. The blueprint demonstrates how backward design principles are operationalized through carefully sequenced learning experiences that bridge from fundamental concepts to sophisticated AI-human collaboration in enterprise contexts. The comprehensive mapping in Table 9 provides the detailed session-by-session breakdown, while the phase-based narrative above illustrates the overarching pedagogical progression.

Week	Session Focus	Learning Objectives	Key Activities & Assessments	Industry Alignment
Weeks 1-2: Foundation & Data Generation				
1	ERP Systems & AI Augmentation	LO1, LO2, LO7	Lecture: Digital transformation; SAP GUI navigation; Prompt engineering basics	SAP S/4HANA Fundamentals
2	Basic Transaction Mastery	LO1, LO7	ERPsim Lab: Purchase orders, MRP; SAP cheat sheets; Baseline quiz	ERPsim Transactions
Weeks 3-4: Process Integration				
3	Cross-functional Process Mapping	LO7, LO8	Supply chain integration; Inventory scenarios; AI process optimization	SAP Business Process Integration
4	Disruption Scenarios I	LO2, LO4, LO7	Supplier bankruptcy simulation; Team problem-solving with AI; Case analysis	ERPsim Supply Chain Management
Weeks 5-8: Descriptive & Diagnostic Analytics				
5	AI-Augmented Decision Making	LO3, LO4, LO5	Human-AI collaboration frameworks; Demand spike forecasting; Predictive analytics	AI Business Analytics
6	Disruption Scenarios II	LO4, LO6, LO9	Capacity constraints; AI risk assessment; Analytics Portfolio Part 1	ERPsim Analytics
7-8	Competitive Simulation	LO3, LO4, LO5, LO6, LO8	Strategy development; Competitive AI analysis; Live competition; Performance metrics	ERPsim Strategy
Weeks 9-11: Predictive & Prescriptive Analytics				
9	AI Output Validation	LO9, LO10	Critical evaluation workshop; AI bias identification; Implementation case studies	AI Validation
10	Optimization Strategies	LO5, LO6, LO8	Multi-period optimization with AI; Prescriptive analytics; Optimization report	SAP Predictive Analytics
Weeks 12-15: Synthesis & Validation				
11-12	Certification Preparation	LO1-LO8	SAP transaction mastery; AI scenario analysis; Mock certification	Comprehensive Course Exam
13-14	Capstone & Career Integration	LO10, LO11, LO12	Comprehensive business scenario; Strategic planning; Resume workshop; Interview prep	Industry Portfolio Standard

Table 9. 15-Week Course Implementation With Learning Outcome Mapping

5. EVALUATION AND VALIDATION

Following the Understanding by Design framework (Wiggins & McTighe, 2005), optimal student performance is achieved through continuous review of results and subsequent course revision. The three-stage backward course design process is supported by a "Unit Design Cycle" (Figure 3) that facilitates continuous improvement through design, implementation, evaluation, and revision. This systematic approach ensures the course remains aligned with industry needs and educational best practices.

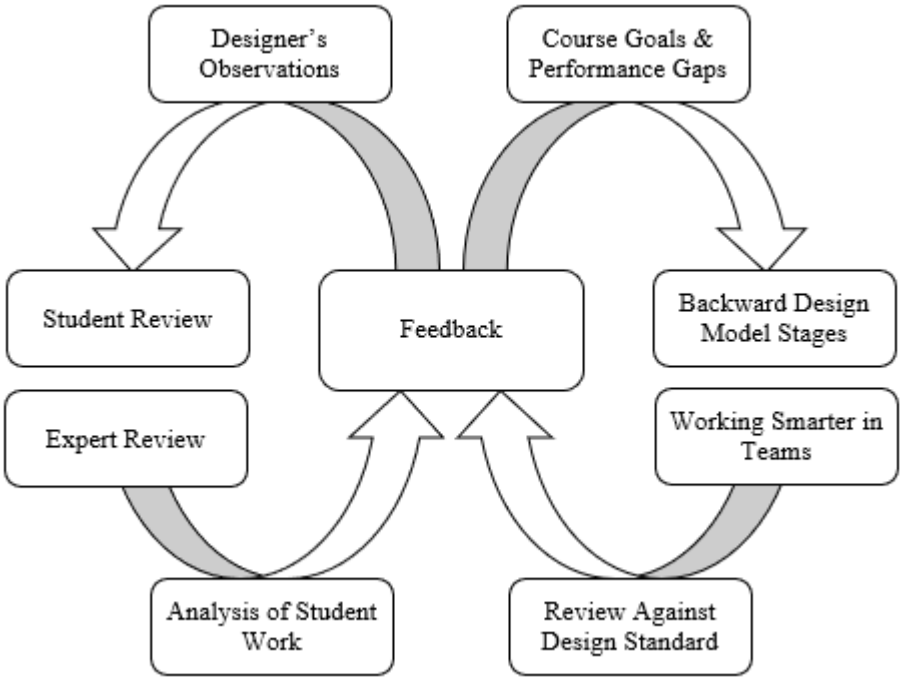


Figure 3. The Unit Design Cycle for Evaluation

5.1 Measures and Data Collection

This subsection details the instruments and procedures used to gather the evaluation data. Our approach combined direct assessment, self-reported surveys, and observational indicators.

- *Participant Profile:* The evaluation data were collected from 105 students across three course sections taught during the 2024-2025 academic year. Of these participants, 82% were final-year MIS majors completing their capstone requirement, while 18% were MBA students with prior business experience but limited technical ERP background. A prerequisite for enrollment was completion of an introductory enterprise systems course that covers foundational business processes, ensuring all students possessed baseline business process literacy. The three sections were demographically comparable, with approximately 60% male and 40% female students, and an average age of 23 years.
- *Instrument Selection and Adaptation:* We adapted the feedback instrument from Wiggins and McTighe's (2005) Understanding by Design framework because this instrument is specifically validated for evaluating curricula built on backward design principles. Since our entire course methodology follows backward design (see Section 4), using this aligned instrument ensures that we measure what our pedagogical framework prioritizes: the effectiveness of designed learning experiences in achieving desired outcomes. The original instrument was modified to include items specifically addressing AI-augmented learning (e.g., "AI tools enhanced analytical capabilities")

and ERP simulation experiences, while retaining its core structure for evaluating instructional design quality.

- *Cognitive Load Measurement:* Cognitive load was assessed using the NASA Task Load Index (NASA-TLX), a validated, multi-dimensional scale widely used in educational research to measure perceived cognitive workload. Students completed the NASA-TLX after a baseline, manual data analysis task in Week 2 (requiring them to analyze simulation data using Excel only) and again after an AI-augmented analytics task in Week 8 (using generative AI tools for the same analytical purpose).
- *Interview Request Metric:* This indicator is a descriptive, observational measure intended as a promising signal rather than a causal claim. It was calculated by comparing the average number of job interview requests per graduating senior in the MIS cohort that completed this course (cohort of 2025, n=38) against the historical department average for the three preceding cohorts (2022, 2023, and 2024; combined n=112). Data were collected through the department's annual exit survey, which asks graduating seniors to report the number of job interviews they received. We acknowledge this metric does not control for broader labor market conditions or self-selection effects; it is presented as an encouraging indicator of employability trends warranting further investigation.
- *ERPsim Game Performance Data:* Simulation performance metrics (e.g., cumulative profit, market share percentage, inventory turnover) were recorded automatically by the ERPsim platform at the conclusion of each competitive round. Teams compete in a simulated real-market environment, with rankings determined by their market performance against peer teams. These rankings reflect the emphasis on applied strategic decision-making in authentic competitive contexts. Additionally, the final exam pass rate reflects the percentage of enrolled students who passed the official, proctored ERPsim final exam administered through HEC Montréal's certification program at the conclusion of the course.
- *Qualitative Analysis of Industry Interviews:* The semi-structured expert interviews (Section 3) were audio-recorded, transcribed verbatim, and analyzed using an inductive thematic analysis approach following Braun and Clarke's (2006) six-phase framework. Two researchers independently coded the transcripts to identify recurring themes related to skill gaps and competency needs. Initial coding achieved an inter-coder reliability of 0.84 (Cohen's Kappa). After discrepancies were resolved and the codebook was refined, a final reliability check across the full transcript set produced an improved score of 0.87, indicating strong agreement. Discrepancies were resolved through discussion to finalize the themes. This systematic process ensures that the themes reported are firmly grounded in the expert data rather than reflecting researcher preconceptions.

5.2 Multi-Level Evaluation Findings

The evaluation process of Wiggins and McTighe's (2005) "Unit Design Cycle" (Figure 3) involved two main stages, following the continuous improvement cycle illustrated in Figure 3. In the *design stage*, we defined course learning goals, identified current industry gaps, and applied the three stages of backward course design in collaboration with academic instructors and industry representatives. The proposed model was then reviewed against DAMA-DMBOK and DCAM standards and industry needs. In the *trial and evaluation stage*, we employed five evaluation criteria that directly correspond to the feedback mechanisms in Figure 3: student satisfaction, learning effectiveness, industry expert validation, academic peer review, and designer observations. These five criteria align with the cyclical feedback loops shown in the diagram: Designer's Observations, Student Feedback, and Expert Review, which together inform ongoing course refinement. This multi-source evaluation approach ensures that the course is continuously improved through systematic collection and integration of diverse stakeholder perspectives, consistent with the Understanding by Design principle of using evidence to drive curriculum enhancement.

5.2.1 Level 1 - Student Satisfaction. We adapted the feedback instrument by Wiggins and McTighe (2005) to create a comprehensive evaluation using a 5-point Likert scale. The course was implemented across three sections, and student feedback was collected using a questionnaire specifically addressing the unique aspects of AI-augmented experiential learning.

