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MISunderstood: A Longitudinal Analysis of Major MISperceptions

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Abstract:

Low information system (IS) enrollment continues to present a threat to IS programs and pose a serious problem to companies in desperate need of IS professionals. Research attributes low enrollment and the shortage of IS talent to misperceptions about the nature of IS programs, careers, and job prospects. Recent research (Akbulut-Bailey, 2012) suggests that enrollment remains low despite improved perceptions about the IS job market, which raises the question as to whether the misperceptions about IS careers and programs still exist and whether they represent the main factor in why students do not choose the IS field. Using the case study method (Yin 1984), we provide a longitudinal view of the perceptions that students have had about MIS, how they have changed, and ways in which we can meaningfully combat misperceptions.

Keywords: Information Systems Enrollment, Information Systems Curriculum.

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1 Introduction

While many know that management information systems (MIS) program enrollments have seen a significant decline since the dot-com bust, many may not know that enrollments have actually grown recently—though not nearly fast enough to meet the positive job growth in the IS field (Akbulut-Bailey, 2012). As Figure 1 indicates, the number of IS graduates in the United States fell from roughly 18,000 in 2002 to slightly above 6,000 in 2010. Since 2010, we have started to see enrollments increase annually by about two percent on average. This slow enrollment recovery cannot meet the significant increase in projected demand for IS professionals (Akbulut-Bailey, 2012; Firth et al., 2011). Case in point: the U.S. Department of Labor (2015) expects computer and information technology jobs to grow by 12 percent from 2014 to 2024—faster than the average for all occupations.

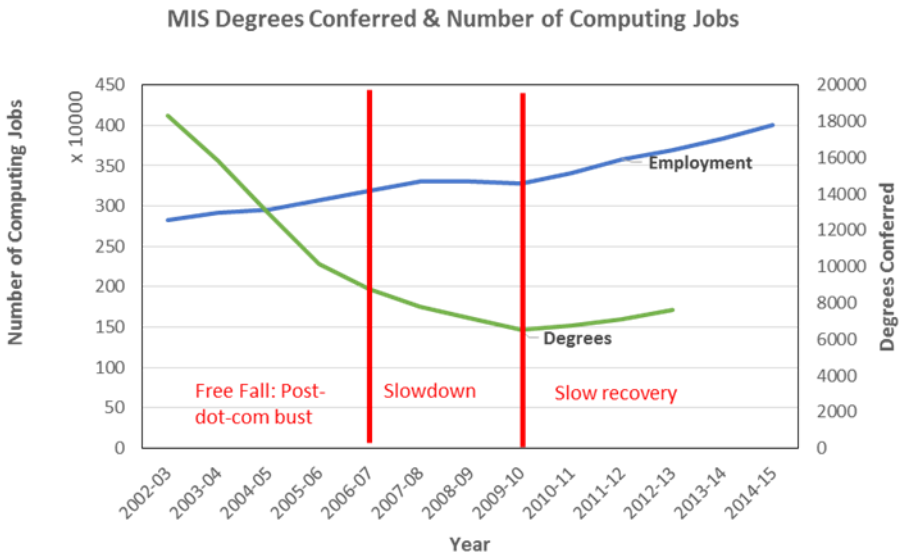


Figure 1. Number of U.S. Undergraduates Receiving Bachelor's Degrees in MIS (U.S. Department of Education National Center for Education Statistics, 2014) vs. Number of Computing Jobs (U.S. Bureau of Labor, 2015a)

This gap between supply and demand for IS professionals presents significant challenges to the U.S. economy and MIS programs alike. IS professionals (a sector of STEM professionals) help the U.S. economy innovate and compete in the global marketplace (Langdon, McKittrick, Beede, Khan, & Doms, 2011). Langdon et al. (2011) and Engler (2012) note that growth in STEM professions, especially technology-related roles (Benamati, Ozdemir, & Smith, 2010), continues to increase while the supply of graduates continues to decrease. The IS community requires higher enrollment numbers to ensure the livelihood, growth, and credibility of its IS programs and departments (Firth et al, 2011; Benamati & Rajkumar, 2013). Low enrollments threaten IS program vitality and independence in the academic enterprise. Accordingly, in the last decade, the IS community has seen numerous IS programs become marginalized, omitted, or merged with other departments due to low enrollments (Firth et al., 2011).

Researchers have attributed low enrollments in IS programs to various factors over the last 15 years (Akbulut-Bailey, 2012; Firth et al., 2011). For instance, some researchers have cited abysmal economic conditions and decreasing demand for IS jobs after the dot-com bust as two environmental factors that drove low IS enrollments in the early 2000s (Dick, Granger, Jacobson, & van Slyke, 2007; George, Valacich, & Valor, 2005). Some have cited curriculum quality and relevance to industry as reasons why students stopped choosing MIS as their major (Firth, Lawrence, & Looney, 2008; Firth et al., 2011; Scott, Fuller, MacIndoe, & Joshi, 2009). Others have cited individual factors, such as students' self-efficacy, attitudes, outcome expectations, social support, and social norms, as the major reasons why students choose MIS as a major (Benamati & Rajkumar, 2013; Akbulut-Bailey, 2012; Joshi & Kuhn 2011; Koch & Trower, 2011). However, how students perceive MIS represents perhaps the most often investigated and cited factor that influences MIS enrollment (Benamati & Rajkumar, 2013; Akbulut-Bailey, 2012; Walstrom & Schambach 2012). In the last 12 years, prospective students held highly negative misperceptions about the MIS major, related professions, and job availability (e.g., Granger, Dick, Luftman, van Slyke, & Watson, 2007; Scott et al., 2009; Benamati & Rajkumar, 2013). Despite the efforts of IS programs and the

Association for Information Systems (AIS) to combat these "MISperceptions", we still see that misperceptions and low enrollment rates persist. To address this issue, we focus on more deeply understanding perceptions about MIS and investigating whether we have truly made headway in debunking the misperceptions about the MIS major and related professions and whether the enrollment crisis remains a misperception issue.

Accordingly, in this longitudinal case study, we explore changes in how students perceived the MIS major between 2006 and 2014. The study includes two components: 1) a detailed analysis of related literature over four distinct enrollment-change phases and 2) a longitudinal case study of a top-ranked MIS program that increased enrollment from 90 to over 400 students between 2006 and 2014. With this research, we focus on understanding how perceptions have evolved over time to highlight what misperceptions still exist and to offer a way forward for struggling MIS programs.

1.1 Research Questions

To address the enrollment and perception challenges in MIS programs, we need to understand how students perceive MIS programs and how these perceptions have changed since the enrollment crisis began. For this reason, we pursue three research questions (RQ):

RQ1: What perceptions did students have about MIS programs between 2006 and 2014?

RQ2: Which perceptions changed during that period?

RQ3: Which perceptions did not change and why?

2 Literature Analysis: The Four Phases of MIS Enrollments and Perceptions

The decline in MIS program enrollments after the dot-com bubble burst drew the attention of many IS researchers, and a new stream of research emerged exploring the reasons for this crisis. This research focused on four central themes. First, it explored misperceptions about IS programs and careers that students and faculty from other business fields held (e.g., Benamati & Rajkumar 2013; Dick et al., 2007; Granger et al., 2007; Lee & Lee 2006; Walstrom & Schambach, 2012). Second, it focused on exploring student preferences: how and why they choose their major in business colleges (Lee & Lee, 2006; Hogan & Li, 2011; Walstrom, Schambach, Jones, & Crampton, 2008; Zhang, 2007; Akbulut-Bailey, 2012; Downey, 2011). Third, it explored the broader issue of the field's identity and its relevance and credibility in the IS industry and the IS academy (Dick et al., 2007; Firth et al., 2011). Fourth, it focused on curriculum design and program best practices (e.g., marketing and recruitment efforts) (Abraham et al., 2006; Street, Wade, Bjørn-Andersen, Ives, & Venable, 2008; Firth et al., 2008; Gefen et al., 2012; Westfall, 2012; McGann, Frost, Matta, & Huang, 2007). In this review, we focus on literature relevant to MIS enrollment and perceptions to better understand how students perceived the MIS major and how it evolved between 2006 and 2014.

2.1 The Rise: The Dot-Com Boom Era (1995–2000)

The 1990s brought about rapid and fundamental changes to IS professionals (Lee, Trauth, & Farwell, 1995). As information technology became the backbone of organizations, the profession experienced tremendous job growth and a diversity of career paths and, thus, MIS/CIS degree programs (Lee et al., 1995). In the 1990s, the IS academy saw significant growth and rapid change and had little concern for the health and wellbeing of IS enrollments and programs. In the late 1990s, IS enrollments peaked (see Figure 1) due to the dot-com boom (Zhang, 2007; Firth et al., 2011). During this period, MIS programs formed, grew, and matured as independent departments and fields (Watson, Sousa, & Junglas, 2000; Sherer, 2002). Challenges in this era included defining the field and developing and delivering relevant and timely education (Watson et al., 2000; Sherer, 2002). Research published during this period reported on challenges regarding the shortage of IS faculty, preparing faculty with limited IS background to teach IS, designing and investing in technology infrastructure, integrating IS curricula in the business core, and creating relevant and timely curricula aligned with industry needs (Watson et al., 2000; Sherer, 2002; Maglitta, 1996 Maier & Gambill, 1996; Lee et al., 1995).

