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Designing and Integrating an Introductory Information Systems Course Into Business Core Curriculum: Case Roadmap and Lessons

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ABSTRACT

An Introductory Information System (IIS) course is an opportunity for Information System (IS) programs to clarify business students' understandings of IS disciplines and help them prepare for careers requiring IS skills. The course is also essential to attract students into the IS major and mitigate declines in IS enrollment. This paper provides a roadmap and description of implementing an IIS course as part of the business core curriculum at a public university in the Midwestern United States. The roadmap is rooted in both generalizable and institution-specific contexts and includes the identification of key stakeholders, institutional challenges, and nine course design principles. The core principles are outlined and recognized as the foundation of the success of the course. Following course implementation, we present the evaluation of the success of our roadmap and reflect on lessons learned in the process.

Keywords: Information systems education, Introductory course, Curriculum design & development, IS curriculum

1. INTRODUCTION

There is commonly a gap between the number of students pursuing Information Systems (IS) degrees and the growing number of available and unfilled jobs requiring an IS academic background and skills. IS degree programs are not thriving; the percentage of IS programs at Association to Advance Collegiate Schools of Business (AACSB) schools continues to decline while the demand for IS skills continues to increase (Bohler et al., 2020). Suggestions were made that this paradox may exist due to students' lack of information about the IS profession and the typical career opportunities available to IS professionals (Akbulut et al., 2008; Firth et al., 2008; Lomerson & Pollacia, 2006). However, the current paradox can also be explained through the cyclical nature of the demand for IS degrees. Additionally, it may be attributed to the fact that some universities do not experience the decline reported by their AACSB peers but instead grow. The Introductory IS (IIS) course represents an excellent opportunity to clarify students' critical understandings about IS as a discipline and make known the breadth of available career choices. Research has shown that, if the content, pedagogical approach, instructors, and technologies used in IIS courses are selected correctly, these

courses might positively influence how students view the IS field (Akbulut et al., 2008; Akbulut-Bailey, 2012; Dick et al., 2007). Therefore, a closer look at the initial experience with IS through IIS courses is needed.

In this research, we provide our roadmap for an IIS course implementation as part of the business core curriculum at a public university in the Midwestern United States (U.S.). In the process, we acknowledge that academic courses are not implemented in a vacuum but within the context of the broader IS discipline. Further, course designs and implementations face challenges unique to each academic institution. Institutions facing similar challenges will be interested in our responses to these barriers and the initial outcomes of those responses. In contrast, those facing different challenges will be interested in the processes of creation and redesign of the IIS course. Acknowledging these challenges and using the input from identified stakeholders, we describe nine design principles used to implement the course and their direct impact on course design.

Our research goal is to answer the following question: How do we design and implement an IIS course, as part of a business core curriculum, that effectively deals with both generalizable and institution-specific challenges? By answering this question,

we offer several contributions. First, we provide a roadmap for institutions struggling with similar pressures. Second, we provide a detailed description of the IIS course design. Third, we provide empirical evidence of the outcomes of the roadmap and the resulting course implementation.

Our findings included both anticipated and unanticipated topics of investigation and corresponding outcomes. The first part of this paper describes the course setup and implementation process, while the latter presents outcomes and draws conclusions. Some items of particular note from the latter part include: (1) the impact of dynamics concerning the political challenges of changing a business college core, (2) strong stakeholder support for nine design principles that may be applied to technology-related curriculum development, (3) the continuing challenge of identity for IS curriculum/programs, which is further complicated when a Computer Science (CS) program is housed in the same college, (4) focusing on student performance led to important considerations of information overload, objective to task relationship, and scrutinizing current/new technology, and (5) students' perceptions of the value of IS are both important and in good standing, in spite of general confusion around its definition.

2. IIS COURSE LITERATURE

Most business schools' IS programs offer at least one required IIS course for all business majors. In such a course, it is typical that IS concepts are discussed and training is provided on how to use basic computer applications. Often, this class is a student's first formal exposure to IS topics. As these introductory courses are essential for recruiting new students to IS, it is critical that IS programs carefully choose the course instructor(s), teaching approach, and content (George et al., 2005).

Extant research suggests there are several hurdles facing those designing and delivering IIS courses. First, students often lack interest in the IS discipline due to the negative image of IS professionals (Dick et al., 2007; Firth et al., 2008; Joshi & Kuhn, 2011; Lomerson & Pollacia, 2006; Zhang, 2007). Second, the curriculum may be perceived as too difficult and technical (Li et al., 2014), and students feel they would not enjoy the work. Others note that IS jobs might likely be moving offshore; thus, students may perceive IS positions as less available (Ferguson, 2004; Maloni et al., 2019). There is an opportunity for a well-designed introductory course to alleviate some of those concerns by providing general information about the IS field and the nature of IS careers (Akbulut, 2015). Further, it is important to better understand students' initial experiences with IS through IIS courses (Dyer et al., 2004). The IS academic community examined these experiences, which led to recognizing the value of teaching approaches, the impact of the gender gap, and the role of IIS in the business core curriculum.

2.1 Teaching Approaches in IIS

A robust literature evaluated the role of teaching approaches in IIS courses (Mykytyn et al., 2008; Pridmore et al., 2010). This literature suggested a clear need to move away from the traditional classroom lecture-based approach for IIS courses and to instead explore other approaches to learning that create high-level interest in the IS field (Mukherjee, 2005). For example, the University of Minnesota introduced a 12-step IIS

teaching program that tripled enrollment in 300-level database courses. Some of the identified steps included assigning the most effective teachers, exposing the students to innovative new technologies, exposing students to career and internship opportunities, and focusing on local strengths (Firth et al., 2008). This 12-step program was also implemented to address the "MS Excel lecture boredom" problem and to encourage students to take additional IS courses (Whelan & Firth, 2012). Another study increased students' interest in IS by focusing on relevant technologies and hands-on labs, and concluded that interest in IS will lead to a choice of IS as a major (Akbulut et al., 2008). Others found that, by providing students with a relaxed environment in IS classes, students may master more difficult material (Bakke et al., 2007). Additionally, students who do not feel confident in their computer skills could overcome that barrier by working with the professor on computer-based, in-class exercises (Ballou & Huguenard, 2008).

There is a consensus that active, hands-on learning is particularly effective in teaching IIS and related computer literacy courses (Mykytyn et al., 2008; Pridmore et al., 2010). A study evaluated an introductory undergraduate computer literacy course and found that in-class exercises and hands-on activities were most helpful to students (Dunsworth & Igoe, 2004). A study using Ausubel's Assimilation Learning Theory recommends tailoring three approaches to teaching a Decision Support Systems module in an IS course. These approaches include a lecture format, an activity-based format with active learning, and a case study-based format, showing considerable improvements in technology's long-term, meaningful use (Drake, 2012). Active learning has been further explored to identify which active learning exercises have been successfully used in IIS courses (Mitchell et al., 2017). Others noted that an effective way to teach IIS is to allow students to relate concepts to their personal experiences through an active, hands-on approach (Stockdale & Stoney, 2007).