Student satisfaction data, presented in Table 10, reveal consistently high ratings across all three course sections.

Evaluation Dimension	Class 1	Class 2	Class 3	Average
Learning Experience				
Class simulations helped understand enterprise systems	4.5	4.7	4.8	4.7
AI tools enhanced analytical capabilities	4.4	4.6	4.7	4.6
Course content was presented effectively	4.6	4.7	4.8	4.7
Skill Development				
Assignments developed practical problem-solving skills	4.5	4.8	4.8	4.7
Assessments fairly measured learning outcomes	4.5	4.7	4.7	4.6
Developed critical thinking and AI evaluation skills	4.4	4.6	4.7	4.6
Instructional Quality				
Instructor demonstrated expertise in AI-ERP integration	4.6	4.7	4.8	4.7
Course expectations and evaluations were clearly explained	4.6	4.7	4.7	4.7
Organized presentation of complex material	4.5	4.6	4.7	4.6

Table 10. Comprehensive Course Evaluation Metrics (n=105 across three classes)

The average ratings of 4.7 for "simulations helped understand enterprise systems" and 4.6 for "AI tools enhanced analytical capabilities" indicate that students perceived the AI-augmented experiential approach as effective. Notably, 94% of students reported high satisfaction with industry interaction components, and 89% found industry evaluator feedback "extremely valuable" for career preparation. These perceptual measures, while subjective, suggest the course successfully engaged students in ways that felt relevant to their professional development.

The consistency of ratings across all three sections (ranging from 4.4 to 4.8) suggests that the course design, rather than instructor idiosyncrasies, drove student satisfaction. The slightly higher ratings in later sections (Classes 2 and 3) may reflect iterative improvements based on early feedback, consistent with our continuous improvement cycle (Figure 3). These perceptual measures, while subjective, indicate that students perceived the AI-augmented experiential approach as effective and relevant to their professional development.

5.2.2 Level 2 - Learning Effectiveness. Objective learning measures provided stronger evidence of competency development:

- *Exam pass rates:* 92% of enrolled students achieved ERPsim competency (final exam pass + successful simulation performance), significantly exceeding the 80% target and suggesting that the course successfully prepared students for external, standardized assessment.
- *AI competency assessment:* 87% demonstrated proficiency in business-focused prompt engineering as evaluated through their AI Analytics Portfolios. This assessment, conducted by the instructional team using a standardized rubric, measured students' ability to formulate effective prompts for diagnostic and prescriptive analysis.
- *Industry partner evaluation of student portfolios:* Five industry experts evaluated student portfolios using a 5-point scale across dimensions including analytical quality, business relevance, and AI

integration. The average rating of 4.4/5.0 across all portfolios provides external validation that student work meets professional standards.

5.2.3 Level 3 - Industry Expert Validation. Following the completion of the course, we conducted structured interviews with the five industry professionals who had participated in our initial needs analysis to gather their assessment of student outcomes. All five confirmed that the course successfully addresses current AI and analytics needs, with specific praise for:

- Integration of SAP S/4HANA with generative AI tools: *"This is exactly what we're trying to figure out how to do internally. Having graduates who've already practiced this integration gives them a huge head start."* ---CIO, Fortune 500 manufacturing company
- Emphasis on AI output validation and critical thinking: *"The validation piece is what separates dangerous AI users from valuable analysts. Your students clearly understand that AI is a tool, not a replacement for judgment."* ---SAP Solutions Architect
- Preparation for human-AI collaborative work environments: *"We're seeing teams struggle with how to integrate AI assistants into workflow. Your students have already developed instincts for effective collaboration."* ---Digital Transformation Lead

5.2.4 Level 4 - Academic Peer Review. Two peer instructors from other AACSB-accredited institutions reviewed the course materials and observed final presentations. Both validated that the planned learning objectives and industry requirements were appropriately implemented, noting particularly effective scaffolding of AI augmentation throughout the course progression. One reviewer commented: *"The progression from basic transaction execution to sophisticated AI-augmented strategy development is carefully calibrated. Students aren't overwhelmed early, but by the end they're doing work I'd expect from junior analysts."*

This multi-level evaluation provides converging evidence that the course achieves its intended outcomes while meeting the standards of multiple stakeholder groups: students (satisfaction and skill development), industry (workforce readiness), and academic peers (pedagogical quality).

5.2.5 Level 5 - Designer Observations. Beyond quantitative metrics, we collected rich qualitative data through multiple channels: instructor field notes documented during and immediately after each class session (particularly during simulation debriefs), systematic analysis of student AI Analytics Portfolios submitted in Weeks 6 and 10, along with final capstone presentations analyzed during Week 15, and reflective memos written by the instructional team after each course section. This qualitative approach allowed us to understand not just *whether* learning occurred, but *how* the learning process unfolded and what mechanisms drove the observed outcomes.

Our analysis of these qualitative data sources revealed three dominant themes characterizing student development throughout the course. These themes emerged through iterative coding of field notes and portfolio content, following the same thematic analysis approach described in Section 5.1.

Theme 1: Evolution of Prompting Strategies From Simple Queries to Sophisticated Analytical Dialogue. Early in the course (Weeks 2-4), student interactions with AI tools were characterized by simplistic, direct queries that treated AI as a search engine. Typical prompts included: "Show me our sales data" or "Tell me why profits are low." These prompts yielded superficial outputs that required significant additional analysis.

By Week 8, portfolios revealed a marked shift toward sophisticated, multi-turn prompting strategies. Students learned to:

- Constrain the AI's role: *"Act as a supply chain consultant with expertise in bicycle manufacturing..."*
- Provide contextual business parameters: *"...considering our production capacity of 800 hours per period and supplier lead times of 2 periods for frames."*

- Request specific analytical frameworks: *"...perform a root cause analysis using the 5 Whys methodology and provide evidence from our SAP transaction data."*

By the final portfolio submission (Week 10), 78% of students demonstrated what we term "collaborative prompting," using AI iteratively to refine analysis, challenge assumptions, and explore alternative scenarios. One student's portfolio documented six rounds of prompting on the same strategic question, with each round incorporating the AI's previous output and pushing toward deeper insight. This evolution directly evidences achievement of Learning Objective 4 (utilizing prompt engineering for diagnostic analysis) and Learning Objective 10 (demonstrating effective human-AI collaboration).

Theme 2: Critical Validation Emerging as a Core Competency. Perhaps the most significant developmental trajectory observed was students' growing capacity to critically evaluate AI outputs. Initial portfolio submissions (Week 6) often accepted AI-generated insights uncritically. Students would present AI recommendations without questioning underlying assumptions or verifying them against source data. Instructor field notes from Week 6 document multiple instances where teams implemented AI recommendations that contradicted basic business logic, such as increasing production despite negative cash flow.

The Week 9 AI Output Validation workshop marked a turning point. Following structured exercises where students were required to trace AI claims back to specific SAP transactions and identify potential biases in AI reasoning, portfolios showed a dramatic shift. By the final portfolio submission (Week 10), 85% of portfolios included explicit "validation" sections where students:

- Cross-referenced AI-generated metrics against SAP standard reports
- Identified assumptions embedded in AI analysis
- Discussed limitations and potential biases in AI recommendations
- Documented how they reconciled AI suggestions with human judgment

Instructor field notes capture this transformation: *"Teams now instinctively ask 'How do we know this is right?' before implementing AI recommendations. They're treating AI as a colleague whose work needs checking, not an oracle."* This development directly addresses Learning Objective 9 (critically evaluating AI insights for bias and accuracy) and represents a foundational competency for responsible AI deployment in organizations.

Theme 3: Integration of Technical and Strategic Thinking. A third theme concerned students' growing ability to connect technical ERP operations with strategic business outcomes. Early in the course, students treated SAP transactions as isolated technical exercises; completing a purchase order correctly was the goal itself. By the end of the course, portfolios demonstrated a sophisticated understanding of how operational decisions cascade through integrated business processes to affect strategic outcomes.

Evidence from final portfolios showed students:

- Tracing how raw material procurement decisions (technical) affected production capacity and ultimately market share (strategic)
- Analyzing how pricing strategies (strategic) impacted inventory turnover and cash flow (operational)
- Modeling how AI-prescribed production plans balanced multiple constraints including capacity, storage, and financial resources

This integration is precisely the "bridge between IT and business" that industry experts identified as critical in our needs analysis. The 4.7/5.0 rating for "simulations helped understand enterprise systems" reflects student appreciation for this integrated learning, while the 92% ERPsim competency rate provides industry-level validation that students achieved genuine technical mastery alongside strategic thinking.

Our qualitative findings align with recent research on student-AI interaction patterns. Fang and Zhou (2025) identified four engagement themes in their analysis of 258 business students: epistemic beliefs about

AI, functional cognitive engagement, reflective metacognitive learning, and human-GenAI co-agency. Critically, they found that higher-performing students engaged AI as a collaborative partner through iterative prompt refinement and critical output evaluation, while lower-performing students accepted or rejected AI outputs prematurely, a pattern directly mirrored in our own observations of prompting evolution. Similarly, López-Pernas et al. (2025) analyzed over 2,300 student-AI interactions and found that without proper scaffolding, students tend toward "cognitive offloading," delegating thinking to AI rather than engaging in deeper metacognitive strategies. Their finding that students rarely engaged in reflection or evaluation when using AI tools confirms the critical importance of structured pedagogical interventions like our Validation Workshop, which deliberately cultivates AI literacy and critical thinking skills alongside technical proficiency.

5.3 Summary of Observational Metrics

While the qualitative themes above illuminate the learning process, Table 11 provides quantitative context for these observations. The metrics below should be interpreted alongside the qualitative themes to provide a complete picture of student development.