Perhaps the most critical themes in this literature concerned the rapid changes and growth in the IS field that led to a disconnect between curricula and industry. Lee et al. (1995) discussed the diversity of skills

that industry required as the career paths for IS professionals grew and diversified. They found that IS programs needed to prepare students with a mix of technology, management, and "soft skills", and they made it clear that IS curricula's relevance and timeliness had yet to meet industry's needs. This latter challenge about not meeting industry's needs pertains to our analysis since we show that it persists. The divergence in the IS field evident in the diversity of programs, curriculum focus, and research gave way to a lack of understanding and a plethora of misperceptions about the IS academic community and educational programs (Gorgone et al., 2003; Ives, Valacich, Watson, Zmud, & Alavi, 2002). Gorgone et al. (2003) identified 13 names for IS programs in academic institutions. This inconsistency led deans, faculty, and professionals to misunderstand these programs and to perceive that they lacked credibility (Ives et al., 2002). Even so, students continued to flock to the MIS classrooms.

2.2 The Free Fall: The Dot-Com Bust (2000–2006)

Once the dot-com bubble burst and economic recession followed, MIS enrollments dropped dramatically (see Figure 1) (George et al., 2005; Koch, van Slyke, Watson, Wells, & Wilson, 2010). From 2001 to 2004, U.S. IS jobs also decreased due to outsourcing/offshoring (George et al., 2005). Despite the bleak economic environment, the job market turned around in 2002 and job growth for IS professionals started to grow once again (albeit slowly). For example, George et al. (2005) pointed out that software engineer jobs would increase by 179,000 from 2002 to 2012. Popular press, however, continued to sound the alarm that IT jobs were moving abroad (Granger et al., 2007). While IS job growth projections remained stable from 2005 to 2008, IS enrollment continued to fall (Abraham et al., 2006; Granger et al., 2007).

This sharp and lasting drop in enrollments despite the growth in IS jobs caused dramatic changes in IS programs: they became marginalized, omitted, or merged with other departments (Firth et al., 2011). Toward the mid-2000s, IS scholars turned their attention to the enrollment crisis, which the rise in feature panels at main IS conferences and publications that addressed this issue evidences (Lee & Lee, 2006).

2.3 The Slowdown (2006–2010)

Despite the positive job growth projections between 2004 and 2014, enrollments continued to decrease (Granger et al., 2007) but at a slower rate (see Figure 1). This continued decrease between 2000 and 2006 prompted the IS research community to ask two types of questions. The first type focused on the *relevance and nature of the IS profession* and the implications for IS curricula (e.g., George et al., 2005; Abraham et al., 2006; Hirschheim, Loebbecke, Newman, & Valor, 2007; Bullen, Abraham, Gallagher, Simon, & Zwieg, 2009; Granger et al., 2007; Firth et al., 2008; Kuechler, McLeod, & Simkin, 2009; Koch et al., 2010). The second type probed *why students do not major in MIS* (e.g., Lee & Lee, 2006; Zhang, 2007; Walstrom et al., 2008; Scott et al., 2009; Ferratt, Hall, Prasad, & Wynn, 2010).

First, scholars who investigated the *nature of the IS profession* concluded that industry requires a range of technical and social skills and business and management competencies from college graduates entering the workforce (Abraham et al., 2006; Bullen et al., 2009; Downey, 2011). Scholars identified the need to emphasize the business context and the importance of management in IS curricula (McGann et al., 2007; Abraham et al., 2006). Koch et al. (2010) and Topi et al. (2010) stressed that technical curricula should include more practical experience for students. Topi et al. (2010) suggested that the curriculum must help students with skills that they can use outside of an academic environment. Abraham et al. (2006) emphasized the importance of active learning pedagogy as a means to help students learn such skills. Dick et al. (2007) and McGann et al. (2007) indicated the importance of curricula integration to improve skill development and relevance to students. Furthermore, scholars emphasized leadership courses, guest speakers, and mentoring to retain students (Topi et al., 2010; Koch et al., 2010). Some IS programs experimented with innovative approaches to improving enrollment as a panel at the International Conference on Information Systems (ICIS) in 2007 discussed (Street et al., 2008). The most significant such approaches recruited students, designed and delivered curricula, and placed students in a comprehensive and integrated way (Akbulut & Looney, 2007; Firth et al., 2008; McGann et al., 2007; Koch et al., 2010).

Second, scholars who focused on understanding why students do not major in IS programs consistently identified that they had strong misperceptions about IS, which we can summarize in three predominant themes:

1) **IS jobs' scarcity:** studies reported that students still believed IT jobs were scarce (Abraham et al., 2006; Granger et al., 2007; Lee & Lee, 2006; Zhang 2007; Bullen et al., 2009; Akbulut-Bailey, 2009; Street et al., 2008). Due to the dot-com bust and IT companies' moving jobs offshore, students perceived few current and future job opportunities in the field (Granger et al., 2007; Lee & Lee, 2006). Furthermore, students thought that IT jobs did not pay well (Granger et al., 2007). Kuechler et al. (2009) and Bullen et al. (2009) suggested creating a job pipeline with industry members to help with enrollment since students would see the direct benefit of the degree with a developed job-placement program in place.
2) **IS jobs' technical and difficult nature:** studies indicated that students viewed IS majors as technical and hard (Granger et al., 2007; Lee & Lee, 2006; Dick et al., 2007; Walstrom et al., 2008) and not always relevant to industry. Perceptions of sitting at a computer all day also surfaced in the literature (Akbulut-Bailey, 2009). Zhang (2007) also indicated that students often viewed IS professionals as "geeky" and did not want to associate with their co-workers. Dick et al. (2007) and Walstrom et al. (2008) recommended spreading awareness and facilitating interactions with professionals as a means to combat these myths.
3) **Fear of IT:** students' self-efficacy regarding computers also came through in some of the studies (Zhang 2007; Walstrom et al., 2008). These studies showed that students did not feel they had the aptitude to work with information technology. Findings in these studies revealed that students did not think they were good with computers and, thus, believed that they would fail if they majored in MIS.

2.4 The Recovery (2010–2014)

In the late 2000s, the Great Recession hurt recovering IS enrollment numbers (Koch et al., 2010). But, in 2010, the enrollments stopped declining, and, for the first time in over a decade, started to rise. During this period, enrollments increased slowly but steadily (see Figure 1. Researchers predicted job growth to continue to increase, but the graduate supply grew only slightly (Benamati & Rajkumar, 2013). The slow growth in IS enrollment could not match the job growth in IS/IT—a significant concern to the IT industry that desperately sought talent (Benamati et al., 2010). The status of IS programs posed another concern for the field in this period. In light of decreased education funding, IS departments with low numbers represented prime candidates for cutting (Firth et al., 2011). The continued struggles to define the IS field and create consistent standards led the public to downplay its importance (Firth et al., 2011). Furthermore, research identified a mismatch between IS curricula and industry needs, especially in the areas of contracting, outsourcing, and managing vendors because MIS course sequences did not typically include them (Firth et al., 2011; Gefen et al., 2012). The IS scholarly community continued its focus on the enrollment challenge.

Research that focused on student perceptions identified some consistent misunderstandings about the profession. For instance, Joshi and Kuhn (2011) and Benamati and Rajkumar (2013) indicated that students still viewed IS professionals as "geeky/nerdy", which affected the profession's desirability. Students' peers' and families' (i.e., their social network) beliefs about IS careers (Joshi & Kuhn, 2011; Downey, 2011) significant influenced students' perceptions about IS careers as well. Akbulut-Bailey (2012) found that social support would help stimulate interest in the field since it enhances self-efficacy. Social support can also play a large role in the student-recruitment process (Akbulut-Bailey, 2012). Other related studies indicated that student interest in a topic or field is a significant determinant of their major choice (Downey, 2011). Walstrom and Schambach (2012) conducted an interesting study in which they assessed the impact that students' awareness about a MIS career path had on their perceptions. They found that students had more positive perceptions about the career path when they better understood its activities compared to when they understood it conceptually.

2.5 Summary

We summarize our findings from reviewing research on the state of the IS profession, IS enrollment, and the perceptions students that students hold about the profession in Table 1. Over the last decade and a half, dramatic changes in job market demands and IS enrollment have caused trepidation in the industry as many IS jobs went unfilled. The literature also revealed two primary challenges for MIS departments:

1) The relevance of IS curricula continues to fall short of industry demands despite some headway in the "slowdown era", which the economic and political challenges that IS programs face in terms of faculty cuts and mergers with other departments may explain.
2) Students continue to misperceive IS programs/careers persist despite efforts to manage and change them.