2.2 Gender Gap and IIS

Since the year 2000, which coincided with the burst of the dot com bubble, women have constituted a higher percentage of persons 25 to 29 years old attaining bachelor's degrees or higher (NCES, 2017). While other business disciplines were able to capitalize on the increase in female student enrollment, IS enrollment continued to suffer, partly due to our discipline's inability to attract and retain female students. The well-known gender gap issue in IT (Information Technology) professions has been thoroughly documented (Ahuja, 2002) and is beyond the scope of the present research; however, the unresolved gap strongly impacts enrollment in the IS major. A study in Australia found that nearly half of first-year IS students are women, yet only 10% of women graduate with a degree in an IS discipline (Stockdale & Stoney, 2007). Our internal data found that only 10% of enrolled IS students were women. More recently, a national U.S. survey painted a different picture, suggesting that women constituted 38% in 2019 (Mandviwalla et al., 2019) and 47% in 2022 (Mandviwalla et al., 2022) IS baccalaureate degree graduates, clearly suggesting some regional and university differences. Similarly, it is worth noting that representation of women in IS bachelor's programs is still significantly higher than in other STEM fields, such as computer science.

To combat the low enrollment of women in the IS major, research has attempted to uncover factors contributing to this gap. A study in New Zealand discovered that female students failed to find a connection between the course content and their understanding of the workplace (Stockdale & Stoney, 2007). Other studies found that SAT scores predicted performance in IIS courses for male students but not female students. Furthermore, female students saw an increase in performance associated with motivation and GPA but, in all students, motivation predicts IS course performance the most (Kruck & Lending, 2003).

2.3 IS in Business Core Curriculum

The IIS course plays an important role in a business school's curriculum (Schell, 2019). IIS courses have been discussed through the lens of a core business class, as IIS courses provide an appropriate level of computer literacy that all business students are likely to encounter in business environments (Karsten & Roth, 1998). The early literature suggests that IIS courses must be integrated with the college of business core curriculum and remain this way over time (Gordon & Chimi, 1998). Reinforcing the idea of hands-on activities and the involvement of IS in the business core curriculum, researchers restructured an introductory IS course to allow students to apply learned concepts in specific hands-on projects and understand the experience of working as a business analyst (Frost & Pike, 2004). Another study suggests that an introductory course is necessary for incoming business students because they may lack the necessary computer knowledge and skills to obtain their undergraduate business degree (Wallace & Clariana, 2005). Approaches have been explored to frame an IIS course about e-commerce within a business information systems class and to address the need for business core students to understand the software development lifecycle (SDLC) as a critical part of how a business functions (Grenci, 2005). Others presented an IIS course by focusing on enhancing students' understanding of the entirety of business operations and their interdependencies (Hershey, 2003).

3. CASE STUDY: DESIGNING AN IIS COURSE

The following narrative reflects the process of designing and implementing a customized IIS course as part of the business core curriculum.

The focus of this design process was primarily from the perspective of an IS department in a business college. However, an important contextual detail is that this study included considerations/implications for the university's computer science program, also housed in the business college. The colocation of the programs meant that resources could be leveraged for either discipline where there was overlap. The IS faculty were responsible for several of the foundational courses which were requirements for CS majors, including database concepts, data communications, and systems analysis and design. IS students were required to take at least one programming course and might take several depending on their focus, courses which were primarily taught by CS faculty. Both majors had directed elective options which could be housed in either program.

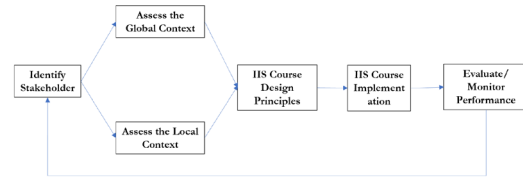


Figure 1. IIS Course Design and Implementation Process

The process started with identifying and involving key stakeholders to assist in assessing global and local (i.e., community, university, and departmental) challenges and needs. The resulting data were used to inform guiding design principles for the new IIS course. The principles drove specific course design implementation elements and an evaluation process to determine whether the course aligned with the original intentions (see Figure 1).

3.1 Identifying Stakeholders

IIS course development was approached from four different stakeholder perspectives. The first considered the job market and industry needs of all business graduates. The second considered the students' perceptions of IS topic areas they felt were important to their education and a "hands-on" approach to matching the skill level of the general student population. The third considered whether there were needs of faculty members in other disciplines using IS tools, concepts, and techniques. The final perspective came from IS faculty, considering their expertise, experiences, research, and departmental constraints. Interviews, questionnaires, observations, and literature were used to capture stakeholder perspectives.

Data from faculty and industry stakeholder groups were gathered primarily through conversations at pivotal meetings. Faculty meetings were held at regular intervals throughout the academic year as a part of business college operations. Where possible, these meetings were leveraged for purposes of the IS course design. Industry was consulted at the business college board of advisors' meetings and IT Alliance (directors and high-level managers of IT) meetings, each of which happened once a semester. At all these meetings, updates were given as to the progression of the new course development. Additionally, faculty and industry stakeholders were asked for feedback and critiques.

Faculty meeting feedback centered on what technologies were used in the business college disciplines and how best to align an introductory course with each discipline's needs. Further discussions also incorporated a strategic evaluation of the technology introduced in the IS course and how it might be reinforced within specific disciplines.

Industry feedback was done in a similar fashion but with a slightly different focus. Here we were concerned with which technologies were predominantly used in the industry segments that might hire our graduates. Further discussion was had about what skill sets were expected with such tools from fresh undergraduates. Meeting attendees were asked to take copies of a survey with them in case other members of their organization that were not able to attend might have additional feedback regarding the course development. Responses from those surveys were few and incomplete.

Regarding the student stakeholder perspective, a student sample was obtained through visits to non-IS business core curriculum classes with guided open discussion forums. A standardized set of questions was given to interviewees and responses were gathered in the group setting. This was supplemented with questionnaires given to members of student organizations active in the business college.

3.2 IIS Course Design Guiding Principles and Implementation

Informed by the literature, our stakeholder input, and our department resource constraints, IS faculty agreed on nine principles to guide our IIS course redesign: (1) Simplify and reduce information overload, (2) Modular approach and relevant topics, (3) Local program focus, (4) Hands-on technology use, (5) Clear connection of objectives and outcomes, (6) Introduction of new and relevant technology, (7) Common experience, (8) Buy-in from other business faculty, and (9) Ensure alignment with IS curriculum.