Metric	Target	Actual	Improvement	Evidence Source
Cognitive load reduction (NASA-TLX)	30%	43%	+13 pp	Pre/post comparison
Interview requests (compared to historical avg)	1.5x	2.1x	+40% (relative)	Department exit surveys
Learning gain with structured debriefing	20%	29%	+9 pp	Pre/post simulation performance
Technical competency	80%	92%	+12 pp	ERPsim final exam and simulation performance
AI prompt engineering proficiency	75%	87%	+12 pp	Portfolio assessment
Critical validation demonstrated	80%	85%	+5 pp	Portfolio includes validation section

Table 11. Implementation Performance Metrics

Cognitive load reduction was measured using the NASA Task Load Index, with students rating their perceived cognitive workload after a manual analysis task in Week 2 and again after an AI-augmented analysis task in Week 8. The 43% reduction represents the aggregate decrease across all six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration. This pre/post design within the same student population provides a controlled comparison of the AI intervention's effect on cognitive load. Interview requests were calculated by comparing the average number of job interviews reported by graduating seniors in the course cohort (n=38) against the historical department average for the three preceding cohorts (2022, 2023, and 2024; combined n=112). Data were collected through annual exit surveys. This 2.1x increase is presented as an encouraging indicator of employability trends rather than a causal claim, as it does not control for broader labor market conditions or self-selection effects. Learning gain with structured debriefing was measured by comparing teams' simulation performance metrics (cumulative profit, market share, inventory turnover) before and after structured debriefing sessions where students reflected on AI-generated insights and refined their strategies. The 29% gain represents the average improvement in overall performance ranking following these debriefing sessions. Technical competency reflects the percentage of students who successfully demonstrated mastery of SAP transactions and ERP processes through a combination of the ERPsim final exam and successful simulation performance throughout the course. The 92% attainment rate significantly exceeded our 80% target. AI prompt

engineering proficiency was assessed through students' AI Analytics Portfolios submitted in Week 10. Using a standardized rubric, the instructional team evaluated students' ability to formulate effective prompts for diagnostic and prescriptive analysis, with criteria including prompt specificity, contextualization, and iterative refinement. The 87% proficiency rate indicates most students developed sophisticated prompt engineering capabilities. Critical validation demonstrated measures the percentage of students who included explicit validation sections in their portfolios. The baseline measurement in Week 6 was 70%, which increased to 85% by the final portfolio submission (Week 10). This 15-point increase reflects the effectiveness of the Week 9 AI Output Validation workshop in cultivating this essential competency.

These metrics, interpreted alongside the qualitative themes, provide converging evidence that the course successfully developed the competencies our theoretical framework targeted. The 43% cognitive load reduction supports our proposition that structured AI workflows can offload routine analysis, enabling students to focus on higher-order strategic thinking, precisely the capacity documented in Theme 3. The finding that 85% of students demonstrated critical validation skills by course end (Theme 2) confirms that AI literacy was genuinely achieved, not merely claimed.

Note that percentage differences between targets and actuals (e.g., 43% minus 30%) are reported as percentage points (pp), whereas the increase in interview requests is reported as a relative percentage improvement.

6. DISCUSSION

The initial evaluation of our theoretical model offers promising evidence for the course's impact on MIS graduate outcomes and demonstrates substantive contributions to both pedagogical theory and business education practice. The results indicate that integrating generative AI as a cognitive partner within an experiential learning environment creates a synergistic effect that accelerates skill development. Notably, the 2.1× increase in interview requests and the 92% ERPsim competency rate suggest that the course meaningfully addresses the persistent theory–practice gap in business analytics education.

6.1 Reconnecting Evidence to Theory

Returning to the Experiential AI Integration Model (Figure 1), the evaluation results provide empirical support for the central premise that AI functions as an effective "cognitive partner" across all four theoretical pillars.

6.1.1 Experiential Learning (Kolb, 2014). The observed 43% reduction in cognitive load (NASA-TLX) empirically validates our claim that AI can offload routine analytical tasks, freeing cognitive resources for deeper learning. By relieving students of the mechanical burden of data manipulation, AI enables greater investment in Kolb's reflective observation and abstract conceptualization phases, thereby enhancing understanding. The 29% learning gain in structured debriefing sessions further substantiates that students completed the experiential cycle, moving from concrete experience (ERPsim outcomes) to reflective observation (AI-assisted analysis) and onward to active experimentation (strategy refinement).

6.1.2 Situated Learning (Lave & Wenger, 1991). The 4.7/5.0 student rating for the value of simulations in understanding enterprise systems suggests strong perceived authenticity. More critically, the emergence of *critical validation* as a recurring competency theme (Theme 2, Section 5) reflects how AI tools acted as *cognitive artifacts* within this authentic community of practice. Students progressed from peripheral participation (Weeks 2–4 transaction execution) to more central roles (Week 15 strategic AI-augmented decision-making), mirroring the developmental trajectory predicted by situated learning theory.

6.1.3 Human Capital Theory (Becker, 2002). The 2.1× increase in interview requests, 92% competency rate, and 4.4/5.0 industry evaluation of student portfolios collectively illustrate the development of *augmented human capital*, the integration of ERP proficiency and AI collaboration skills. Rather than

acquiring isolated technical or analytical skills, students demonstrated the ability to connect operational decisions to strategic outcomes, aligning strongly with employer expectations and validating our human capital framing.

6.1.4 Gamification (Deterding et al., 2011). Sustained student engagement across the 15-week term, evidenced by 94% satisfaction with industry interaction and consistently high attendance at optional prep sessions, confirms that gamified elements (leaderboards, real-time feedback, team competition) successfully maintained intrinsic motivation. This aligns with gamification research predicting increased engagement in learning environments that incorporate competitive and feedback-driven structures.

6.2 AI as a Cognitive Partner

The evolution from basic prompting to sophisticated analytical dialogue (Theme 1, Section 5) illustrates the development of *AI-augmented reflection capacity*. With 87% of students demonstrating proficiency in prompt engineering and critical validation skills increasing from 70% to 85%, the evidence confirms that these abilities can be cultivated through structured pedagogical interventions. The four-stage analytical workflow thus successfully positioned AI as a collaborative thinking partner rather than a shortcut or answer generator.

6.3 Contributions to Theory and Practice

This study makes several significant contributions to IS pedagogy and business education practice.

1) *A Novel Pedagogical Framework for the AI Era.* We introduce a theoretically grounded model that redefines experiential learning by embedding human–AI collaboration into simulation-based education. By explicitly connecting theory to classroom practice, the model offers a transferable blueprint for designing AI-augmented courses across disciplines.
2) *Evidence That Structured AI Integration Enhances Learning.* The evaluation demonstrates that structured AI integration, particularly via the four-stage analytics workflow, enhances both technical proficiency and strategic decision-making. The 29% learning gain from structured debriefing underscores that AI augmentation, when scaffolded appropriately, accelerates rather than bypasses meaningful learning processes.
3) *A Replicable Competency Mapping Approach.* Our competency-mapping methodology aligns DAMA-DMBOK, DCAM, SAP certifications, and employer needs, providing a replicable framework for maintaining curriculum relevance in rapidly evolving technological landscapes. Programs seeking to align with accreditation standards (e.g., AACSB) may benefit from adopting similar approaches.
4) *Theoretical Contributions to Human–AI Collaboration in Learning.* The findings extend emerging research on human–AI interaction by demonstrating that AI can serve as a transformative element in experiential learning, accelerating reflection, supporting hypothesis generation, and facilitating deeper analytical reasoning. The 43% cognitive load reduction highlights the importance of structured scaffolding for effective AI integration in complex learning environments.
5) *Strategic Value for AACSB-Accredited Institutions.* The proposed framework supports key AACSB priorities by:
    - Ensuring curriculum relevance in a rapidly digitizing business environment (Standard 3)
    - Demonstrating pedagogical innovation (Standard 8)
    - Enhancing student employability outcomes (Standard 9)
    - Supporting robust industry engagement (Standard 4)

The model's scalability allows implementation across diverse institutional contexts, making it particularly useful for business schools navigating digital transformation and evolving employer expectations.

7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

7.1 Limitations

While our initial results are promising, several limitations must be acknowledged to appropriately bound our claims and guide future research.

First and foremost, this study presents a design and initial evaluation; it is not a controlled experiment. The evidence should be interpreted as proof-of-concept and early feasibility rather than definitive causal proof of effectiveness. Without a control group, we cannot rule out alternative explanations for observed outcomes, including student self-selection effects, broader labor market improvements, or placebo effects from novel technology use. We have intentionally framed our claims using language such as "promising evidence" and "encouraging indicators" to reflect this evidentiary status.

Second, our study was conducted within a single university context, which may limit generalizability across different institutional types and student populations. Our institution is a regional comprehensive university with a primarily undergraduate MIS program; findings may not directly translate to research-intensive universities, community colleges, or non-US educational contexts. The student population, while diverse within our region, may not represent the full range of demographic and prior preparation backgrounds found elsewhere.

Third, the sample size for qualitative industry validation (n=5 experts), while appropriate for exploratory thematic analysis, limits the representativeness of our needs assessment. These experts, though drawn from diverse organizational contexts, may not capture the full range of industry perspectives on AI-augmented analytics competencies. Future research should expand expert sampling to include a broader range of industries, organizational sizes, and geographic regions.

Fourth, the rapid evolution of generative AI technologies means that specific tool implementations (e.g., particular versions of ChatGPT, specific SAP AI features) may require frequent updates. Our conceptual framework and pedagogical approach are designed to be tool-agnostic, but the evaluation data necessarily reflect specific technological configurations that may become dated. Replication studies with evolving AI tools will be essential to validate the framework's enduring relevance.