Table 1. Summary of Trends in the IS Literature Between 1995 and 2014

Period	The rise: dot-com boom (1995–2000)	The free fall: dot-com bust (2000–2006)	The slowdown (2006–2010)	The recovery (2010–2014)
Enrollment	Peak of enrollment	Peak of enrollment decline Average decline at 15%	Slowdown of the enrollment decline Average decline at 5%	Turnaround of enrollment Average increase at 2%
MIS perceptions	Significant job opportunities The way of the future	Misperceptions peaked: • Too technical • Too hard • No jobs • IT jobs outsourced	Between 2006 and 2008, misperceptions persisted: • No jobs • Too technical • Too hard Turning point in perceptions in 2009 • Jobs available • Still too technical	Perceptions: • Jobs available • IS matters • Too technical
Research on MIS perceptions	No research on perceptions during this era	Some researchers started asking why students are not interested in MIS	Significant attention paid to investigate students' perceptions	Attention still being paid to investigate student perceptions
Response from IS community	Focus on the field's identity Program growth, programs trying to limit enrollment to manage demand, investment in faculty hires	Assess the state, identity, and relevance of IS	Start to respond: IS community focus shift to teaching programs turned things around	More focus on IS programs, pedagogy, and relevance to industry
IS jobs	Rapid double-digit growth	Slowdown between 2000 and 2002 but strong projections of growth between 2002 and 2006	Strong projections of growth continue	Strong projections of growth continue and demand much higher than supply
Industry relevance	Curriculum challenges to stay relevant	Peak focus on relevance of IT: "Does IS matter?". Challenge to keep MIS in core business curriculum	Curriculum challenges to stay current and relevant	Curriculum challenges to stay current and relevant

In Section 3, we take a longitudinal approach to more deeply understand how students perceive MIS.

3 Methodology

To fully understand the nature of how students perceive MIS and the changes in their perceptions over time, we conducted a longitudinal case study with students enrolled in a college of business (COB) in the U.S. Midwest that housed a top-ranked MIS program. A case study refers to "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p. 18. In particular, the case study method suits efforts to understand how a phenomenon (i.e., perceptions) has changed over time, especially when the researcher cannot control factors that influence the phenomenon as in our case. The qualitative and rich nature of the case study method allows one to deeply understand a phenomenon in context. Yin (1984, 2003) suggests that the case study method has a distinct advantage when one asks a "how" or "why" question about a contemporary set of events (in our case, how perceptions about MIS have evolved and the impact they had had on enrollments). Moreover, according to Yin (2003), one can "eminently justify" a single case study design when the case serves a longitudinal purpose (p. 45) as in our long-term study.

Our study design (see Figure 2) followed the case study method that Yin (2003) presents. We adopted this design to systematically investigate student perceptions in three periods: 2006, 2010, and 2014. We chose these periods because they mark changes in trends in the IS job market and MIS program enrollments as we show in Section 2. One can consider each phase as an embedded case study that we conducted to understand COB student perceptions during their respective period. We collected and analyzed data in each phase in an iterative fashion that the literature and findings from the prior phases guided. The research findings we obtained from each phase informed interventions in the form of content that we added to MIS courses or marketing and promotion strategies for the MIS major. We also conducted an overall cross-case analysis to identify the changes between phases and overall implications of our findings.

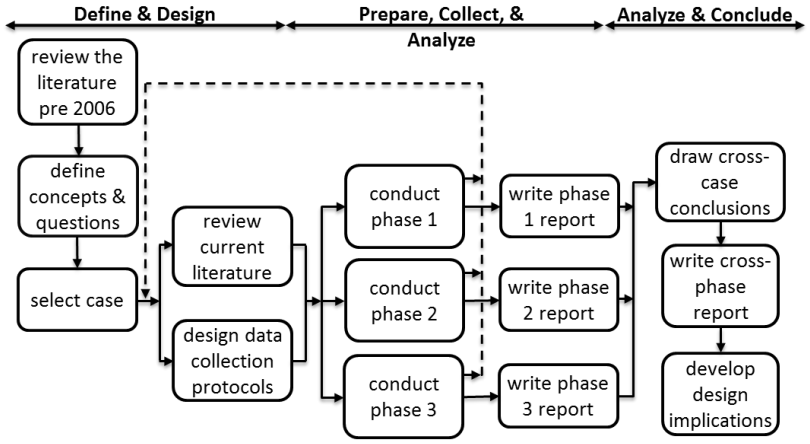


Figure 2. Longitudinal Case Study Design

3.1 Data Collection

The study design included various data sources to ensure we triangulated evidence in alignment with case study methodology (Yin 1984, 2003). To better understand how students perceived the MIS profession in context, we elicited perceptions from COB students, their parents, and non-MIS faculty and staff members in phases one and two. The three sources inform our understanding of the larger context. By including faculty and parents, we could obtain perceptions from individuals who influence students and shed further light on students' perceptions as the literature suggests (e.g., George et al., 2005; Abraham et al., 2006). We used a mix of data-elicitation techniques; namely, focus groups, questionnaires, and interviews. We provide more details about how we collected data in each phase in Section 4. Table 2 summarizes the data-collection and data-analysis techniques we used for each data source.

Table 1. Data Sources, Purpose, and Analysis

Type of data collected	Purpose	Data analysis
Phase one (2006): the tail end of the dot-com bust: what perceptions do students have about MIS?		
Focus group COB students (qualitative)	To better understand students' perceptions about the MIS profession to inform questionnaire. Open-ended questions regarding what MIS is and why you would choose or not choose to major in MIS.	Deductive and inductive content analysis to observe and further elaborate on themes from the literature.
Survey of COB students (35 responses) (qualitative and quantitative)	To better understand students' perceptions about the MIS profession. Closed-ended questions with scale on perceptions as technical, difficult, relevant, and having jobs. Open-ended questions explored what MIS is.	Descriptive statistics of quantitative data. Inductive and deductive content analysis of qualitative data.
Survey of parents of COB students (28 responses) (qualitative and quantitative)	To understand parents' perceptions about the MIS profession. Closed-ended questions with scale on perceptions as technical, difficult, relevant, and having jobs. Open-ended questions explored what MIS is.	Descriptive statistics of quantitative data. Inductive and deductive content analysis of qualitative data.
Non-MIS faculty and staff interviews (nine faculty and two staff members) (qualitative)	Understand faculty and staff perceptions of what MIS is and jobs available in MIS. Open-ended questions explored what MIS is, the nature of the MIS profession, the MIS job market, and the relevance of MIS in business.	Deductive and inductive content analysis of qualitative data.
Phase two (2010): the slowdown: do students still have misperceptions about MIS? What are they? Have they changed?		
Focus group with COB students (qualitative)	To better understand students' perceptions about the MIS profession to inform the questionnaire. Open-ended questions, including what MIS is and why you would choose or not choose to major in MIS.	Deductive and inductive content analysis to identify existing and emerging themes.
Survey of COB students (216 total responses, omission for incomplete or illegible responses yielded 189 responses) 55% male 45% female	To better understand students' perceptions of MIS profession. Closed-ended questions with scale on perceptions as technical, difficult, relevant, and having jobs. Open-ended questions explored what MIS is.	Descriptive statistics of quantitative data. Deductive and inductive content analysis of qualitative data.
Non-MIS faculty and staff interviews (eight faculty and one staff member—a subset of the individuals from the 2006 phase)	Understand faculty and staff perceptions about what MIS is and jobs available in MIS. Open-ended questions explored what MIS is, the nature of the MIS profession, the MIS job market, and the relevance of MIS in business.	Deductive and inductive content analysis of qualitative data.
Phase three (2014): Do misperceptions about MIS persist? Why?		
Survey of all COB students at the start of two quarters (total of 347 responses) (qualitative) 54% male 46% female	Open-ended questions to gain richer context for and better understand views about the MIS domain, career paths, and relevance.	Deductive and inductive data analysis.

3.2 Data Analysis

We first analyzed the data in each phase. We analyzed qualitative data using Miles and Huberman's (1994) iterative data-collection, data-reduction, and data-display process and, ultimately, drew and verified conclusions. We first developed a basic content-analysis framework using themes from the literature (e.g., MIS as technical, non-technical, or socio-technical; jobs available/not available). The content-analysis unit during analysis was the question. We inductively modified the content-analysis scheme until we reached saturation, which means no new concepts emerged from the inductive data analysis (Patton, 1992). We used two or three coders to conduct the content analysis in each phase and performed intercoder reliability tests. They showed the coders reached above 80 percent intercoder reliability (Baker-Brown et

al., 1990). We analyzed quantitative data using descriptive statistics to identify the range and frequency of perceptions. We cross-analyzed the findings from each phase to identify changes in perceptions over time thematically.

4 Embedded Case Studies Discussion

In this section, we detail the data sources and elicitation techniques we used, how we analyzed data, the results we found, and the post-phase intervention in each phase. Figure 3 illustrates the data-collection and intervention timeline.