3.2.1 Simplify and Reduce Information Overload. An essential aim of the course design was to minimize content overlap and reduce student information overload. Data gathered from student interviews and surveys suggested that there was too much information to absorb in the current IS-focused curriculum and not much reinforcement in subsequent coursework. Further, there were some students whose introductory IS experience included large amounts of in-depth study in specific technical areas that were simply overwhelming. There were three courses which each covered some portion of an introduction to IS, with significant overlap amongst them (CIS111 – Introduction to IS, CIS261 – Advanced Microcomputer Applications, CIS305 – Management Information Systems). All business majors required CIS261, and some required the other two courses. One key challenge in developing a new IIS course would be to minimize or eliminate any overlap. Limited departmental resources meant there was a clear advantage to be gained if the elimination of overlap would coincide with the reduction of courses needed to deliver the appropriate content.

Questionnaire and interview data were scrutinized to focus on core concepts, tools, and objectives. An analysis of content from the three existing courses was conducted to define groupings of content, eliminate overlap, and identify unique subject areas. Ultimately, a decision was made to collapse all three courses into a single new course design. This new course, CIS201 – Business Information Systems, became the single IS course in the business core curriculum.

3.2.2 Modular Approach and Relevant Topics. To maintain flexibility in the new course, it was decided that a modular approach to content delivery would be ideal. These modules could be exchanged for others as key stakeholder needs (e.g., marketplace, IS standards, IS major changes) changed. Our literature review supported the ideas of currency and relevancy being important to ensuring a positive perception of the IS discipline. Table 1 shows the resultant topic areas from analysis of stakeholder feedback, existing course content analysis, IS standards, and other desired course design outcomes. Core topics were created at a level that could be well accepted as introductory material in IS but also serve as a basis for further

reinforcement in subsequent IS or non-IS business college coursework.

The modular approach allows for ease of changes to the curriculum. To this end, the faculty involved with development, execution, and maintenance met regularly to collect and discuss feedback from students, industry, and other faculty. The students were given surveys at the start and end of each semester, and those surveys were evaluated to determine the course's effectiveness and relevance (see section 4 for details).

Module 3 in the curriculum, Excel, was a controversial topic. In its most generic sense, the module covers productivity tools. A high-level treatment of various productivity tools is given as an introduction. Content then focuses specifically on the use of spreadsheets as productivity tools. Whereas the prior IS courses spent entire semesters or more covering this topic area, now only a single three-week module would take its place. There was much discussion and analysis on this portion of the course. It was ultimately decided that, while an essential tool for business students, spreadsheet fundamentals could be well covered in a short period. Tools and resources such as tutorials and reference libraries would be given to the students, which they could draw from as needed. For example, where spreadsheets would be used as tools in another discipline (e.g., finance, accounting, management), they would build on the fundamentals developed in the introductory IS course. This would be critical to long-term retention.

A critical part of this modular approach would be the content and course material itself. Due to our content's custom nature, no existing textbook covered only the topics we wanted to cover at the desired level of detail. The solution was the creation of a custom textbook through cooperation with a reputable publisher. The book was evaluated in the same regular meetings to determine whether the modules continued to be effective, needed editing, or needed replacing.

3.2.3 Local Program Focus. While the design approach described here can be generalized to other institutions, local factors specific to implementation in our geographic region and specific university were essential in this process. For our context, these factors included declining enrollment trends, local business/employer characteristics and IT needs, and IS program identity. For years leading up to this redesign project, enrollments had been shrinking. The design would need to make IS accessible to more students to increase the reach of recruitment efforts. Consequently, the course needed to incorporate both general information about the field and specific information addressing local industry needs. Further, discussions about majors and minors, certificate paths, and career options were incorporated into IIS course design conversations. The stakeholders identified for the study were also a significant element of the local focus principle. While the stakeholders we identified (students, faculty, industry) are generalizable across schools and programs, their mix and attributes are potentially unique. In our case study, the type of industry in the area had a significant impact on discussions of relevance. Additionally, the mix of software programs and faculty familiarity and skills directly impacted how topics would be introduced and reinforced in other non-IS coursework.

Module	Content	Length
Module 1: Introduction to Information Systems	Data vs. Information vs. Knowledge. IS, computer components, Network, Internet, WWW, Extranet, Intranet, e-commerce, e-business, m-commerce, organizational IS systems, IS & Competitive advantage	3 weeks
Module 2: IT Project Management	Project Management, Stakeholders, Project team, PLC, SDLC, Agile, Work Breakdown Structure, Project estimation	2 weeks
Module 3: Excel	Worksheet and Chart creation (fundamentals), Formulas, Functions and Formatting, Large Worksheets, Charting, and What-If Analysis	3 weeks
Module 4: Web and Web Programming	Introduction to WWW technology, Client/Server environment, Web pages and Web sites, Html/CSS/scripting overview	2 weeks
Module 5: IT Security	The need for cybersecurity, CIA and data protection, threats, and threat actors, protection practices, techniques, and tools	2 weeks
Module 6: BI & Analytics	Databases and data mining, big data. Organizational decision-making and IS support, data visualization	2 weeks
Module 7: Enterprise Systems	Defining an ERP. Types of IS that span the enterprise (SCM, CRM), ERP implementation challenges/solutions	2 weeks

Table 1. IIS Course Content

Finally, the issue of identity for the IS program needed to be addressed. The fact that the IS program was housed in a business college alongside a computer science program meant that identity was, and would continue to be, an essential topic of conversation with the students.

Many new students have a reasonably clear definition or understanding of computer science, which they do not have of IS. The breadth and relevance of materials in this course design had to represent, and thus be tied to, advance study opportunities for the IS program.

3.2.4 Hands-On Technology Use. The hands-on use of technology in coursework has been shown to increase understanding and knowledge retention (Mykytyn et al., 2008; Pridmore et al., 2010) and was identified in our literature review as an effective way to teach an IIS course. The design of this course needed to be capable of engaging the students in a way that would maximize understanding and knowledge retention. Following the design principle of hands-on technology use, Table 2 shows the hands-on approach for each module's assignments. The focus was on creating activities at a level that would not be difficult for those with little to no knowledge in the topic area but still challenging enough to be engaging.

As shown in Table 2, the modules include a range of activities, including research/writing assignments, the use of varying software applications, and incorporating business concepts with technology. The assignment tasks and their contexts were chosen to complement activities that occur both within the IS discipline and in other disciplines. For example, we will return to the use of Excel as a primary goal of the course.