Fifth, our assessment of long-term career impact, while encouraging (2.1× interview requests), relies on short-term, self-reported indicators rather than longitudinal tracking of employment outcomes. We cannot yet demonstrate that course graduates achieve sustained career advancement, salary premiums, or professional success beyond initial job placement. Longitudinal tracking over a 3-5 year period is needed to fully understand sustained professional development.

Sixth, the cognitive load reduction finding (43%), while statistically meaningful within our pre/post design, measures perceived rather than objective cognitive load. Future research should incorporate physiological measures (e.g., eye tracking, heart rate variability) or performance-based indicators to triangulate subjective reports. Additionally, the optimal level of cognitive load reduction, balancing efficiency gains against the risk of over-reliance on AI, remains an open question requiring further investigation.

Finally, while our thematic analysis followed rigorous procedures (inter-coder reliability 0.87), qualitative interpretation inherently involves researcher subjectivity. Different researchers might identify alternative themes or emphasize different aspects of the data. We have attempted to mitigate this limitation through transparent reporting of our analytical process and inclusion of direct quotations and field note excerpts, but readers should interpret qualitative findings as interpretive rather than definitive.

7.2 Future Research Directions

These limitations suggest several productive avenues for future research: (1) Multi-institutional studies examining the framework's effectiveness across diverse educational contexts (research universities, liberal arts colleges, community colleges, international settings) to establish generalizability and identify contextual moderators of effectiveness. (2) Longitudinal tracking of graduate career progression over 3-5 years, including salary progression, promotion rates, and employer evaluations, to assess sustained impact on professional outcomes. (3) Controlled experimental designs comparing AI-augmented vs. traditional

analytics instruction, ideally with random assignment or rigorous quasi-experimental methods, to establish causal effects on learning and career outcomes. (4) Adaptation studies applying the framework to other enterprise platforms beyond SAP (e.g., Oracle, Microsoft Dynamics) and to other business disciplines (finance, marketing, supply chain) to test transferability. (5) Cross-cultural implementations examining how cultural differences in attitudes toward AI, collaboration norms, and educational expectations moderate the framework's effectiveness. (6) Cognitive process studies using think-aloud protocols, eye tracking, or neuroimaging to investigate the specific cognitive mechanisms underlying human-AI collaborative problem-solving and how these develop through structured pedagogy. (7) Optimization research investigating the optimal balance between AI assistance and human critical thinking, identifying the "sweet spot" where AI enhances without replacing human judgment.

As AI capabilities continue to advance, research on preparing students for human-AI collaborative work will only grow in importance. We offer our framework and initial findings as a foundation for this ongoing scholarly conversation.

8. REPLICATION GUIDELINES FOR IS EDUCATORS

A central goal of this paper is to provide other IS educators with a fully replicable model for AI-augmented business analytics instruction. To support adoption across diverse institutional contexts, we have provided comprehensive teaching materials in the appendices. Rather than requiring access to external resources, all essential components for implementation are contained within this manuscript. Below, we map each course design element to its location, enabling readers to adapt our approach to their specific institutional settings. For additional discussion or clarification, the authors welcome inquiries from IS educators seeking to adapt this approach.

8.1 Complete Course Materials (Appendices)

To address the need for ready-to-use teaching resources, we have developed seven appendices containing all materials necessary for course implementation:

- *Appendix A: Complete Course Syllabus* – Full 15-week syllabus with learning objectives, grading breakdown, weekly schedule, and course policies
- *Appendix B: AI Analytics Portfolio Assignments* – Detailed assignment descriptions for Parts 1 and 2, including required sections, submission templates, and grading rubrics
- *Appendix C: Grading Rubrics* – Comprehensive rubrics for simulation performance, ERPsim final exam, reflection papers, and strategy presentations
- *Appendix D: AI Prompt Library* – 50+ example prompts for descriptive, diagnostic, predictive, prescriptive, and validation analysis, organized by the CRAFT framework
- *Appendix E: SAP Transaction Cheat Sheets & ERPsim Job Aid* – Step-by-step guides for ME21N (purchase orders), CO01 (production orders), VA01 (sales orders), and S_ALR_87012296 (financial reports)
- *Appendix F: AI Output Validation Workshop Materials* – Complete workshop materials including the VALID framework, handouts, and practice scenarios
- *Appendix G: Technical Setup Guide* – Step-by-step instructions for SAP GUI installation, ERPsim game setup, and AI tool access (ChatGPT Enterprise, Microsoft Copilot, RapidMiner)

These materials are designed to be *directly usable*; instructors can adapt the syllabus, distribute the cheat sheets, use the prompt library in class, and implement the validation workshop with minimal modification.

8.2 Prerequisites and Institutional Readiness

Before implementation, programs should assess their readiness. Based on our experience, the following are essential:

- *Curriculum positioning:* Course should be a capstone or advanced elective following prerequisites (such as Intro to Enterprise Resource Planning)
- *Technical infrastructure:* Access to SAP S/4HANA (via SAP University Alliances), ERPsim license, and enterprise-grade AI tools
- *Faculty preparation:* ERPsim certification and familiarity with SAP transactions

Institutions lacking any of these can begin with scaled-down versions using publicly available datasets and free AI tools.

8.3 Implementation Timeline

Based on our experience, successful implementation requires approximately 6-9 months of preparation:

- Months 1-3: Secure infrastructure, complete ERPsim certification, establish industry advisory panel
- Months 4-6: Develop learning objectives, create assessment rubrics, design prompt engineering workshops (as detailed in Section 4)
- Months 7-9: Recruit pilot section, conduct technical dry runs, finalize industry participation
- Ongoing: Collect evaluation data, iterate based on feedback (see Section 5 instruments)

8.4 Common Challenges and Mitigation Strategies

8.4.1 Technical Challenges

- *Cognitive overload* (SAP/ERPsim + AI simultaneously) – Deploy cheat sheets & job aids (Appendix E); scaffold AI tools gradually; use flipped classroom
- *AI tool reliability* (downtime, inconsistent outputs) – Maintain backup manual methods; design for multiple tools; require validation
- *Live competition failures* (SAP downtime, connectivity) – Prepare backup exercises; record demo videos; build buffer time; troubleshooting guide (Appendix G)
- *Rapid AI tool updates* – Design around conceptual frameworks; monitor developments; adaptable prompt library (Appendix D)

8.4.2 Pedagogical Challenges

- *Variable student backgrounds* – Week 1 skills assessment; peer mentoring; optional workshops; cheat sheets (Appendix E)
- *Student resistance to AI* – "AI as a collaborator" framing; industry speakers; validation as differentiator (Week 9); share research
- *Over-reliance on AI* – Require validation sections (Appendix B); grade on critical evaluation (Appendix C); VALID framework (Appendix F); deduct for unvalidated outputs
- *Team dysfunction* – Peer evaluations (Appendix C); rotating roles (CFO/COO/CMO); CATME; peer multiplier

8.5 Adaptation for Different Institutional Contexts

Our model is designed for adaptation across varying resource levels:

- *Limited AI budgets:* Free tiers of ChatGPT, Google Gemini, or open-source alternatives (Llama 2) support basic prompt engineering
- *Larger class sizes:* Implement team-based competition with 4-5 students per team; use peer grading with instructor moderation
- *Online/hybrid programs:* ERPsim supports remote collaboration; use breakout rooms and recorded demonstrations

9. CONCLUSION

This research presents a comprehensive, theoretically grounded approach to transforming business analytics education for the AI era, supported by promising initial evaluation results. By integrating generative AI as a core component of experiential learning through the ERPsim platform, we have developed a pedagogical model that directly addresses the critical skills gap between academic preparation and workplace requirements. Our theoretically grounded framework, aligned with industry standards and competencies, demonstrates how strategic AI integration can simultaneously enhance technical proficiency, analytical capability, and career readiness. The initial evaluation of student outcomes, including qualitative evidence of competency development and employability indicators, provides promising evidence for the effectiveness of our approach. More importantly, our research offers business educators a practical, detailed, and replicable blueprint for preparing students not just for current job requirements, but for the evolving nature of human-AI collaborative work. As organizations increasingly seek graduates who can bridge technical and business domains while effectively leveraging AI capabilities, the approach described herein represents a significant step forward in ensuring the continued relevance and impact of business education in an AI-driven economy.

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APPENDICES

Appendix A. Sample Course Syllabus

Course Title: AI-Augmented Business Analytics (MIS 4XXX)

Prerequisites:
- MIS 3XXX: Intro to Enterprise Resource Planning

Course Description:
This capstone course integrates enterprise systems with generative AI to develop advanced business analytics capabilities. Students manage virtual companies using the ERPsim Manufacturing Game on SAP S/4HANA, generating real transactional data across procurement, production, sales, and finance. Through a structured four-stage "Data-to-Decisions" workflow, students employ generative AI tools (ChatGPT Enterprise, Microsoft Copilot, SAP Analytics Cloud) as cognitive partners to analyze data, diagnose problems, predict outcomes, and prescribe strategies. The course emphasizes critical evaluation of AI outputs, human-AI collaboration, and strategic decision-making in authentic business contexts.