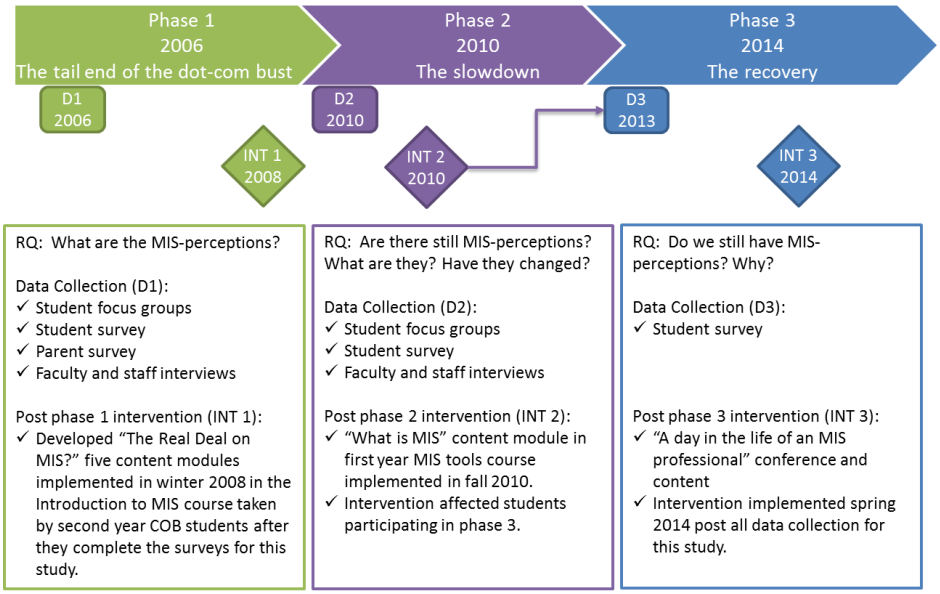


Figure 3. Longitudinal Case Data-collection and Intervention Timeline

4.1 Phase One—2006: The Tail End of the Dot-com Bust

We began this phase in 2006. It focused on determining what perceptions students had about MIS. In this phase, we used focus groups and surveys with various stakeholders such as students, parents, and non-MIS faculty and staff. Results from this phase revealed misperceptions regarding the MIS major that we attempted to address by developing interventions that we implemented in the introduction to MIS course all COB students take in the second year.

4.1.1 Phase One Data

In this phase, we conducted three student focus groups that comprised eight to 11 students each. The focus groups, which participants self-selected into, informed the way we initially understood student perceptions and the questionnaire we designed to survey students. We designed the focus groups to elicit student input on themes that we identified in the literature about how students perceive MIS, the types of people who work in the field, the skills required, and job market prospects. Focus groups also included a scribe who took detailed notes while recording the discussion and a facilitator (upper-level students in the college) who we trained to conduct the sessions and to probe other areas as they surfaced. The facilitators asked the following open-ended questions:

1) What is MIS?
2) What types of skills do MIS professionals require?
3) Describe the types of people who pursue MIS careers.
4) What is the nature of the MIS major/curriculum?
5) What is the nature of the job market in MIS?
6) How do MIS jobs compare to other business careers in terms of salaries?

7) What do MIS graduates do?

8) Would you major in MIS? Why or why not?

We used the findings from conducting the focus groups and reviewing the literature to create a questionnaire that we used to elicit the perceptions from a larger number of students (see Appendix A). The first part of the questionnaire contained close-ended statements (on a five-point Likert scale: 1 = strongly disagree, 5 = strongly agree) that mirrored the themes in the literature and the focus groups about the technical nature of MIS, the MIS major's level of difficulty, the nature of jobs in MIS, skills required to complete the major, stereotypes about IS professionals, their salary and benefits, and their job market prospects. The second part of the questionnaire contained open-ended questions to allow students and parents to articulate what MIS was to them, the nature of MIS jobs, and general concerns regarding MIS as a career. With the open-ended questions, we could better understand participants' perceptions in their own words, which left room for new themes to emerge.

We distributed the questionnaire at the start of the quarter to approximately 180 students who enrolled in the (mandatory) introduction to MIS course. We also asked students to forward the questionnaire to their parents. We did not mandate participation in this questionnaire in this phase (thus, the students did not have to participate if they did not want to). Thirty-five students and 28 parents responded. We also interviewed nine non-MIS faculty and two academic advisors, which we recorded and transcribed. We analyzed the data using the methods we describe in Section 3.2.

4.1.2 Phase One Results: What Perceptions did Students have about MIS in 2006?

The results from the student focus groups, the surveys we conducted with parents and students, and the interviews we conducted with non-MIS faculty confirmed what we found in our literature review. Our data suggested that respondents viewed MIS careers as technical and difficult, confirmed the image of a "techie geek" isolated in a computer lab, and viewed MIS jobs as diminishing. The data from all three stakeholder groups and data sources revealed that, in 2006, students, parents, and faculty from non-MIS fields largely identified MIS as a *technical field* with roles primarily in programming, development, support, and (to a lesser extent) IT consulting. Specifically, students in the focus group perceived that the MIS major focused on programming because they had observed MIS majors spend significant time in computer labs. The following student quote illustrates this widely held sentiment: "MIS majors have a stereotype of being very 'geeky' computer people".

The questionnaire results echoed the "techie" perceptions. As Figure 4 illustrates, 68 percent of students and 66 percent of parents agreed or strongly agreed with statements that suggest that MIS professionals are "techies". Further, we found that 96 percent of respondents scored between three and five (on a five-point Likert scale: 1 = strongly disagree, 5 = strongly agree) that MIS professionals spend most of their time isolated behind a computer. Non-MIS faculty and staff interviews produced similar results in that they virtually all shared this misperception when asked to describe the nature of MIS.

Consistent with the "techie" theme, focus groups perceived that MIS majors required a high level of intelligence, attention to detail, and self-motivation to work with computers. They strongly expressed the sentiment that one must know quite a bit about computers prior to choosing the major. Students commented that MIS is too hard or not what they want to do. For example, one student said: "When my computer breaks or I need help with an application, I call an MIS major. I certainly couldn't be one [an MIS major] as I can't, and don't want to, help anyone with their computer problems.".

Results from the questionnaire echoed the focus group sentiment that one needs *strong prior knowledge and interest in computers* to enter the major (Figure 5). The data revealed that 85 percent of students and 75 percent of parents agreed or strongly agreed that one needs prior knowledge and interest.

When asked about the MIS job market during the focus groups, students shared their *concerns regarding offshoring and outsourcing* as significant threats to the technology industry. Survey results indicated that 57 percent of parents and 44 percent of students strongly agreed or agreed and 21 percent of parents and 32 percent of students scored gave a neutral response to whether MIS jobs are being offshored (Figure 6). Further, we found it surprising that the majority of students and parents did not think jobs in IS were declining (see Figure 6). In fact, 54 percent of parents and 56 percent of students indicated that they disagreed or strongly disagreed with the statement that IS jobs were declining. This finding suggests that concerns regarding negative sentiments toward MIS job prospects largely involved offshoring. Faculty and staff also shared concerns regarding the dot-com bust and offshoring. One faculty member expressed his

concern by saying “the future job market will be worse off in the long run”. One faculty member made distinctions between MIS jobs and computer science (CS) jobs. He stated that most CS jobs will be offshored but not all MIS jobs will. Students in the focus groups expressed that faculty and parents often emphasized that one has no future in MIS and that should take it only as a second major. For example, one student stressed: “We are told in college intro classes that MIS is a ‘secondary major’ and can’t survive on its own”. Faculty and staff interviews revealed the same sentiments.

While discussing the IS job market, compensation emerged as a theme in the focus groups, and we followed up on this topic with faculty and staff interviews. In both data sources, students, faculty, and staff perceived *IS jobs to receive lower compensation* compared to other majors, especially accounting and finance. We found this factor to also detract from whether COB students chose the major.

Lastly, during this phase, we probed focus group participants, faculty, and staff to further explain what MIS is and the roles MIS graduates take in industry. We found clear results: students *did not clearly understand what MIS is* or *what an MIS graduate does*. Most participants, however, stressed that MIS graduates are “techies” and, thus, good with computers (as the previous quote from the student who mentioned calling MIS majors for help when faced with computer problems illustrates). Faculty and staff gave mixed responses. Only two faculty members demonstrated that they fairly accurately understood MIS, its strategic importance in business integration, and the diversity of roles available. The remaining faculty and staff seemed to have a surface-level understanding that focused mostly on the work’s technical nature.