This module was designed to give the students a fundamental understanding of the tool, its capabilities, and perhaps most importantly, how to use base skills to perform advanced tasks by following tutorials. Once they have completed the module, students should be capable of performing most tasks, even those not covered in the course. Other non-IS disciplines, e.g., accounting, finance, and marketing, use Excel to support their curriculum. Giving the students exposure to and practice with the fundamentals and providing access to advanced tutorials allowed instructors in non-IS disciplines to leverage capabilities using customized

Excel tutorials without spending valuable course time on content not directly related to their non-IS courses.

Module	Activity Detail
Introduction to Information Systems	Team research assignment identifying the uses of IT for creating or responding to competitive advantage
IT Project Management	Using a project management software tool to create a project schedule based on a given work breakdown structure and possible resource constraints
Excel	Various tutorial-based assignments, three project-based assignments using a spreadsheet software package
Web and Web Programming	The creation of web pages using html and CSS, the creation of a website using a content management tool
IT Security	Team research assignment relevant to current cybersecurity breaches, relating back to introductory cybersecurity concepts
Business Intelligence/Analytics	Using a data visualization software package to create data visualizations to convey meaning
Enterprise Systems	Use of an ERP tool to configure and enter data related to enterprise-wide use of an information system

Table 2. Module Assignment Activities

Each of the other modules was designed with similar strategic intentions. For instance, the project management activity allows students to create a schedule and become familiar with monitoring and controlling that schedule. These are concepts that are critical to SDLC and systems analysis and

design, but also for business management. Researching competitive advantage and the ability of an IS either to create an advantage or combat competitive forces is relevant for management and marketing discussions. Knowledge of and ability in web page/site creation is applicable to marketing, while data analytics and visualization activities are valuable in business disciplines across the board.

3.2.5 Clear Connection of Objectives and Outcomes. Several motivations were addressed within each of the module objectives. It was considered desirable for objectives to utilize applied technology in their outcomes. This would allow the students to gain experience with industry-relevant tools while reinforcing IS concepts. Finally, it was important that objectives aligned with the use of tools that could prepare students for success in non-IS courses. Table 3 shows the design of the IIS course relative to module objectives and deliverables.

As a matter of practice, not all modules presented an appropriate context for incorporating the applied use of technology. In those cases, written analyses with a focus on relevant technology were used instead. Specifically, Modules 1 and 5 presented such contexts. Module 1 included an analysis of the use of IT for competitive advantage, while Module 5 focused on the analysis of specific cybersecurity incidents. Modules 2, 6, and 7 lent themselves well to using current applied technologies that directly address curricular content, concepts, and techniques. In each case, an industry-standard tool was used and made accessible to our students. Module 4 took on a more creative tone as the students were asked to use

web programming to create a web page with simple styling. Web programming hands-on experience also included creating an entire website using a content management system (CMS) as a development tool. The website assignment required the students to create a personal website with a minimum of three pages, including a personal bio, a resume, and a portfolio page, allowing for posting samples of relevant work. This module outcome was a valuable primer for the business communications and management curriculum.

Module 3 was designed to replace a previous semester-long course. As such, it was essential to address enough content from this course to give students the best possible foundation in the shortest possible time frame. This module focused on office work productivity tools, particularly on the use of spreadsheets.

To ensure the desired outcomes, we created a set of guided tutorials on foundational spreadsheet concepts and functions. Knowledge gained through those tutorials would then be assessed by creating project spreadsheets using foundational skills and information. To be sure students could expand upon this base knowledge once completing the course, they would be given access to a comprehensive library of tutorials. This library would build on the foundational skills in differing and more advanced application areas that could apply to any business college discipline. Students would also be given guidance on the access and use of this library. Contract agreements with the publishers would extend access to the tutorials for five years beyond completion of the course.

Module	Module Objective – Upon completion of this course, you should be able to:	Module Deliverables/Outcomes - Upon completion of this course, you will:
Module 1	Define and describe the role of information systems/information technology (IS/IT) in business	Provide an analysis that evaluates a firm in an industry and its use of technology and information systems to account for competitive advantage
	Defend an argument for the importance of IS/Business alignment	
Module 2	Demonstrate project management skills and relate their application to IT projects	Create a project plan (Gantt chart) to track project steps, milestones, resources, and their dependencies using relevant project management technology
Module 3	Demonstrate knowledge of and capabilities with office productivity tools	Perform basic spreadsheet functions and be able to build upon those skills easily
Module 4	Identify and demonstrate the use of elementary parts of web programming and web content management	Create web pages with HTML/CSS and a simple personal website using a content management tool
Module 5	Identify risks associated with the security of organizational data and recommend tools/techniques for mitigation of such risks	Provide an analysis that identifies IT security concerns for a specific incident and recommends strategies/tools/techniques for mitigation or response
Module 6	Defend an argument for the importance of data in today’s organization and demonstrate how data could be organized to enable its analysis	Gain basic insights from data through simple data analysis and dashboards while using leading BI technology
	Explain the relationship between competitive advantage and knowledge management, business intelligence, and business analytics	
Module 7	Describe an enterprise system and discuss support of enterprise-wide processes	Perform basic ERP navigation and data input in SAP systems and be able to easily build upon those skills

Table 3. Module Objectives and Outcomes

	1	2	3	4	5	6	7
Module	Intro to IS	IT Project Mgmt.	Office Productivity	Web/Web Programming	IT Security	BI & Analytics	Enterprise Systems
Technology		MS Project	MS Excel	HTML CSS Google CMS		Tableau	SAP

Table 4. Technologies Used in IIS Course

3.2.6 Introduction of Current and Relevant Technology.

Students from all business college disciplines, and some from outside the business college, would take this course. The level of technical aptitude and the amount of prior experience with technology would vary significantly amongst those taking the course. To address this diversity, it was desirable to incorporate technology that was both perceived as and proven to be easy to use. Ideally, the chosen technology could also offer flexibility for more advanced and experienced students. The impact of ease of use on intentions to use and even adopt information technology has been well supported (Venkatesh et al., 2016) and was a key consideration in the course design. The technologies chosen to coincide with each module are shown in Table 4.

3.2.7 Common Experience. Since the impacts of this course would be experienced widely (i.e., by every business student), and because of its inclusion in the AACSB review as the business core class, it was essential to ensure that students would receive consistent content and messaging across sections.

Processes for standardizing many aspects of the course were incorporated to make this possible. Standardization started with the use of a common textbook. To ensure the same hands-on experiences and the same theoretical messaging were provided to all students, the activities the students performed and the tools and instructions used were also common across sections. This standardization extended to the library of tutorials (MS Excel) to which the students would have access for five years after course completion. Likewise, standardized exams were created through faculty collaboration to create a large common question bank. A standard approach to weighting the grade values of modules and tasks within the modules was also adopted. Lastly, although each instructor created a syllabus to describe their approach to administering the course work and classroom management, each syllabus included a common set of goals/objectives, grading weights, grading scale, and tools used.