Learning Objectives:
Upon successful completion of this course, students will be able to:

LO	Description	Assessment
LO1	Demonstrate proficiency in extracting and managing transactional data from SAP S/4HANA using standard reporting tools	ERPsim Final Exam; SAP Transaction Accuracy
LO2	Apply data governance principles to ensure data quality, integrity, and security throughout the analytics lifecycle	Quizzes; Case Analyses
LO3	Employ generative AI tools to create descriptive analytics including automated summaries, visualizations, and performance dashboards	AI Analytics Portfolio Part 1
LO4	Utilize prompt engineering techniques to perform diagnostic analysis for root cause identification and business process optimization	AI Analytics Portfolio Part 1
LO5	Develop and validate predictive models using AI tools to forecast business outcomes and market trends	AI Analytics Portfolio Part 2
LO6	Create prescriptive analytics recommendations using AI optimization techniques for strategic decision-making	AI Analytics Portfolio Part 2
LO7	Analyze and optimize end-to-end business processes (Order-to-Cash, Procure-to-Pay) through integrated ERP transaction execution	Simulation Performance; ERPsim Final Exam
LO8	Evaluate cross-functional business impacts and make integrated decisions that balance operational constraints and strategic objectives	Simulation Performance; Case Analyses
LO9	Critically evaluate AI-generated insights for bias, accuracy, and business relevance using validation frameworks	Reflection Papers; AI Analytics Portfolio

LO	Description	Assessment
LO10	Demonstrate effective human-AI collaboration by integrating AI recommendations with human judgment in business decision-making	Strategy Presentations; Reflection Papers
LO11	Develop and present data-driven business strategies supported by AI-augmented analysis and ERP system insights	Final Presentation; Simulation Performance
LO12	Create comprehensive analytics portfolios that document the complete "Data-to-Decisions" workflow from data extraction to strategic implementation	AI Analytics Portfolio (Complete)

Required Materials:

- SAP S/4HANA access (provided through SAP University Alliances)
- ERPsim Manufacturing Game license (purchased through HEC Montréal)
- ChatGPT Enterprise account (university-provided)
- Microsoft Copilot for Microsoft 365 (university-provided)
- RapidMiner (academic license - free)
- SAP Analytics Cloud access (provided through SAP)

Textbook:
https://erpsim.hec.ca/en/portals

Grading Breakdown:

Assessment	Weight	Learning Objectives
AI Analytics Portfolio (Part 1: Descriptive/Diagnostic)	15%	LO3, LO4, LO9
AI Analytics Portfolio (Part 2: Predictive/Prescriptive)	15%	LO5, LO6, LO9, LO10
Simulation Performance (Team-based)	20%	LO7, LO8, LO11
ERPsim Final Exam (Individual)	15%	LO1, LO7, LO8
Quizzes (3 @ 3.33% each)	10%	LO1, LO2, LO9
Case Analyses (2 @ 5% each)	10%	LO2, LO8, LO9
Strategy Presentation (Team)	10%	LO10, LO11, LO12
Reflection Papers (2 @ 2.5% each)	5%	LO9, LO10
Total	**100%**	

Grading Scale:

- A: 90-100%
- B: 80-89%
- C: 70-79%
- D: 60-69%
- F: Below 60%

Weekly Schedule:

Week	Topics	In-Class Activities	Deliverables
1	**ERP Systems & AI Augmentation**	Lecture: Digital transformation; Hands-on: SAP GUI navigation basics; AI Integration: Introduction to prompt engineering	none
2	**Basic Transaction Mastery**	ERPsim Lab: Purchase orders (ME21N), material requirements planning; SAP cheat sheets distributed	Baseline competency quiz
3	**Cross-functional Process Mapping**	Lecture: Supply chain integration concepts; ERPsim Lab: Inventory management scenarios; AI Integration: Process optimization with SAP Analytics Cloud	none
4	**Disruption Scenarios I**	ERPsim Lab: Supplier bankruptcy simulation; Team-based problem-solving with ChatGPT Enterprise	Case Analysis 1 due
5	**AI-Augmented Decision Making**	Lecture: Human-AI collaboration frameworks; ERPsim Lab: Demand spike scenarios with RapidMiner forecasting	none
6	**Disruption Scenarios II**	ERPsim Lab: Production capacity constraints; Microsoft Copilot-powered scenario planning	AI Analytics Portfolio Part 1 due
7-8	**Competitive Simulation**	Strategy development; Competitive AI analysis; Live ERPsim Championship with industry evaluators	Simulation performance metrics
9	**AI Output Validation**	Workshop: Critical evaluation of AI-generated insights; Identifying AI bias; Implementation case studies	Reflection Paper 1 due
10	**Optimization Strategies**	ERPsim Lab: Multi-period optimization with Microsoft Copilot; Prescriptive analytics for inventory turnover	AI Analytics Portfolio Part 2 due
11-12	**Certification Preparation**	SAP transaction mastery tests; AI scenario analysis; Mock certification	ERPsim Final Exam
13-14	**Capstone & Career Integration**	Comprehensive business scenario; Strategic planning; Resume workshop; Interview prep	Final Presentation; Reflection Paper 2 due
15	**Final Exam Week**	Course wrap-up; Industry partner networking	none

Course Policies:

- **Late Submissions:** 10% penalty per day, up to 3 days
- **Teamwork:** Peer evaluations will be conducted at midterm and final; scores may be adjusted based on peer feedback
- **AI Tool Usage:** AI tools are required for assignments; however, all AI outputs must be critically evaluated and validated.
- **Academic Integrity:** All work must be your own (or your team's). Improper citation of AI tools or falsifying validation checks constitutes academic dishonesty.

Appendix B. AI Analytics Portfolio Assignment Details

Assignment Overview:
The AI Analytics Portfolio is your opportunity to document the complete "Data-to-Decisions" workflow across two phases. You will use your team's ERPsim simulation data and generative AI tools to perform descriptive, diagnostic, predictive, and prescriptive analysis. The portfolio demonstrates your mastery of LO3-LO6 and LO9-LO12.

Portfolio Part 1: Descriptive and Diagnostic Analytics (Due Week 6, 15%)
Objective: Demonstrate ability to use AI for understanding what happened and why.
Data Source: Your team's ERPsim simulation data from Rounds 1-3 (provided in Excel format)
Required Sections:

1. **Executive Summary** (1 page)
    - Brief overview of your company's performance in Rounds 1-3
    - Key insights discovered through AI-augmented analysis
2. **Descriptive Analytics** (2-3 pages)
    - Export data from SAP using standard reports (S_ALR_87012296)
    - Use SAP Analytics Cloud to auto-generate performance dashboards showing:
        - Time-series sales volume by product
        - Revenue by product and region
        - Inventory levels over time
        - Profit margin trends
    - **For each visualization, document:**
        - The prompt used to generate it
        - Screenshot of the AI-generated output
        - Validation step: Cross-reference AI-generated totals with SAP standard reports (include screenshots)
3. **Diagnostic Analytics** (3-4 pages)
    - Identify a significant performance issue from Rounds 1-3 (e.g., stock-out, profit decline, capacity underutilization)
    - Formulate hypotheses about root causes
    - Use ChatGPT Enterprise to perform root-cause analysis across integrated datasets
    - **Document your prompt evolution:**
        - Initial prompt (and why it was insufficient)
        - Refined prompt (and what you added)
        - Final prompt (and why it worked)
    - Include AI's diagnostic output
    - **Validation:** Trace the AI's logic back to specific SAP transactions (e.g., a missed purchase order in ME21N, production delays in CO01). Provide transaction screenshots as evidence.
4. **Reflection** (1 page)
    - What did AI do well in this phase?
    - What limitations did you encounter?
    - How did you validate (or refute) AI's conclusions?
    - What would you do differently next time?

Grading Rubric (Part 1):

Criterion	Excellent (90-100%)	Proficient (80-89%)	Developing (70-79%)	Below Expectations (<70%)	Weight
Descriptive Analysis Quality	Dashboards are comprehensive, clearly presented, and directly tied to business decisions	Dashboards cover most key metrics but lack some depth	Dashboards are basic or missing key metrics	Dashboards are incomplete or irrelevant	25%
Diagnostic Prompt Engineering	Prompts show clear evolution; final prompt is sophisticated and yields deep insights	Good prompts but limited evolution documented	Basic prompts with minimal refinement	Prompts are copied or show no effort	25%
Validation Evidence	Thorough cross-referencing with SAP transactions; clear proof of validation	Some validation attempted but gaps remain	Minimal validation; accepts AI outputs uncritically	No validation provided	25%
Reflection Depth	Insightful analysis of AI's strengths/limitations; clear metacognitive awareness	Good reflection but somewhat superficial	Limited reflection; mostly descriptive	No meaningful reflection	25%

Portfolio Part 2: Predictive and Prescriptive Analytics (Due Week 10, 15%)
Objective: Demonstrate ability to use AI for forecasting future outcomes and recommending optimal strategies.
Data Source: Your team's ERPsim simulation data from Rounds 1-6 (including additional rounds)
Required Sections:

1. **Executive Summary** (1 page)
    - Summary of predictive insights and strategic recommendations
    - Expected impact on company performance
2. **Predictive Analytics** (3-4 pages)
    - Use historical data from Rounds 1-6 to forecast Round 7 performance
    - Build forecasting models using **both**:
        - RapidMiner (time-series forecasting with validation metrics)
        - SAP Analytics Cloud (trend analysis and demand forecasting)
    - **Document for each tool:**
        - Data preparation steps
        - Model parameters selected
        - Forecast outputs (include screenshots)
        - Confidence intervals and assumptions
    - **Validation:** Compare forecasts from both tools; assess reasonableness using statistical validation metrics (MAPE, RMSE)
3. **Prescriptive Analytics** (3-4 pages)
    - Synthesize insights from descriptive, diagnostic, and predictive phases
    - Use Microsoft Copilot in Excel to optimize:
        - Production quantities by product
        - Raw material order quantities
        - Pricing strategies
    - **Document your optimization process:**
        - Constraints considered (capacity, storage, lead times, cash flow)
        - Multiple scenarios tested
        - Final recommendations with rationale
    - **Validation:** Role-play a management decision committee; challenge your own recommendations against business constraints; document the debate
4. **Complete Data-to-Decisions Workflow Documentation** (2-3 pages)
    - Visual diagram showing your complete workflow from data extraction to final recommendations
    - Explanation of how each stage informed the next
    - Key lessons learned about human-AI collaboration
5. **Reflection** (1 page)
    - Compare your final AI-prescribed strategy with what you would have done without AI
    - Discuss any instances where you overruled AI recommendations and why
    - Reflect on how your AI collaboration skills evolved from Part 1 to Part 2
    - What would you need to trust AI more fully in future decisions?