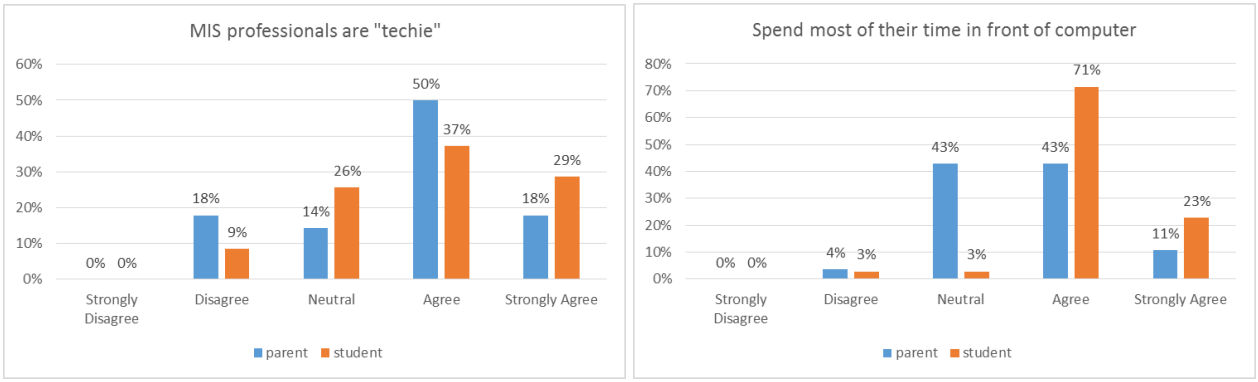


Figure 4. Student and Parent Perceptions in 2006: MIS Is a “Techie” Field

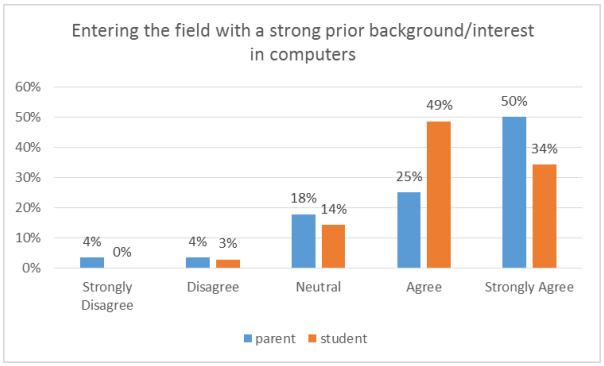


Figure 5. Student and Parent Perceptions in 2006: One Needs Strong Prior Knowledge/Interest in Computers

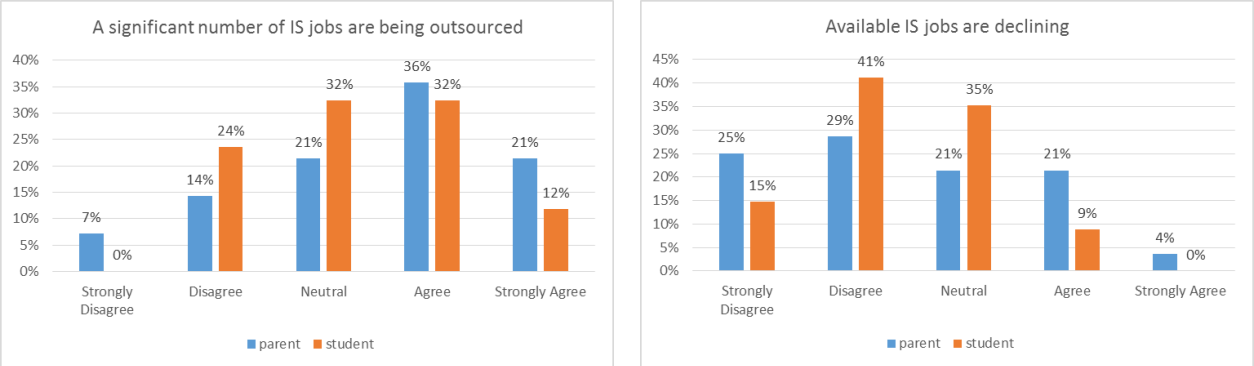


Figure 6. Student and Parent Perceptions 2006: IS Jobs Are Being Offshored/Declining

4.1.3 Post Phase One Interventions: "The Real Deal on MIS"

To address the misperceptions that we identified in phase one, we developed course content to better explain what MIS is, which we discuss in Section 6.1. The content included five modules titled "The Real Deal on MIS". This intervention took a year to develop, and we implemented it in the January to March quarter in 2008. The intervention targeted all second-year COB students in the introduction to MIS course (MIS 202). The course enrolled only COB students and contained mostly second- and third-year students (including transfers). We delivered the intervention in the course after we administered the survey (on the first day of the course), and, therefore, it did not affect participants in phases two and three.

4.2 Phase Two—2010: The Slowdown

Phase two began in 2010 and focused on addressing whether students still had misperceptions about MIS, what they were, and whether they changed In this phase, we used the same elicitation techniques as in phase one with minor adjustments. Results from this phase revealed that misperceptions about MIS diminished only slightly. Therefore, we developed an intervention to target these misperceptions earlier than MIS 202 (as per the previous section) by implementing a module in MIS 201, the IT tools-based MIS course all first-year COB students take.

4.2.1 Phase Two Data

We conducted three focus groups with the same design and guiding questions. We also distributed the 2006 questionnaire to all 216 students enrolled in the introduction to MIS (MIS 202) course during the class period in week one of the quarter before we discussed any content from phase one intervention. Giving the students class time to complete the questionnaire yielded nearly a 100 percent response rate (we omitted some responses for incomplete or illegible responses). We slightly modified the questionnaire to include questions that explored themes that emerged in the literature and analysis in phase one (see Appendix B). Specifically, we asked for more background information about students' current declared majors. We also followed up on perceptions about the major's difficulty. Further, we elicited feedback from eight of the 10 faculty members and one of the two academic advisors who participated in phase one. We did not elicit feedback from parents during this phase. We analyzed data was using the methods we describe in Section 3.2.

4.2.2 Phase Two Results: What Perceptions did Students have about MIS in 2010?

The results from the student focus group revealed that, in 2010, they again perceived MIS as *largely a technical field.* Students associated MIS graduates with holding technical roles in programming, Web development, and Microsoft Office, and (to a lesser extent) IT consulting. Non-MIS majors referred to their first MIS course (a computer literacy/IT tools course that MIS departments typically deliver for COB first-year students) as indicating what the major would be like. Some students in the focus groups commented on the importance of IT for business, and some acknowledged MIS students' business role. Students in the focus groups also perceived that the MIS major centered on programming due to their observing that MIS majors spend significant amounts of time working on programming assignments. For example, one student said: "MIS majors are always programming in the student labs; that is the impression I get of what they do in college".

The responses from the questionnaire echoed the perception of MIS as a technical field: more than 67% gave a neutral response to, agreed with, or strongly agreed with the statement: “MIS professionals are techie”. In the survey, 88 percent gave a neutral response to, agreed with, or strongly agreed with the statement that MIS professionals spend most of their time behind a computer (see Figure 7). We also found from the interviews that faculty perceived that students still view MIS as a highly technical field. One faculty member, for example, mentioned that, when she probed students about taking up MIS, they often replied: “I can’t go into MIS; I don’t know anything about computers or programming”.

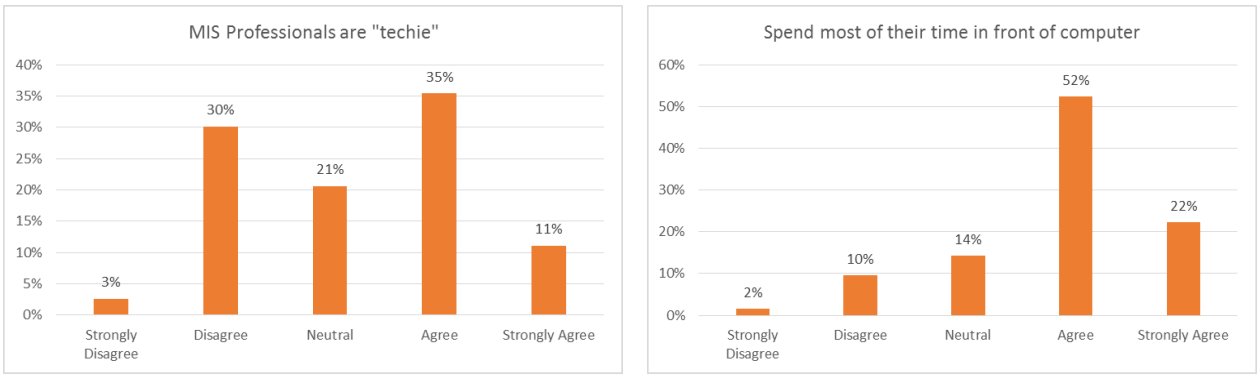


Figure 7. Student Perceptions in 2010: MIS Is a “Techie” Field

The faculty and staff interviews revealed that they remained unclear about the nature of MIS. They differed from student questionnaires and focus groups in that the majority of the interviewees emphasized the importance of a business understanding in MIS and the strategic role of IT. However, they did not understand what MIS professionals do and could not explain the nature of the profession to students beyond the fact that it concerned IT. For instance, one faculty member said:: “I don’t know what you do”.

Results from the questionnaire continued to reveal that a significant number of students believed that *one needs strong prior knowledge and interest in computers* to enter the major (Figure 8). The data revealed that 78 percent of students scored gave a neutral response to, agreed with, or strongly agreed with the statement that one needs prior knowledge and interest.