3.2.8 Buy-in From Other Business Faculty. An introductory course is intended to introduce topics for later use and reinforcement. For this to be effective, there should be a level of cooperation that extends beyond the initial course. Thus, it was imperative that faculty throughout the business college support the course in principle and practice. Concepts, techniques, and tools would need to be reinforced in other areas if the knowledge was intended to be retained in the long term.

Garnering support for the course began early in the design process. Business college faculty were included as one of the key stakeholder groups for soliciting information about the course’s design. They were informed at regular meetings of the course’s design and implementation progress. The course was also an integral part of discussions concerning redesigning the

business school core curriculum in which it would play a role. Many faculty members recognized the opportunities that the new course design would provide to address important technology topics. Many also appreciated the course’s modular approach, flexibility, and adaptability. Some saw the value in the library of tutorials that would be left in the hands of the students throughout their programs. Further, some saw the value in the technology artifacts that would be created and kept by the students (e.g., the online portfolio from the Enterprise Web Development module). Ultimately, any small pockets of resistance were quickly overcome.

3.2.9 Ensure Alignment With IS Curriculum. Important considerations for the course design included alignment with the IS program, meaningful reinforcement in non-IS business core classes, and awareness of IS departmental challenges and constraints.

This course would be seen as a tool for creating a solid foundation in IS for all business college students. It would also be seen as a preparatory and marketing tool for the IS discipline. Figure A1 (Appendix A) shows how the modules in the newly designed course map onto other course offerings in the IS curriculum.

Our institution’s IS department faced immediate and long-term challenges that led to certain concerns in the course design discussion. Top concerns included: declining enrollments in the major, effective use of departmental resources within the major, lack of IS identity in the business core, poor student performance in some IS courses, and student perception of IS value. Figure A2 (Appendix A) shows which specific design principles help address these concerns and provides further justification for our design process.

4. EVALUATION OF IMPLEMENTATION SUCCESS

To evaluate and monitor the implementation success of the new IIS course, we continued to engage the stakeholders: students, industry representatives, business college faculty, and the IS department. Course modules were evaluated once every semester to ensure they were still meeting the original goals of the course. New data were collected at regular intervals to ensure relevance. This was done in several ways. First, students were surveyed to evaluate their perception of the course design. Second, regular meetings were set at the mid- and end-points of each semester to discuss the operations of the course and review content. Third, industry representatives and college faculty were regularly updated on the implementation and given an opportunity to provide feedback.

4.1 Student Feedback

This section presents the feedback obtained from students during the first week of the course (pre-course survey) and the last week of the course (post-course survey). By collecting pre-

and post-course surveys, we could evaluate whether students' perceptions about and skills in IS changed due to the IIS course. The post-course survey was collected over three years, across 27 sections, by three faculty members (all full-time tenure-track). After removing incomplete surveys, post-course survey data were available from 703 students. The pre-course survey used a smaller sample of 272 responses across nine course sections. Table 5 provides summary information about the participants and suggests the profile of students participating is similar and comparable across both sets of surveys.

	Pre-Course Survey		Post-Course Survey	
Gender				
Female	105	38.60%	266	37.84%
Male	154	56.62%	435	61.88%
Not identified	13	4.78%	2	0.28%
	272	100%	703	100%
Major				
Accounting	52	19.12%	132	18.78%
Bus. Admin	44	16.18%	122	17.35%
CIS	16	5.88%	52	7.40%
CS	6	2.21%	27	3.84%
Economics	3	1.10%	2	0.28%
Finance	27	9.93%	81	11.52%
Management	38	13.97%	109	15.50%
Marketing	30	11.03%	57	8.11%
>1 Major	23	8.46%	62	8.82%
Other	33	12.13%	59	8.39%
	272	100 %	703	100%
Class Standing				
Freshman	53	19.49%	92	13.09%
Sophomore	128	47.06%	345	49.08%
Junior	61	22.43%	187	26.60%
Senior	19	6.99%	68	9.67%
Grad/Certif.	2	0.74%	2	0.28%
Not identified	9	3.31%	9	1.28%
	272	100%	703	100%

Table 4. Participants' Summary Information

We first evaluated the students' perceptions of the importance of the content covered in the class. Contrary to what some literature suggests, incoming IIS students are aware of the

importance of IS, as suggested by relatively high ratings across all items (Table 6). For example, students came to the IIS course with a high level of appreciation of the role of IS/IT in today's organization (average rating 5.41/7) and the positive potential impact of a particular skill (e.g., spreadsheets, rated 5.58/7). These relatively high scores are pushed even further after completing the course, ranging from 7.9% to 19.8%. This suggests the newly created IIS course had a positive impact on students' perceptions of IS. Next, we evaluated students' perceptions of their abilities relative to specific course objectives. Table 7 ("Pre" column) suggests that students are aware of their relatively low level of abilities (ranging from 2.82 to 3.66/7) at the start of the course. A significant improvement in self-perception (ranging from 52% to 83%) is noted once students complete the new IIS course (Table 7, "Post" column). The most notable improvement appears to be in the Enterprise Systems module, which is not surprising given a probable lack of exposure to ERP technology often associated with larger organizations.

Each hands-on activity was evaluated to delineate students' perceptions of its effectiveness. The scores ranged from 5.34 to 6.13 on a scale of 1 to 7, suggesting the hands-on technology approach was effective.

Students were also asked to list one thing they liked about the class (free text format). The analysis of the 25 most frequent words (using <https://voyant-tools.org/>) confirmed that the hands-on use of technology is the most liked design feature of the course (Figure B1 in Appendix B). When asked to list one thing they did not like, the list of items changed significantly by focusing on group work, group assignments, papers, tests, quizzes, and lectures, with an occasional mention of specific tools like Tableau, Excel, and SAP (Figure B2 in Appendix B).

To further confirm the perception of the hands-on approach, students were asked to rate how much they agreed with the following statement on a scale of 1 to 7: "I enjoyed hands-on exposure to various technologies in this course." An average rating of 6.14 supported the impact of the hands-on technology design.

Overall course satisfaction was measured through several questions, and responses further suggest course effectiveness (Table 9). Although scores were relatively high, it is worth noting that female students rated their satisfaction as slightly lower than that of their male peers.