Grading Rubric (Part 2):

Criterion	Excellent (90-100%)	Proficient (80-89%)	Developing (70-79%)	Below Expectations (<70%)	Weight
Predictive Model Quality	Both tools used effectively; forecasts validated with metrics; assumptions clearly explained	Good forecasts but limited validation or missing one tool	Basic forecasts with minimal validation	Forecasts missing or irrelevant	25%
Prescriptive Optimization	Comprehensive scenario analysis; clear link between constraints and recommendations	Good recommendations but limited scenario testing	Basic recommendations with minimal optimization	No clear link between analysis and recommendations	25%
Workflow Documentation	Complete, clear, and insightful documentation of entire process	Good documentation but missing some elements	Partial documentation	No workflow documentation	25%
Reflection Depth	Exceptional insights about human-AI collaboration; clear evidence of learning	Good reflection but somewhat generic	Limited reflection	No meaningful reflection	25%

Appendix C. Grading Rubrics

Rubric C1: Simulation Performance (Team-Based, 20%)

Metric	Weight	Scoring Method
Cumulative Profit	40%	Rank-order among teams: 1st = 100%, 2nd = 90%, 3rd = 80%, 4th = 70%, 5th+ = 60%
Market Share	20%	Compared to equally weighted target: within 5% = 100%, within 10% = 85%, within 15% = 70%, below = 60%
Inventory Turnover	20%	Industry benchmark comparison: top quartile = 100%, 2nd quartile = 85%, 3rd quartile = 70%, bottom quartile = 60%
Return on Assets	20%	Rank-order among teams: same scale as cumulative profit
Peer Evaluation Multiplier	±20%	Average peer rating (1-5 scale) applied as multiplier to team score

Peer Evaluation Form:
Rate each team member (including yourself) on a scale of 1-5:
1 = Did not contribute; missed meetings; work was unreliable
2 = Contributed minimally; attended meetings but little initiative
3 = Solid contributor; did assigned work reliably
4 = Strong contributor; went beyond assigned tasks; helped others
5 = Exceptional contributor; led key initiatives; indispensable to team success

Rubric C2: ERPsim Final Exam (Individual, 15%)
The ERPsim Final Exam is a 90-minute proctored exam administered through HEC Montréal's certification program. It consists of:

Section	Weight	Description
Transaction Execution	40%	Students execute specific SAP transactions (ME21N, CO01, VA01) and must achieve correct outcomes
Data Extraction	30%	Students run standard reports and extract specified data elements
Process Knowledge	30%	Multiple-choice questions on integrated business processes (Order-to-Cash, Procure-to-Pay)

Passing threshold: 70% required for ERPsim Certification

Rubric C3: Reflection Papers (2 @ 2.5% each, 5% total)

Criterion	Excellent (90-100%)	Proficient (80-89%)	Developing (70-79%)	Below Expectations (<70%)	Weight
Critical Evaluation of AI	Deep analysis of AI's strengths, limitations, and biases; specific examples	Good analysis but somewhat general	Superficial critique; accepts AI outputs	No critical evaluation	40%
Human-AI Collaboration	Clear evidence of thoughtful integration of AI with human	Mentions collaboration	Limited discussion of collaboration	No discussion	30%

Criterion	Excellent (90-100%)	Proficient (80-89%)	Developing (70-79%)	Below Expectations (<70%)	Weight
	judgment; discusses specific decision points	but lacks specificity			
Learning Insights	Demonstrates metacognitive awareness of how AI skills developed; identifies future growth areas	Some reflection on learning	Minimal reflection	No reflection	30%

Rubric C4: Strategy Presentation (Team, 10%)

Criterion	Excellent (90-100%)	Proficient (80-89%)	Developing (70-79%)	Below Expectations (<70%)	Weigh t
Strategic Recommendations	Clear, data-driven, feasible recommendations with specific implementation steps	Good recommendations but some gaps in feasibility	Vague or generic recommendations	No clear recommendations	30%
Evidence of AI-Augmented Analysis	Compelling demonstration of how AI insights informed strategy; clear workflow shown	Some evidence of AI use but not fully integrated	Mentions AI but no clear link to strategy	No evidence of AI use	30%
Presentation Quality	Professional, engaging, well-organized; all team members contribute effectively	Good presentation but minor issues	Disorganized or uneven team participation	Poor presentation quality	20%
Q&A Response	Handles questions confidently; demonstrates deep understanding of analysis	Answers most questions adequately	Struggles with questions	Cannot answer questions	20%

Appendix D. AI Prompt Library

Introduction to Prompt Engineering for Business Analytics
Effective prompting follows the **CRAFT** framework:

- **C**ontext: Provide business background (company, industry, constraints)
- **R**ole: Assign the AI a specific role (analyst, consultant, CFO)
- **A**ction: Specify the analytical task clearly
- **F**ormat: Request specific output format (table, bullet points, narrative)
- **T**arget: Define success criteria or constraints

D1: Descriptive Analytics Prompts

Level	Example Prompt	Why It Works
Basic	"Show me our sales data."	Too vague; yields generic output
Good	"Analyze our sales transaction data from ERPsim Rounds 1-3. Create a time-series plot of daily sales volume for each product category (Standard, Mountain, Racing). Include a table showing total revenue by product and region. Use SAP Analytics Cloud."	Specific about data source, visualizations, and tool
Advanced	"Act as a business analyst consultant. Using our ERPsim sales data from Rounds 1-3 (attached Excel file), create a comprehensive descriptive analytics dashboard in SAP Analytics Cloud that includes: (1) time-series sales trends with 7-day moving average, (2) revenue contribution by product with Pareto analysis, (3) geographic sales distribution, and (4) month-over-month growth rates. Format as a professional dashboard with executive summary annotations."	Assigns role, specifies multiple outputs, requests professional formatting

Prompt Library - Descriptive:

1. "Generate a profit margin trend analysis for our bicycle company using SAP transaction data. Show gross margin and net margin by product line over time. Highlight any significant deviations and possible explanations."
2. "Create an inventory turnover dashboard for our raw materials and finished goods. Flag any items approaching stock-out or showing excessive holding costs."
3. "Visualize our cash flow position over the simulation periods. Show operating, investing, and financing cash flows separately. Identify any concerning trends."
4. "Compare our pricing strategy against competitors using market data. Show price elasticity trends by product category."
5. "Generate a balanced scorecard view of our company performance including financial, customer, internal process, and learning/growth metrics from our SAP data."

D2: Diagnostic Analytics Prompts

Level	Example Prompt	Why It Works
Basic	"Why did our profits go down?"	Vague; no specific time period or context
Good	"We experienced a stock-out for Racing bicycles in Week 4. Using our sales (VA01), inventory, and production (CO01) data from	Specific problem, data sources, and requested output

Level	Example Prompt	Why It Works
	Rounds 1-4, identify the most probable root cause and provide supporting evidence."	
Advanced	"Act as a supply chain forensic analyst. Our company experienced a stock-out of Racing bicycles in Week 4 that cost us approximately $15,000 in lost revenue. Using our integrated SAP data from Rounds 1-4 (sales VA01, production CO01, purchasing ME21N), perform a root cause analysis following the '5 Whys' methodology. For each 'why,' provide specific transaction evidence. Conclude with a fishbone diagram showing causal factors."	Assigns role, specifies methodology, requests specific output format

Prompt Library - Diagnostic:

1. "Our profit margin declined from 22% in Round 2 to 15% in Round 3. Analyze changes in cost structure (COGS, operating expenses) and revenue mix to diagnose the primary cause. Provide evidence from SAP financial reports."
2. "Production delays occurred in Week 5. Analyze production order data (CO01) to identify bottlenecks. Correlate with raw material receipt dates from purchasing (ME21N) to determine if supplier issues contributed."
3. "Market share dropped in the Mountain bike segment. Compare our pricing, marketing spend, and product availability against competitors. Identify the most likely cause of market share loss."
4. "Cash flow turned negative in Round 4 despite positive net income. Perform a working capital analysis examining receivables, inventory, and payables cycles. Identify which component drove the cash flow decline."
5. "Customer orders spiked in Week 6 but we could not fulfill 30% of them. Analyze the relationship between demand forecasting errors, production planning, and inventory availability."

D3: Predictive Analytics Prompts

Level	Example Prompt	Why It Works
Basic	"Predict next round's sales."	Too vague; no methodology specified
Good	"Using our sales data from Rounds 1-6, build a time-series forecast for demand for each product in Round 7. Use RapidMiner's exponential smoothing model. Highlight key assumptions and provide confidence intervals."	Specific tool, method, and outputs requested
Advanced	"Act as a demand forecasting specialist. Using our historical sales data from Rounds 1-6, develop three predictive models in RapidMiner: (1) exponential smoothing, (2) ARIMA, and (3) linear regression with seasonality. Compare model performance using MAPE and RMSE. Recommend the best model for Round 7 forecasting and explain why. Provide point forecasts with 80% and 95% confidence intervals for each product. Also identify leading indicators from our operational data that might improve forecast accuracy in future rounds."	Multiple models, comparison metrics, confidence intervals, and improvement suggestions

Prompt Library - Predictive:

1. "Build a predictive model in SAP Analytics Cloud to forecast demand for each bicycle type in Round 7. Use at least three exogenous variables (price, marketing spend, competitor pricing). Show the relative importance of each predictor."
2. "Using historical data, predict our likely cash position at the end of Round 7 under three scenarios: (1) optimistic (sales +20%), (2) most likely, and (3) pessimistic (sales -20%). Show probability distributions."
3. "Forecast supplier lead times for raw materials based on historical purchase order data. Identify which suppliers pose the highest delivery risk in upcoming rounds."
4. "Predict customer price sensitivity by segment using historical sales and pricing data. Recommend optimal price points for Round 7 to maximize revenue."
5. "Build a churn prediction model for our customer base. Identify which customers are most likely to reduce orders in Round 7 and suggest retention strategies."