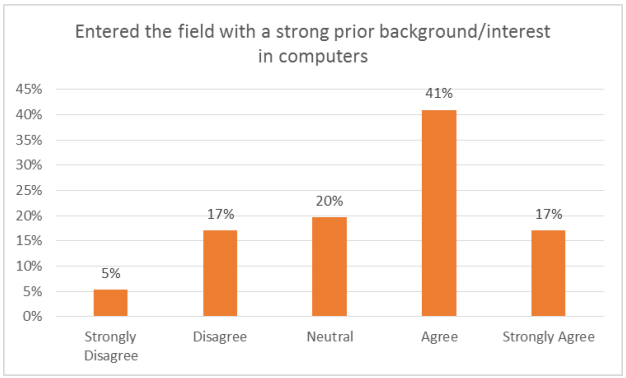
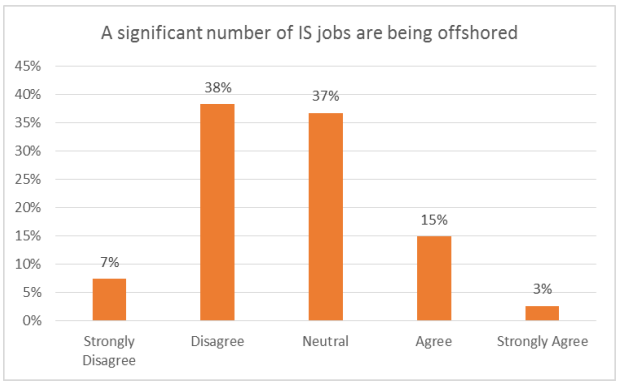
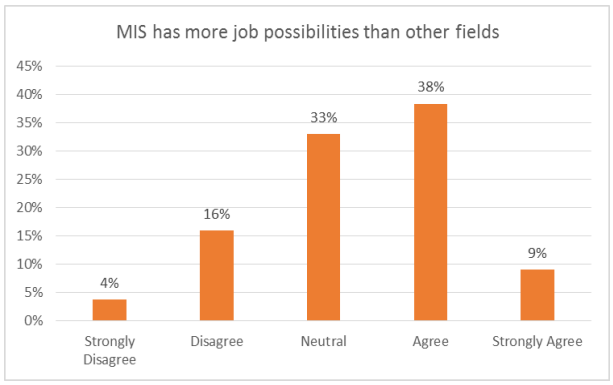


Figure 8. Student Perceptions in 2010: Strong Prior Knowledge/Interest in Computers Is Necessary

When asked about the MIS job market, faculty and staff interviews and students in focus groups expressed *optimism*. Since focus groups revealed a positive outlook for job prospects, we rephrased the survey question from phase two from whether “MIS jobs are declining” to whether “MIS has to more job possibilities than other fields”. Survey results indicated that 54 percent of students agreed or strongly agreed and only 12 percent disagreed or strongly disagreed that MIS jobs are more readily available today. Furthermore, 47 percent of respondents agreed or strongly agreed with, 33 percent gave a neutral response to, and only 20 percent disagreed with the statement that MIS provides more job opportunities than other fields. Students also expressed less concern with offshoring: only 18 percent agreed or strongly agreed that MIS jobs are still being offshored. Many (45%) disagreed or strongly disagreed that jobs were being offshored, while 37 percent gave a neutral response (see Figure 9). Faculty and staff expressed less concern with offshoring as well. We recognize that changing how we phrased the questions between

phase one and two means we cannot directly compare their results. However, the interviews and focus groups do provide context for the positive outlook surrounding the MIS job market in 2010.





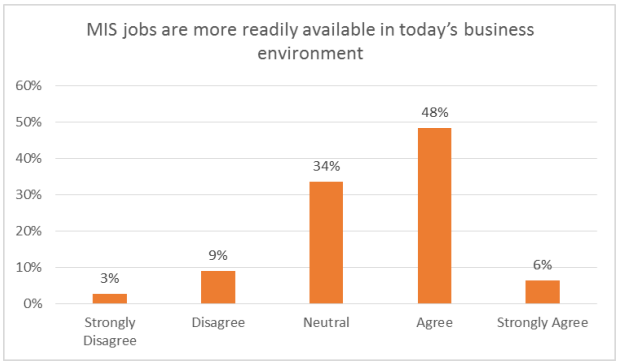


Figure 9. Student Perceptions in 2010: IS Jobs Are Being Outsourced

Further investigating a theme that emerged in 2006, we asked students to share their perceptions about the compensation level for MIS jobs compared to other business majors. Students perceived *IS jobs to be better compensated* than other business majors (Figure 10). Questionnaires revealed that 41 percent of respondents agreed or strongly agreed that MIS jobs pay more than other fields, while 40 percent gave a neutral response. Only 18 percent of respondents disagreed or strongly disagreed that MIS jobs pay more.

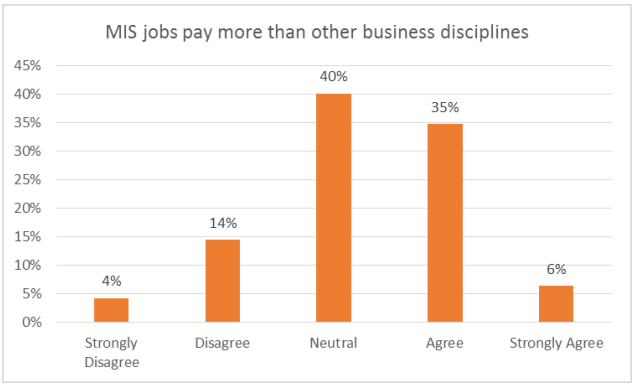


Figure 10. Student Perceptions in 2010: IS Jobs Are Better Compensated

When probed to more deeply explain what MIS is and the roles MIS graduates take in industry, students *did not clearly understand what MIS is or what an MIS graduate does*. Most participants could recite a conceptual definition about the integration of IT in business but focused on technical elements such as designing and developing software programs and websites when probed further. While MIS from faculty and staff understood what MIS is or what an MIS graduate does slightly better than the students, they still could not articulate or explain the roles MIS professionals play and their importance to a business, which the earlier quote "I don't know what you do" illustrates. As such, both students and faculty/staff generally

saw MIS as a technical field with pervasive programming and web development roles. Faculty expressed some knowledge about consulting roles but could not clearly articulate what they entail. Some faculty did refer to business integration as a function that IS professionals meet but could not explain it in detail.

4.2.3 Post Phase Two Intervention: "What is MIS?"

The persistence of misperceptions about MIS between 2006 and 2010 made it clear that we needed to begin to address how students perceived MIS earlier, so we decided to look for an opportunity to do so in the first year of their college careers. We developed one module to explain what MIS is, which we discuss in Section 5.1. We introduced the module in the information and technology tools literacy MIS course (MIS 201) in the curriculum that all COB first year students take. We implemented the content in the September-November quarter in 2010. The intervention had the potential to influence all phase three participants since we implemented it in the year prior to administering the survey in phase three.

4.3 Phase Three—2014: The Recovery

In phase three (in 2013 and 2014), we shifted our attention from RQ1 (how do students perceive MIS) to RQ2 (which perceptions have changed?) and RQ3 (which perceptions have not changed and why?) in more depth. Findings from phases one and two and new themes in the literature suggested that some students' perceptions had begun to shift. The first two phases revealed that students stereotyped and negatively misperceived the profession, individuals in the profession, and the bleakness of job prospects. After phase two, the literature revealed changes in some of the misperceptions but little understanding about why and how (Downey, 2011). For this reason, we turned our efforts in phase three to better understanding students' perceptions and focused on asking more substantive questions regarding what MIS is and why students major in MIS.

4.3.1 Phase Three Data

We administered a modified questionnaire and targeted the same population of students in the introductory MIS course during the September-November quarter in 2013 and March to June quarter in 2014. We received 347 responses. The new questionnaire did not include the quantitative questions about perceptions but rather focused on eliciting perceptions using an open-ended format to provide a richer set of data. We used the same open-ended questions that we used in phases one and two to more deeply understand students' misperceptions by allowing them to describe their understanding in their own words. We used this approach since qualitative open-ended questions provide a better medium for uncovering the extent to which students understood what MIS is and what MIS graduates do (see Appendix C). We also added the following supplemental questions regarding the relevance of MIS:

1) Name two current information systems areas/topics that you are interested in learning more about.
2) Describe one current information systems issue that you think is important and explain why.

While these questions may not provide a direct comparison to phases one and two, they elicit more in-depth responses that require domain knowledge rather than common and basic definitions that students may have acquired through other coursework or heard from advisors. We encouraged students to articulate, in their own words, the breadth and depth of their perceptions and misperceptions in terms of the function, roles, and domain of MIS through these questions. By design, this phase yielded a richer and larger amount of qualitative data for analysis. We explain the data-analysis techniques we followed in Section 3.2.

4.3.2 Phase Three Results: What Perceptions did Students have about MIS in 2014?

We first asked students to define what MIS is. About 14 percent indicated they did not understand MIS at all, 26 percent emphasized that MIS is a technical field, and 60 percent stressed the integration of IT in business (see Table 3). We found that the majority of students understood on a basic level the concept of IT and business integration. Forty percent of students either could not explain MIS or explained it simplistically as something to do with "computers". Of the 26 percent who emphasized the technology, most focused on Microsoft Office or computers as what MIS focused on, which the following comments show:

MIS is specializing in the use of programs like Excel, Access, PowerPoint, [and] Word to develop organized and professional documents for use in the business world.

Understanding of systems such as Excel, PowerPoint, Outlook, etc., and using those systems in a business.