<i>Understanding and familiarity with the following items are important to prepare me for a future business career (1 (strongly disagree) – 7 (strongly agree))</i>		Pre	Post	Var %
Module 1	The role of IS/IT in today's organization	5.41	5.83	7.9%
Module 2	Spreadsheet skills	5.58	6.09	9.1%
Module 3	IT project management skills	4.91	5.68	15.6%
Module 4	Website development skills	4.46	5.34	19.8%
Module 5	Risks associated with securing information and mitigation techniques	4.97	5.74	15.5%
Module 6	Data analysis impact and approaches	5.21	5.73	9.9%
Module 7	The role of Enterprise Systems in today's organizations	4.93	5.63	14.2%
	Average (all modules)	5.07	5.72	12.8%

Table 5. Student Perception of IS Importance for a Business Career

<i>I am able to... (1 strongly disagree – 7 strongly agree)</i>				
Mod.	Objective	Pre	Post	Var %
1	Define and describe the role of information systems/information technology (IS/IT) in business	3.34	5.51	65%
1	Defend an argument for the importance of IS/Business alignment	3.44	5.45	59%
2	Demonstrate PM skills and relate their application to IT projects	3.39	5.51	63%
4	Identify and demonstrate the use of elementary parts of web programming and web content management	3.14	5.38	71%
5	Identify risks associated with the security of organizational data and recommend tools/techniques for mitigation of such risks.	3.14	5.53	76%
6	Defend an argument for the importance of data in today's organization and demonstrate how data could be organized to enable its analysis	3.66	5.58	52%
6	Explain the relationship between competitive advantage and knowledge management, business intelligence, and business analytics	3.17	5.31	67%
7	Describe an enterprise system and discuss support of enterprise-wide processes	2.82	5.14	83%
	Average for all course objectives	3.26	5.43	66%

Table 6. Evaluating Student Perceptions of Their Abilities (Through Course Objectives)

<i>Module activities listed below met the goals of each module (1 strongly disagree – 7 strongly agree)</i>		
Module	Activity	Rating
1	Analysis of IT Role in a firm's competitiveness using Porter's Five Forces (paper)	5.65
2	Build a Gant chart (MS Project)	5.72
3	MS Excel Training and Projects	6.13
4	Building a simple web page (HTML and CSS)	5.80
4	Creating a personal web page (Google Content Management)	5.81
5	Analysis of an actual security incident (team paper)	5.71
6	Create visualizations and a dashboard (Tableau)	5.75
7	Simple ERP navigation (SAP)	5.34
	Average for all activities	5.74

Table 7. Students' Perceptions of Hands-on Activities

<i>Please rate your agreement with the following statements (1-7):</i>	Gender			Total
	Female	Male	Var %	
As a business student, I consider this class valuable	5.73	5.85	-2.2%	5.81
Every business student should take CIS201	5.53	5.75	-4.0%	5.66
I would recommend this class to other business students	5.41	5.77	-6.7%	5.63
I am satisfied with CIS201 course	5.38	5.74	-6.7%	5.61
I think the content of this course is appropriate for 200 level course	5.90	5.97	-1.2%	5.94
Average	5.59	5.82	-4.1%	5.73

Table 8. Course Satisfaction

Data were also collected on students' willingness to take additional CIS courses following the IIS course. This would provide an additional way to measure the impact of the course design and implementation. In this analysis, we excluded students with senior standing (since it was too late for them to take additional CIS classes to switch their major) and those who were already CIS majors or minors. Although a small number of students strongly considered adding CIS as their major following the class, over 16% strongly considered adding it as a minor, and almost half considered taking additional IS courses (Table 10).

	Female	Male	Total
I am strongly considering declaring CIS as my major	2%	2%	2%
I am strongly considering declaring CIS as my minor	13%	18%	16%
I am strongly considering taking other CIS classes	34%	53%	46%

Table 9. CIS Future Plans

Lastly, further analysis of responses focused on participants "strongly considering taking other CIS classes" revealed a consistently high percentage (over 39%) across all majors (Table 11). Business Administration, Management, and Accounting students appear to be the most interested in taking

additional CIS courses, based on total number of students. Based on percent of total students in a major, Computer Science and Business Administration students appear to be the most interested in additional CIS courses.

<i>I am strongly considering taking other CIS classes (Yes)</i>			
	Major	Yes # of students	% of total students in a major
1	Computer Science	9	64%
2	Bus. Admin.	58	54%
3	Economics	1	50%
4	Finance	35	49%
5	Other	24	48%
6	Management	40	45%
7	Marketing	24	44%
8	2+ Majors	19	40%
9	Accounting	47	39%

Table 10. CIS Future Plans by Major

4.2 Success Evidence Through IS Faculty Feedback and Resulting Course Modifications

It was known that many students perceived IS concepts as somewhat abstract. For this reason, interpretations of course assessments that were not highly structured had to be addressed and made as structured as possible. This was particularly important for essay-type assessments. Due to the abstract concepts being introduced in the first module of this course, it was decided to split the introduction of IS and the application of IS (through the Competitive Forces model) into separate concepts. It became evident that the students would need more time and instruction to internalize facts about IS. This knowledge base was needed to support any further analysis regarding the application of IS to business needs. Thus, the essay assessment for Module 1 was moved to the end of the course, at which point students would have had a great deal of exposure to the concepts needed to complete the assessment.

The final module of the course focused on Enterprise Systems. This was intended to be a track in the IS curriculum that did not materialize. As a result, ongoing conversations have centered on removing, replacing, or restructuring this module. The module’s hands-on assessment based on the rudimentary use of an ERP interface did not seem to offer the intended support to the curriculum. Given the gradual removal of ERP from the IS curriculum and the low student satisfaction with this module, plans were made to reconfigure or completely replace the ERP module while managing buy-in from key stakeholders.

4.3 Success Evidence Through Curriculum Acceptance

As part of mandates from the AACSB accreditation board and the university’s strategic plan, the business college was to incorporate regular assessment strategies and tools into standard operations. An essential component of the assessment method was identifying introduction points, reinforcement points, and assessment points. The IIS course was identified as an introductory point for four of six assessment criteria. This suggests strong evidence of our university’s faith in the content and execution of the course design.

The IS curriculum had areas of content overlap with several classes. Further, additional gap areas were identified by the IS

department and from stakeholder data. These issues were addressed with the redesign of the IIS course; however, the redesign called for the removal of at least one IS course that was previously a part of the business core. It was not guaranteed that faculty would accept the new course as a replacement. Making this concern more contentious was the fact that the course being removed focused primarily on the use of Excel. The redesigned course would reduce that content to offer a broader scope of IS. A faculty vote was held, and the inclusion of the new course in the core curriculum passed (59 for and 3 against), further suggesting that faculty supported the design and content of the new course.

Finally, the business college advising center created a four-year plan for first-year students, laying out the courses students would take each semester through graduation. The center recognized the course’s inclusion in the business core and started adding the newly created course into students’ second-year semesters. Shortly after that, they contacted the IS department asking whether a 30-hour prerequisite could be removed so that students could place the course earlier in their plans. This was driven, at least partially, by a desire from students. There was recognition of, and interest in, the newly designed content. The prerequisite was dropped, and the advising center subsequently incorporated the course into first-year scheduling.