D4: Prescriptive Analytics Prompts

Level	Example Prompt	Why It Works
Basic	"What should we do next round?"	Too vague; no constraints considered
Good	"Based on the demand forecast from RapidMiner and our current cash flow from SAP FI, recommend optimal production quantities and raw material order quantities for Round 7 to maximize profit while minimizing stock-outs. Consider our capacity (800 hours), storage limits, and supplier lead times."	Specific inputs, objective, and constraints
Advanced	"Act as a strategic optimization consultant. Synthesize insights from our descriptive, diagnostic, and predictive analyses to recommend an integrated Round 7 strategy. Using Microsoft Copilot in Excel, develop a constrained optimization model that simultaneously optimizes: (1) production quantities by product, (2) raw material orders by supplier, (3) pricing by product, and (4) marketing spend allocation. Constraints include production capacity (800 hours), storage capacity (500 units), cash on hand ($150,000), and supplier lead times (1-2 periods). Provide three alternative scenarios (conservative, aggressive, balanced) with projected P&L for each. Recommend which scenario we should implement and why."	Comprehensive integration, multiple decision variables, explicit constraints, scenario analysis, and clear recommendation

Prompt Library - Prescriptive:

1. "Recommend optimal pricing for each bicycle type in Round 7 given our demand forecasts, competitor pricing intelligence, and inventory positions. Show expected revenue and profit impact."
2. "Develop a raw material procurement plan that minimizes stock-out risk while staying within our cash flow constraints. Consider varying lead times by supplier."
3. "Prescribe a marketing spend allocation across products and regions to maximize market share growth given our budget constraints."
4. "Recommend a capacity expansion strategy if we continue to experience production bottlenecks. Show ROI analysis for adding 100, 200, or 300 production hours."

5. "Develop a contingency plan for supplier disruption. Which suppliers should we dual-source? What safety stock levels would protect us?"

D5: Validation Prompts

Purpose	Example Prompt
Fact-checking	"Verify the sales totals in your analysis against the SAP standard report S_ALR_87012296. Do your numbers match exactly? If not, explain discrepancies."
Assumption checking	"List all assumptions you made in your forecast. For each assumption, rate your confidence level (high/medium/low) and suggest how we could validate it."
Bias detection	"Review your recommendations for potential biases. Are you over-weighting recent data? Under-weighting supply chain risks? Identify three ways your analysis might be biased."
Sensitivity analysis	"Test how sensitive your recommendations are to changes in key assumptions. If demand is 10% lower than forecast, does your recommendation still hold? What about 10% higher?"
Alternative explanations	"Before finalizing this root cause analysis, generate three alternative explanations for the profit decline that are also consistent with the data. For each alternative, suggest what additional data would confirm or refute it."

Appendix E: SAP Cheat Sheet & ERPSIM Job Aid

E1: ME21N - Create Purchase Order
Purpose: Order raw materials from suppliers based on production forecasts
Prerequisites:

- Material numbers for raw materials (e.g., 100-101 for wheels, 100-102 for frames)
- Vendor numbers (assigned by instructor)
- Planned delivery dates based on lead times

E2: CO01 - Create Production Order
Purpose: Authorize production of finished goods (bicycles)
Prerequisites:

- Available raw materials inventory
- Available production capacity
- Bill of Materials (BOM) defined for each product

E3: VA01 - Create Sales Order
Purpose: Record customer orders and set pricing
Prerequisites:

- Customer numbers (assigned by instructor)
- Finished goods inventory available
- Pricing strategy determined

E4: S_ALR_87012296 - Profit & Loss Statement
Purpose: Review company financial performance
Key Metrics to Extract:

- Total Revenue
- Cost of Goods Sold
- Gross Profit
- Operating Expenses
- Net Income
- Contribution by Product (if detail view available)


HEC MONTRÉAL
ERP SIMULATION GAME
Manufacturing Game
powered by ERPsim
Manufacturing Advanced Game
User: $_1 to $_9
Initial password: ERPSIM
Adapted for Fiori and for SAP GUI with Fiori Visual Theme Activated
© ERPsim Lab, HEC Montréal
Last Update: Sep 3, 2025
FORECAST SALES
Create Planned Indep. Req. (MD61)
1 Select Product group and enter the following information
Product group: $$-F
2 Continue
3 Enter your forecast quantities in the 2nd date column
4 Save
CALCULATE REQUIREMENTS
MRP Run (MD01)
1 Press Enter or click Execute
2 Ignore orange warnings
Press two more times on Enter
3 In the pop-up window, click Continue
ORDER MATERIALS
Create Purchase Orders (ME59N)
1 Make sure the Fixed Vendor field is empty
2 Execute
! Purchase orders are created
! If no open requisitions: No suitable requisitions found
RELEASE PRODUCTION
Convert Planned Orders (CO41)
1 Run Selection
! If no planned order: Planned order could not be selected
2 Select orders
3 Convert
! If conversion fails, click on ✕ to see log
PLAN MARKETING BUDGET
Marketing Expense Planning (ZADS)
1 Enter your daily amount of marketing expenditure for each product per area
2 Save
MAINTAIN PRICES
Change Price List (VK32)
1 Open the Prices folder and double click on Price list
2 In Distribution channel, enter 10, 12 or 14
3 Execute
4 Modify your prices
5 Save
FINANCIAL STATEMENTS
Financial Statements (F.01)
1 In Company Code, enter your <company code>*
2 GUI step Select ALV Tree Control
FIORI step In Statement Version, enter SIM1
3 GUI step Execute
FIORI step Go
STOCK LEVELS
Inventory Report (ZMB52)
Shows stock levels for both finished products and raw materials
Shows quantities of raw materials reserved for production
CASH FLOW
Liquidity Planning (ZFF7B)
Displays an estimate of your cashflow for the coming weeks
PROCUREMENT TRACKING
Purchase Order Tracking (ZME2N)
Shows the details and the status of each purchase order
Shows the dates of expected goods delivery
Procurement Sourcing (ZME13)
Shows the price of each raw material sold by vendors
PRODUCTION SCHEDULE
Production Report (ZCOOIS)
Shows released production orders
For each order, the time released, started and finished (or to start and finish if incomplete)
If Target Qty > Conf. Qty production is still pending
PRODUCTION COST
Product Cost Planning (ZCK11)
Shows variable and fixed costs for each finished product
Recalculates costs based on production capacity and productivity level
Shows daily amounts of fixed costs (overhead, depreciation and S, G & A)
SALES AND MARKET DATA
Summary Sales Report (ZVC2)
Shows aggregate daily sales by product
Detailed Sales Report (ZVA05)
Shows sales related info such as sales revenue by region
Price Market Report (ZMARKET)
Shows aggregate market sales data of past 5 days
CHANGE PRODUCT DESIGN
Validated BOM Change (ZCS02)
1 Select the material to change by clicking on Edit BOM
2 Change quantities and Save
! If received error messages, click on Continue to modify the entries
INCREASE CAPACITY
G/L Account Posting (ZFB50)
1 Under Standard Investments, in Capacity Improvement line:
2 Enter the Posting Amount
3 Click on Purchase
4 Click on Post
SETUP TIME REDUCTION
G/L Account Posting (ZFB50)
1 Under Standard Investments, in Setup Time Reduction line:
2 Enter the Posting Amount
3 Click on Purchase
4 Click on Post
LOAN REPAYMENT
G/L Account Posting (ZFB50)
1 Under Standard Investments, in Loan Repayment line:
2 Enter the Posting Amount
3 Click on Repay
4 Click on Post
PLAN STOCK TRANSFER
Stock Transfer (ZMB1B)
1 Select between a Push or Pull Planning Mode
2 In Scheduling, enter your delivery frequency
3 Enter the amount of each product you wish to send/ maintain in each region
4 Save
*To find your company code, refer to transaction ZORG (Organizational Structure)
Planning
Procurement
Production
Sales
Reports
Accounting
Logistics
1/2



HEC MONTRÉAL ERP SIMULATION GAME
Manufacturing Game
powered by ERPsim

Manufacturing Advanced Game

User: $_1 to $_9
Initial password: ERPSIM

Adapted for Fiori and for SAP GUI with Fiori Visual Theme Activated

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Last Update: Sep 3, 2025

Nut	
$$-F01 $$-F11	500g 1kg

20% wheat*
30% oat*
20% nut*
1 box / 1 bag*

*minimum

Blueberry	
$$-F02 $$-F12	500g 1kg

20% wheat*
30% oat*
20% blueberry*
1 box / 1 bag*

*minimum

Strawberry	
$$-F03 $$-F13	500g 1kg

20% wheat*
30% oat*
20% strawberry*
1 box / 1 bag*

*minimum

Raisin	
$$-F04 $$-F14	500g 1kg

20% wheat*
30% oat*
20% raisins*
1 box / 1 bag*

*minimum

Original	
$$-F05 $$-F15	500g 1kg

20% wheat*
30% oat*
1 box / 1 bag*

*minimum

Mixed	
$$-F06 $$-F16	500g 1kg

20% wheat*
30% oat*
30% fruits & nuts**
1 box / 1 bag*

*minimum
**At least some of all fruits/nut

CUSTOMERS

DC 10: Hypermarkets
Payment Time: 20 days
Approximate Market Size
€90 000 per team per week