Working with computers in a business environment.

Of the 60 percent who referred to the integration of IT and business, they clearly had a largely superficial understanding. They expressed that MIS concerns using technology to improve business efficiency, to bridge computer programmers with business needs, or to manage business information, which the following quotes illustrate:

Products and development resources used to store and manage information for businesses.

How companies keep track of information through databases.

Table 3. Students' Perceptions in 2013 and 2014: How Students Define MIS

MIS definition	Total	Total %
No understanding of MIS	50	14.41%
Emphasized the technical nature of MIS	89	25.65%
Emphasized a mix of technology and business concepts	208	59.94%
Total	**347**	**100.00%**

To understand the depth of students' perceptions from a broader perspective, we asked them to describe one MIS-related issue that is important for business and why. A significant number of students (33 percent) stated they were unsure, did not know, or left a blank space in response to this question, which indicates they lacked knowledge and awareness of the MIS domain. This finding suggests that a third of business students in their second or early third year of college have little awareness about how MIS applies to business. The majority of responses (40%) provided further evidence that a significant number of students (39%) viewed MIS in relation to technology broadly or to basic personal IT tools (dark grey categories in Table 4). Students listed technology innovation (9%), technology in business (9%), application of technology in a specific industry (7%), use of productivity software such as Microsoft Office (5%), and Web development and design (6%). The results indicated that only 23 percent of students more substantively understood the breadth and depth of the MIS domain: they indicated logistics, business analysis, and efficiency improvement as key functions (light grey categories in Table 4).

To understand students' perceptions in an alternative way, we probed students to reveal what MIS topics they had an interest in or wished to learn more about. Students shared a breadth of topics (see Table 5). The list of topics we identified further reveals the limited and superficial understanding that students had about MIS in terms of range and depth of topics/contexts. Topics that focus on personal productivity software, which 31 percent of students listed, represented the highest category and made up 21 percent of the responses. This result suggests that the students lacked understanding about the types of software and topics in the IS domain. Twenty one percent of students centered on Web design and Web development (14% of topics listed). Data analysis, which 16 percent of students identified, made up 11 percent of topic categories. Fourteen percent of students wrote "unsure", "don't know", or left a blank space in response to this question, which indicates they lacked knowledge, interest, or confidence in this area. Further, 10 percent did not identify a specific topic but stated words to the effect that they were interested in how one could use MIS or pertained to their major. Lastly, 11 percent, most likely MIS majors, identified specific and more substantive topic areas related to the MIS domain, such as system integration and enterprise systems (3%), security (2%), and system analysis and design (6%). In general, this analysis suggests that most students *superficially understood the scope and depth of the MIS domain.* Most topics that the students identified suggest that they understood MIS at a high level but still viewed it as tool based. Consistent with earlier phases, students still associated MIS with PowerPoint, Excel, Web design, and software-application development—all major components in introductory-level computer literacy courses in the university and business curricula. Perhaps this content, often part of tool-based introductory technology courses delivered by MIS departments, skewed how students comprehended the major.

Table 4. Students' Perceptions in 2013 and 2014: MIS Domain Topics Students Identified as Important

MIS-related issues	Total	% of total students	% of total responses
Unsure	113	33%	31%
Technology innovation	32	9%	9%
Other	31	9%	8%
Role of technology in business	30	9%	8%
Security	28	8%	8%
Improving business process efficiencies	24	7%	7%
Application of technology to specific industry	24	7%	7%
Web development and design	21	6%	6%
Business analysis	19	5%	5%
Use of productivity software (e.g., Microsoft Office)	19	5%	5%
Social media	15	4%	4%
Logistics	11	3%	3%
Total	**367***	**105%**	**100%**

* Note: we obtained more responses than student respondents as some provided multiple responses to this question.

Table 5. Students' Perceptions in 2013 and 2014: MIS Domain Topics Students Are Interested in Learning More About

MIS topics of interest	Total no. of occurrences	% of total students	% of total responses
Personal productivity software (Microsoft Office)	106	31%	21%
Web development/Web design	71	21%	14%
General MIS knowledge	68	20%	14%
Data analysis	55	16%	11%
Unsure	48	14%	10%
Mobile apps	39	11%	8%
Other	28	8%	6%
Application of MIS to other fields	27	10%	5%
Systems analysis and design	24	6%	5%
Integration and enterprise software	16	3%	3%
Security	8	2%	2%
Social media	6	2%	1%
Total	**497***	**144%**	**100%**

* Note: we obtained more responses than student respondents as some provided multiple responses to this question.

We also asked students to list and define specific roles available in MIS to gauge how deeply and broadly they understood the nature of MIS careers. Students seemed to have knowledge about possible career paths for an MIS major, such as business analysts, consultants, and IT personnel but, again, superficially understood these roles. This question further revealed a mix of perceptions about MIS roles (see Table 6). Students most commonly identified the programmer or developer role (15 percent of the responses from 24 percent of the students). Another 24 percent of the students identified IT personnel as a role listing "computer people", "work with computers", or "install computers" as their response. These findings suggest that 30 percent of the students still perceived MIS roles in a technical way. The majority of students (50%) listed common and general roles in MIS, such as business analyst, consultant, and data analyst, which reveals they at least understood the generic roles available in MIS at a basic level. Seven percent of students listed more specific roles such as testing, IT audit, and logistics, which indicates a

more specialized interest or understanding. Twenty-three percent of students listed vague, irrelevant, or blank answers.

Table 6. Students' Perceptions in 2013 and 2014: MIS Roles Students Identified

Roles MIS majors hold	Total	% of total students	% of total responses
Developers/programmers	83	24%	15%
IT personnel	82	24%	15%
Business analysts	81	23%	14%
Vague, irrelevant, or no response	80	23%	14%
Consulting	79	23%	14%
Management positions	61	18%	11%
Data analyst	48	14%	9%
System design/administration/maintenance	26	7%	5%
IT audit	16	5%	3%
Logistics/supply chain	4	1%	1%
Testing	2	1%	0%
Total	**562***	**162%**	**100%**

* Note: we obtained more responses than student respondents as some provided multiple responses to this question.

Lastly, we elicited student perceptions about the MIS job market and whether they would consider MIS as a major and why. Not surprisingly, *almost all students indicated that MIS has a positive job market.* Twenty-four percent of students said they were considering MIS as their major, 56 percent said they were not, and 20 percent said they would consider it as a second major. Reasons for why students would not consider MIS as a major included they had already chosen a major (35%), MIS is too difficult (4%), they do not have the prior technical skills (16%), or they would not enjoy the work (6%) (see Table 7). These responses repeat (although to a lesser extent) the themes from the first two phases about the major's *difficulty and perceived prior knowledge requirement*.

We also found that many students, including those who suggested that they would not choose MIS as their major, indicated that they recognize that *MIS has great value to business and their careers.* Some comments revealed that, unlike marketing or finance, students did not become aware of MIS until after they attended college and took the introductory MIS course. The following comments indicate the perception that, by the time students enrolled in the typical (not tool-based) introduction to MIS (MIS 202) course and decided they might want to pursue it as a major, many had progressed too much into their college degree to switch or add majors:

> *I would consider MIS as a second major; however, I do not have enough time left for it to be a realistic possibility. I didn't know MIS was a viable major until I got into my business classes. After taking the initial MIS class, it seemed like something I would enjoy.*
>
> *I wish I had understood the importance and need for the growing industry in MIS before I declared my major in marketing and management. I would add it as a minor.*

Table 7. Why Students Choose or Not Choose to Major in MIS in 2013 and 2014

Reasons to pursue or not pursue MIS	Total	Total %
I already declared a major	129	34.68%
MIS is valuable	102	27.42%
No prior knowledge of MIS	58	15.59%
No response	39	10.48%
Don't enjoy MIS	22	5.91%
Difficulty	16	4.30%
Compensation	6	1.61%
Total	**372***	**100%**

In summary, the results from the 2014 phase indicate that, for the first time, a critical mass of business students seemed to understand MIS on a conceptual level and in broad terms. The majority understood that MIS involves not only technology but also how businesses use it. However, we concluded that they still understood MIS at a somewhat general level. Further, questions regarding roles MIS majors occupy in industry and topics in the domain still revealed that students lacked knowledge about the profession's true nature. We clearly found the students *could now reasonably define MIS but did not actually understand what MIS professionals do*.

4.3.3 Post Phase Three Intervention: "What MIS Does?"

In our post phase three intervention, we developed more explicit real-world examples that illustrate what MIS professionals do, such as an annual conference day designed for COB students enrolled in the introduction to MIS (MIS 202) course (after taking the survey) and all MIS majors and other strategies that we outline in Section 6.2.

5 Cross Analysis: Which Perceptions Changed Between 2006 and 2014?

In this study, we investigate three research questions:

RQ1: What perceptions did students have about MIS programs between 2006 and 2014?

RQ2: Which perceptions changed during that period?

RQ3: Which perceptions did not change and why?

In this section, we present the findings from conducting a cross-phase analysis in which we focused on examining the thematic differences in perceptions between the three phases and on revealing the reasons behind those changes.