5. POST-IMPLEMENTATION REFLECTIONS ON DESIGN PRINCIPLES

Our design process resulted in nine guiding principles: (1) Simplify and reduce information overload, (2) Modular approach and relevant topics, (3) Local program focus, (4) Hands-on technology use, (5) Clear connection of objectives and outcomes, (6) Introduction of new and relevant technology, (7) Common experience, (8) Buy-in from other business faculty, (9) Ensure alignment with IS curriculum. Although replicating IIS in another university setting may yield different principles, we suggest that ours were rooted in the most current needs of our stakeholders (employers, students, and faculty) and provide meaningful guidelines for others to consider. We offer reflections on how our course implementation met our challenges.

5.1 Design Principles 1-8

Several courses in our IS curriculum displayed significant overlap; our ability to discontinue those courses and roll out a single course may not be possible or needed in other institutions. Further, we identified gaps in the curriculum, especially as they pertained to the scope of all business majors. Thus, the resulting modifications are unique to our local context. They will likely manifest differently in other institutions, based partly on the program into which an introductory course might be incorporated and by the scope of the audience. The course discussed here was intended for all business majors. An introductory course aimed only at IS majors may have the luxury of going into greater depth for some or all the designed categories.

A focus on local needs and challenges also influenced how we implemented our modules and technologies. Recall that the modules chosen and designed for the new IIS course were based on data gathered from local stakeholders in combination with the gaps identified in our curriculum analysis. While the design

was intended to be generalizable and meet industry needs beyond the scope of our region, it was in part driven by the needs of local industry and the strengths of internal faculty. These needs may change significantly based on stakeholders, particularly those doing much of the hiring for a given institution. For example, the choice of technology may depend on geographical region. In our case, that meant the inclusion of ERP and web technologies that may not be included in a traditional IIS course. In other markets, that may mean more emphasis on data analytics through the hands-on use of SQL, Python, and R programming.

Next, offering a common experience for all students was an important goal for the course design. The course serves the entire business college, and ensuring that every student can achieve the same level of knowledge and experience across sections of the course is highly valued at our institution. An equally important principle was to ensure buy-in from other business faculty. We share our experiences for the sake of example.

5.2 Design Principle 9 – Ensure Alignment With IS Curriculum

Fully acknowledging the uniqueness of IS departments, curriculum, and faculty across universities in the U.S. and the world, we present our reflections and findings of how our design process and the first eight principles affected our IS curriculum alignment and related department challenges in the following paragraphs. Recall that those concerns include declining student enrollment, faculty resource constraints, lack of IS identity in the business core, student performance in IIS courses, student perception of the IS value, curriculum issues related to IS major, and the need to create a single course for both IS and non-IS students.

5.2.1 Declining Student Enrollment. Regionally, challenges have risen regarding enrollments within the IS discipline and across the university. While declining enrollments that are systemic to the university are not discussed here, enrollments for the IS major are of direct concern.

The IIS curriculum design seems to have impacted the awareness of IS as a discipline and the distinction between IS and CS. Anecdotal evidence supports the idea that a significant number of students who declare a major in IS do so because of their introduction to IS through the newly designed IIS course. Further, students with initial impressions about IS and CS claim to have better clarity on the differences after completing the course. While our college-wide enrollment was dropping, enrollments in IS remained stable. The ratio of IS and CS student enrollments had also increased. Lastly, student feedback (see Section 4) indicated that around 46% of students strongly considered taking additional courses, while only 2% strongly considered declaring IS as a major. This suggests that additional IS courses (beyond IIS) are critical in IS major recruitment.

5.2.2 Faculty Resource Constraints. Before implementing the new IIS course, the IS department had been maintaining and operating five courses in support of different introductory objectives. The data analysis that guided our course design made the critical aspects of these five courses clear. It also pointed to areas that were outdated or did not need coverage in the curriculum. As a result, implementing the new IIS course

has freed up resources that would have been dedicated to other areas or courses. The courseload for the department each semester has decreased by at least four courses.

One unexpected outcome of creating a highly customized course is the increased need for experienced and talented faculty. Due to the diversity of content, the expected relationships with other curricula, and the general operation and evaluation of the course, the faculty that teach this course must have a diverse and flexible knowledge base. Further, the desire to use this course as a promotional tool for the IS discipline means that those teaching the course must play an additional role as a marketer. This makes it a potentially more challenging course to take on, especially for new faculty, and it has not worked well as a course for adjunct instructors at our institution.

5.2.3 IS Identity in the Business Core. Before implementing the new IIS course, the only IS course required across the entire business curriculum was a productivity tools course focused exclusively on MS Excel. While this course provided an in-depth understanding of many of the functions and uses of MS Excel, it did not provide any perspective on what IS means to business. Consequently, business students equated IS with MS Excel. By defining topic areas of interest and relevance based on research and practice, the new IIS course has provided a more comprehensive introduction to the uses of IS in the business environment. Finally, the new IIS course focused on technology and business topics that foster skills that are relevant to all business majors.

While these are positive factors for students enrolled in the course, the identity of IS to other faculty in the business college has also been improved. Including business college faculty in the design process, education about the tools used in the class, discussions about the technology used in assessments, and discussion of relevant topics has fostered greater awareness and understanding of the IS curriculum.

5.2.4 Student Performance in IS Classes. Poor student performance in an advanced MS Excel course at our institution raised significant concerns about critical thinking and problem-solving skills at the university level. Our course design attempted to address these concerns through three design principles: reducing information overload, clearly connecting objectives and outcomes, and introducing new and current technology. As mentioned previously, many of the concepts in IS can be abstract, especially to those who have not chosen a technology field as their major. As well, business processes and needs can be abstract for undergraduates with no corporate experience. Hence, a delicate balance must be found between introduction and application, while monitoring the level of detail. By focusing on topics deemed relevant and essential by research and practice-driven data, information was disseminated in appropriate amounts and made relatable to the students (see Section 4 for student feedback).

The modular approach of the course lends itself to focusing on objectives and defining learning outcomes with clarity. For each module, the students know the topic, the tools, and the expectations. The IIS design has eliminated overlap and other complexities that confused the students and complicated the intended outcomes. Finally, through student feedback and ongoing reviews, we ensure that both supporting technologies and technologies of focus for each module remain relevant, accessible, and manageable. The modular format of the course

allows for small and large changes regarding the technology used in the course. As technologies evolve, the IIS course can integrate them relatively quickly into the course content, ensuring students' continued engagement and excitement. This approach has been instrumental to removing the IIS course from the list of courses with an unusually high number of students failing or withdrawing.