DC 12: Grocery Chains
Payment Time: 10-20 days
Approximate Market Size
€360 000 per team per week

DC 14: Independent Grocers
Payment Time: 1-20 days
Approximate Market Size
€135 000 per team per week

SUPPLIERS (V01, V02)

Lead time (days)	1-5
Payment time (days)	20

TRANSPORTATION COSTS

Main Warehouse to Regional Storage Location	€1 000

STORAGE CAPACITY AND COSTS

Product type	Current space	Cost per additional 50 000 units*
Finished products (Main warehouse)	250 000 boxes	€500/day
Finished products (Regional locations)	No space	€500/day
Raw materials	250 000 kg	€1 000/day
Packaging (bags and boxes)	750 000 units	€100/day

FIXED COSTS (€ paid each 5 days)*

Labor	20 000
Manufacturing overhead	15 000
S, G & A	40 000
Depreciation (Building)	1 250
Depreciation (Equipment)	50 000**

*Billed automatically

PRODUCTION CAPACITY

Capacity (units/day)	24 000
Additional Capacity Cost (€ per 1 000 units)	1 000 000**
Minimum/Maximum Lot Size	16 000/48 000

**Investing in additional capacity will increase equipment depreciation costs

SETUP TIME

Setup time (hours)	Expense (€)
8	-
7	50 000
6	125 000
5	250 000
4	500 000
3	1 250 000

2/2

Appendix F. AI Output Validation Workshop Materials

F1: Workshop Overview
Week 9 - AI Output Validation Workshop (75 minutes)
Learning Objectives:

- Understand why AI validation is critical in business contexts
- Apply a systematic framework for evaluating AI-generated insights
- Identify common AI biases and limitations
- Practice validating AI outputs using real ERPsim data

Agenda:

Time	Activity
0:00-0:10	Introduction: Why AI validation matters (case study of AI failure in business)
0:10-0:25	The VALID Framework (5-step validation process)
0:25-0:45	Small Group Practice: Validate sample AI outputs
0:45-1:05	Full Class Debrief: Groups share findings
1:05-1:15	Individual Application: Apply framework to your own AI portfolio draft

F2: The VALID Framework Handout
VALID: A 5-Step Framework for AI Output Validation

Step	Question	Actions
Verify	Can I trace this back to source data?	✓ Cross-reference AI claims with SAP transaction data ✓ Check if referenced transactions exist ✓ Verify numbers against standard reports
Assess assumptions	What did the AI assume?	✓ List all assumptions in the AI's reasoning ✓ Rate your confidence in each assumption ✓ Identify missing context the AI didn't consider
Look for bias	Is the AI showing systematic errors?	✓ Check for recency bias (over-weighting recent data) ✓ Look for confirmation bias (ignoring contradictory evidence) ✓ Consider what perspectives might be missing
Identify limitations	What can't this AI do well?	✓ Acknowledge domain-specific knowledge gaps ✓ Note where probabilistic vs. deterministic reasoning matters ✓ Consider data quality issues

Step	Question	Actions
Decide	What do I do with this?	✓ Accept with confidence ✓ Accept with modifications ✓ Reject and seek alternative analysis ✓ Gather more data and retry

F3: Practice Scenarios

Scenario 1: Stock-Out Analysis

AI Output:

"The stock-out of Racing bicycles in Week 4 was caused by insufficient production planning. Your team only produced 150 Racing bikes in Weeks 2-3, while average weekly demand was 75 units. You should have produced at least 225 units to cover three weeks of demand plus safety stock."

Your Task: Validate this analysis

VALID Step	Your Findings
Verify	Check SAP VA01 sales data: Was average demand really 75? Check CO01 production data: Was production really only 150?
Assumptions	What assumptions does this analysis make about lead times, capacity, etc.?
Look for bias	Is the AI ignoring supply-side constraints? Did raw material availability affect production?
Identify limitations	What context might the AI be missing?
Decide	Accept? Modify? Reject?

Scenario 2: Pricing Recommendation

AI Output:

"To maximize profit in Round 5, increase the price of Mountain bikes by 15%. Demand for Mountain bikes is relatively inelastic based on historical data, and competitors have not changed their pricing in this segment."

Your Task: Validate this recommendation

VALID Step	Your Findings
Verify	Check pricing history: Is demand actually inelastic? Run a simple correlation.
Assumptions	What does this assume about competitor reactions? About customer price sensitivity?
Look for bias	Is the AI over-optimistic about your ability to raise prices without losing market share?
Identify limitations	Does the AI understand your inventory position? Cash flow needs?
Decide	Accept? Modify? Reject?

Scenario 3: Forecast Validation

AI Output:

"Based on time-series analysis, demand for Standard bicycles in Round 7 will be 92 units (confidence interval: 85-99 units)."

Your Task: Validate this forecast

VALID Step	Your Actions
Verify	Check the historical data used. Are there any anomalies (promotions, stock-outs) that distort the pattern?
Assumptions	What seasonality or trend assumptions did the model use?
Look for bias	Does the model under-weight recent demand spikes? Over-weight them?
Identify limitations	What external factors (competitor actions, market changes) aren't in the model?
Decide	Use as-is? Adjust? Reject?

Appendix G: Technical Setup Guide

H1: SAP S/4HANA Access Setup

Step 1: Install SAP GUI

1. Go to [university-provided SAP portal]
2. Download SAP GUI for your operating system (Windows/Mac)
3. Run installer with default settings
4. Launch SAP GUI after installation

Step 2: Configure Connection

1. In SAP GUI, click "New Connection"
2. Enter:
    - **Connection Name:** [University] SAP S/4HANA
    - **Application Server:** [server address provided]
    - **Instance Number:** [provided]
    - **System ID:** [provided]
3. Click "Finish"

Step 3: Login

1. Double-click your new connection
2. Enter:
    - **Client:** [assigned client number]
    - **User ID:** [your student ID]
    - **Password:** [temporary password provided]
3. Change password on first login
4. You are now connected!

H2: ERPsim Game Setup

Step 1: Access ERPsim Portal

1. Go to https://erpsim.hec.ca
2. Click "Login" (use university credentials if integrated)
3. Navigate to "My Games"

Step 2: Join Your Team's Game

1. Your instructor will provide a **Game ID** and **Team Password**
2. Click "Join Game"
3. Enter Game ID and Team Password
4. Select your team name from dropdown
5. Confirm join

Step 3: Game Interface

The ERPsim interface runs within SAP GUI. Key elements:

- **Decision Panel:** Where you enter transactions
- **Dashboard:** Real-time performance metrics
- **Messages:** System notifications and competitor actions
- **Round Timer:** Shows time remaining in current round

H3: AI Tool Access Instructions

ChatGPT Enterprise

1. Go to chat.openai.com
2. Click "Log in with [University] account"
3. Use your university credentials
4. You now have access to:
    - GPT-4 with higher rate limits

- Longer context windows
- Data privacy (your conversations not used for training)

Microsoft Copilot

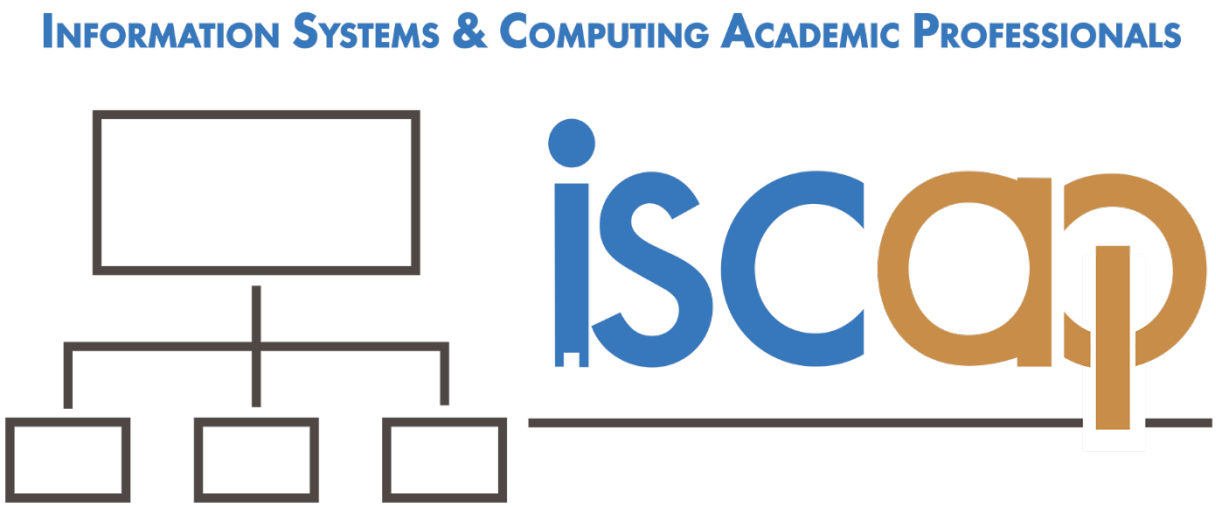
1. Open Microsoft 365 apps (Word, Excel, PowerPoint)
2. Look for Copilot icon in ribbon (top right)
3. Click to open Copilot pane
4. Sign in with university credentials if prompted

SAP Analytics Cloud

1. Access via SAP Fiori launchpad
2. Click "Analytics Cloud" tile
3. Navigate to "Stories" for pre-built dashboards
4. Use "Create Story" to build custom visualizations

RapidMiner

1. Go to rapidminer.com/academic
2. Register with university email
3. Download RapidMiner Studio (academic license)
4. Install and activate with license key emailed to you



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