5.2.5 Student Perceptions of IS Value. One of the local curricula concerns we kept in mind was an assumption that students lacked an appropriate perception of the value of IS as part of any business education. Literature suggests that high school students are unaware of what information systems are and of their value. Our anecdotal experience through discussions with business students found this trend to be true during most students' college years; we found that students were generally confused about the IS discipline and rarely entered college to major in IS. However, when presented with questions about their perception of IS value, most students in our pre-course survey rated their perception of value reasonably high (5.07 - see Table 6). Our post-course survey suggested that the perception of importance increased by around 13% after the course (see Table 6). Similarly, when explicitly asked about the value of the course, the students voiced a positive opinion of it (see Table 9: "As a business student, I consider this class valuable" = 5.81; "Every business student should take CIS201" = 5.66). The newly designed IIS course design process and implementation were further validated by the perceived value of IS scores relative to course satisfaction (5.61), willingness to recommend the class to others (5.63), and interest in taking more IS courses (46% - see Table 10).

6. CONCLUSIONS

This paper provides our story and roadmap for an IIS course implementation as part of a business core curriculum. The roadmap recognizes both generalizable and institution-specific contexts. We offer the IS community our process that identifies key stakeholders, institutional challenges, and nine-course design principles. Following course implementation, we presented the evaluation of the success of our roadmap using student perceptions and stakeholder feedback. We also reflected on the process by revisiting how the newly created IIS course can be evaluated regarding meeting its goals through the lens of the foundational design principles. There is no one way to design and implement the IIS course, but this paper offers a process that can inform others as they replicate, modify, and improve their own world-class IIS course.

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APPENDICES

Appendix A. IIS Course Alignment

CIS201 Modules	IS Major/Minor Courses								
	CIS276 Intro Web	CIS301 Intro ERP	CIS345 Intro Security	CIS367 Data Comm	CIS375 Intro SAD	CIS376 Adv Web	CIS377 DB Concepts	CIS454 Managing IS	CIS477 Senior Project
Introduction to Information Systems		●		●				●	●
IT Project Management			●		●			●	●
Excel									●
Web and Web Programming	●			●		●		●	●
IT Security	●		●			●		●	●
Business Intelligence/Analytics							●	●	●
Enterprise Systems		●						●	
	●	Significant reinforcement		●	Some reinforcement				

Figure A1. Aligning IIS Course Modules With IS Major Curriculum

Design Principles	Curriculum Concerns				
	Declining student enrollment	Faculty resource constraints	IS identity in business core	Student performance in IS class	Students' perception of IS value
Reduce information overload		●		●	
Modular approach and relevant topics	●		●		
Local program focus					●
Hands-on technology use					●
Clear connection of objectives and outcomes				●	●
Introduction of new and current technology				●	●
Common experience		●	●		
Buy-in from other business faculty			●		
Ensure alignment with IS curriculum	●	●	●	●	●

Figure A2. Alignment of Design Principles With Local IS Curriculum Concerns

Appendix B. Word Cloud Analysis



Figure B1. Most Liked Course Feature

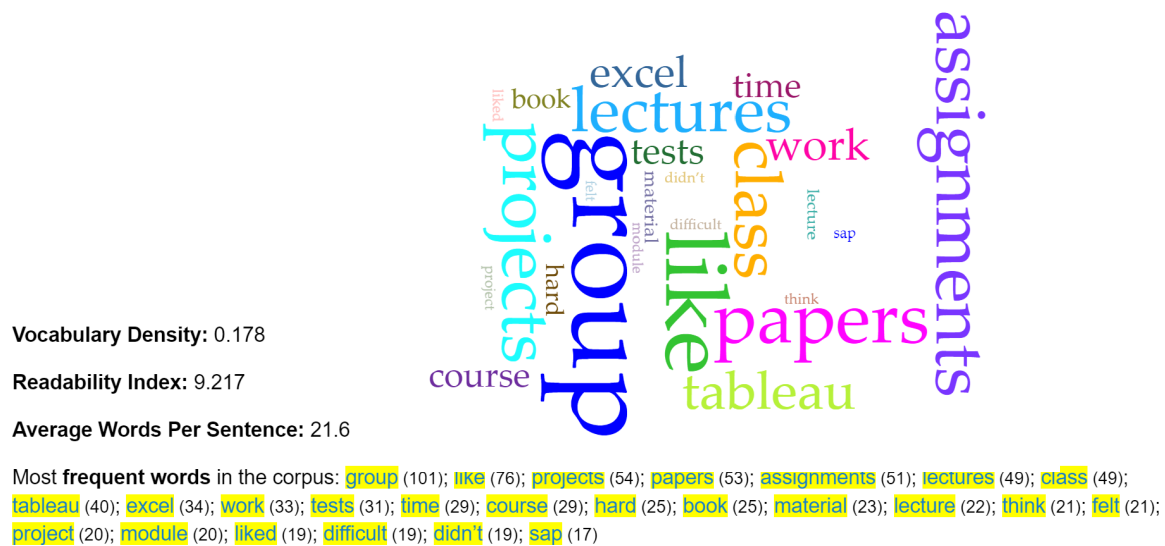
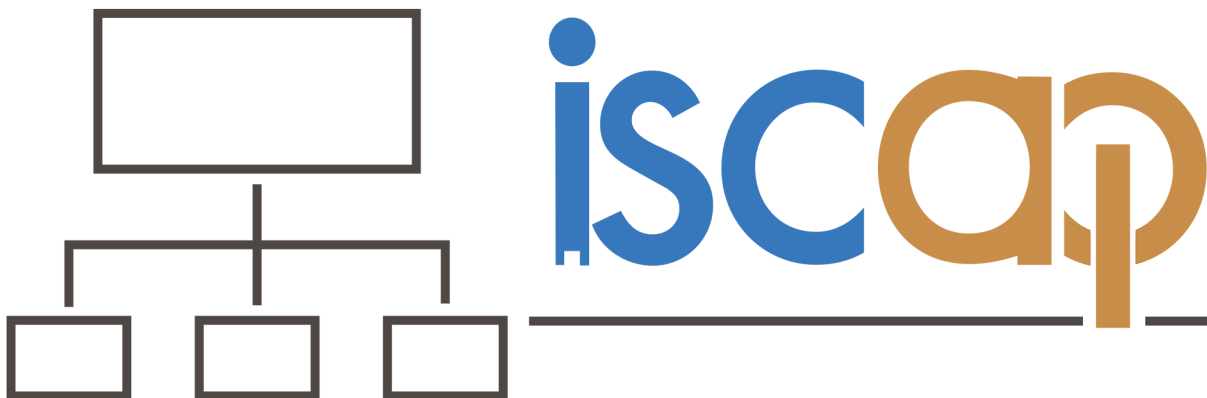


Figure B2. Least Liked Course Feature

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