Analyzing the data across the three phases, we found three clear changes: phases one and two seemed quite similar, while phase three seemed to indicate an evolved perspective. Table 8 summarizes the perceptions in each phase across the themes that emerged in the literature and our analysis. We use this summary as a guide to conduct our cross-phase analysis and discuss this study's implications.

Increased confidence in the job market: in 2006, the data revealed that parents, students, and faculty had little confidence in the MIS job market even though the literature indicates a growth in jobs. Surprisingly, 56 percent of students in 2006 indicated that they disagreed or strongly disagreed with the statement that IS jobs were declining. However, focus groups, interviews, and the question regarding outsourcing indicated they lacked confidence regarding the job market due to offshoring and the dot-com bust as we discuss in Section 4.1. This view changed significantly in 2010 and 2014. In 2010, 47 percent of survey respondents perceived a strong MIS job market and, in 2014, 100 did. In fact, in 2014, 30 percent of students mentioned they were considering MIS as a first or second major due to the positive job market compared to other majors.

Decreased mention of outsourcing and offshoring: in 2006, offshoring emerged as a significant theme and a deterrent from majoring in MIS. Fifty percent of parents and students mentioned offshoring strongly in phase one and associated it with a loss of jobs. In 2010, students still expressed concern with offshoring, but only 18 percent of students agreed or strongly agreed that they had concerns about offshoring. In 2010, 47 percent of students either agreed or strongly agreed that MIS had positive job prospects. Interestingly, we found that students did not mention offshoring at all in phase three and expressed optimism about the MIS job market.

Better understanding or definition of MIS: over time, faculty and students could better articulate what MIS is. In 2006, we often heard the question "so what is MIS?". Respondents of the various phases could not define MIS and often associated it only with "computers". In 2010, respondents did not articulate MIS much better than in 2006, and the majority of students continued to associate MIS with computers. In 2014, we saw that students more clearly articulated and defined MIS (i.e., they mentioned both technology and business concepts and more broadly understood MIS roles at a basic level). In 2006 and 2010, respondents predominantly included development and tech support roles with MIS graduates. In 2014, for the first time, respondents more widely identified roles such as business analysts, project managers, and consulting as key job opportunities for MIS majors. In our opinion, we may attribute this change to the intervention we introduced in 2010 through a module that we delivered in the first-year tool based MIS course.

Table 8. Summary of Themes in Each Phase of the Study

Perception	Phase one: 2006	Phase two: 2010	Phase three: 2013 and 2014
Intervention effect			"What is MIS?" module
MIS is a "techie" field	67% agreed or strongly agree 20% neutral	47% agree or strongly agree 20% neutral	26% some tech notions 60% emphasize mix of tech and business 14% neutral
Spend most of their time behind computers	76% agree or strongly agree 20% neutral	75% agree or strongly agree 14% neutral	Not explored
Difficult and need strong prior knowledge	79% agree or strongly agree 16% neutral	58% agree or strongly agree 20% neutral	21% stated that it's difficult or no prior knowledge in MIS 6% don't enjoy technical
Concerned with offshoring	50% agree or strongly agree 27% neutral	18% agree or strongly agree 37% neutral	Not mentioned
Good job prospects	56% agree or strongly agree 21% neutral*	48% agree or strongly agreed 33% neutral	100% expressed positive perceptions
Compensation	Pays less, doesn't stand on its own	Pays better than other business jobs: 41% agree or strongly agree 40% neutral	Not explored
MIS roles	Mostly development and tech support roles	Mostly development and tech support roles with some mention of consulting	Broader roles listed include business analyst, project management, and others
Understanding of MIS	No clear understanding Strong focus on technology	Not enough depth in understanding Still focus on technology	Better understanding of technology in the context of business on a basic level; limited depth and breadth of MIS domain and profession

* Note: we derived the percentages from the 2006 phase from the question about IS jobs declining; 56% of students disagreed that IS jobs were declining.

5.1 Which Perceptions Did Not Change and Why?

Some perceptions persisted across all three phases and indicate that the participants truly did not understand the role of MIS in business. Students in all phases of the research consistently gravitated towards the tangible aspects of MIS and stressed that MIS involves Microsoft Office and other IT tools, Web and application development, and general programming (vs. less tangible aspects such as systems analysis and design and systems integration). Accordingly, most jobs they identified in the MIS domain remained largely technical (developer positions and technology support). Many students cited the MIS program's purportedly technical nature and the fact that it does not align with their business/career interests as reasons why they did not major in MIS. In focus groups with students and interviews with non-MIS faculty and staff across all phases, we consistently asked them to explain what MIS graduates do. They frequently said statements such as "I do not know what you actually do". Students and faculty again focused on more tangible aspects and referenced using IT productivity tools or programming to exemplify what MIS professionals do. We see several reasons why these misperceptions persisted. First, students have limited exposure to the true role of MIS professionals prior to taking the introduction to MIS course. Thus, they often receive misinformation from ill-informed peers, parents, faculty and advisors. Second, MIS departments often need to teach tool-based service courses to first-year students (e.g. MS Excel and PowerPoint) as our results indicated across all phases. While these courses do not actually form part of the MIS major's knowledge domain (which we emphasize in the course), we found that business students often associate these tools to the major thereafter. Third, most IS programs have technical and/or programming classes as pre-requisites required early in the major. Business students, faculty, and staff often form a false first impression of MIS when witnessing many of their peers in computer labs working on these technical courses (as the comments in focus groups and surveys across the three phases

indicated). Fourth, even though we repeatedly explained the MIS major and its technical and non-technical aspects in information sessions, intro classes, and informal discussions, we found that all stakeholder groups could better understand the more tangible aspects of MIS (e.g., hardware and software development and support). Conversely, they often struggled to internalize the less tangible aspects of MIS (e.g., systems analysis, systems/process integration, risk assessment, project and change management) because they were less familiar with them and because the outputs/deliverables are often not physical artifacts. Finally, we found students increasingly gained their first impressions of MIS through related coursework in high school, which often focus on the technical aspects of IS such as programming. In summary, we found that the general population has come to better understand "what MIS *is"* (i.e., they have grown to better understand the MIS major) conceptually but still does not understand "what MIS *does"* explicitly (i.e., they still do not understand the true roles of MIS professionals).

6 Discussion: A Systematic Approach to Addressing MIS Perceptions

As we show in this study, unprecedented opportunities exist for students in IS-related careers. Job opportunities for MIS majors have increased—a trend that we can expect to continue for the foreseeable future. The challenge involves rectifying the deficit between supply (too few MIS graduates) and demand (too many IS-related jobs available) as per Figure 1. Thus, solving the problem that we identify in this paper could have major ramifications. Students have an unprecedented long-term opportunity but, as each year passes, face a significant opportunity cost in forgoing MIS.

However, our analysis does suggest that progress has been made in debunking the primary misperceptions about the MIS major. It seems clear that business students have started to appreciate that MIS programs are valuable, doable, and viable career options. We submit that this progress has come through MIS programs' proactive efforts to dispel misconceptions early in business students' careers. Such efforts include working with employers to make them visible on campus, to generate interest in MIS programs, and to attest to their demand for IS talent. Student peers' increased word of mouth has also begun to have a positive impact on enrollments. Proactively leveraging senior MIS majors in early-stage MIS classes and events has been critical in promoting MIS to lower-level business students. As a result, we see that business students have started to appreciate the array of IS career options and ample good-paying jobs. They have also begun to view the technical component of IS programs as less of an obstacle—possibly due to the new generation of tech-savvy Millennials who have begun to make their way into classrooms. However, they still seem to understand MIS far too generally. While business students have gained clarity on key aspects of the MIS major, they remain unclear on the specific roles IS professionals play in organizations and, thus, the specific career options/trajectories the MIS major creates.

Despite the progress in addressing misperceptions over the past 15 years, we still need to do much work before MIS program awareness reaches equivalence with other more familiar fields, such as marketing, accounting, and finance. Our research shows that, through proactive awareness efforts, we have been effective at convincing more business students to at least give MIS a try. When they do agree to do so, we have been able to effectively allay their initial fears/concerns about the curriculum and provide clarity on the scope of the MIS major, baseline techniques, tools, and terminology. But we have not successfully helped to definitely understand the scope of career options that MIS programs create. Accordingly, business students have a better idea of *what MIS is* (in the classroom/curriculum), but they still struggle to understand how the curriculum translates into *what MIS does* (in the real world). Through our study, we have learned that ample room for improvement in developing both classroom and real-world understanding of MIS remains. In this section, we offer strategies to help students better understand what MIS is while chipping away at the larger challenge of helping them understand the real-world opportunities that the MIS major creates.

6.1 Strategies for the Classroom: Understanding "What MIS Is"

We successfully helped students to more clearly understand "what MIS is" through teaching unifying constructs that define and scope MIS and provide a common vocabulary for students and instructors. Our experience shows that, as students begin to understand these constructs, they serve to frame how they understand the MIS major from that point forward. Hence, many of the misconceptions that we highlight in previous sections gradually recede. Furthermore, using recognized software tools (e.g., SAP enterprise resource planning [ERP], Tableau analytics, and IBM Watson technology) to solve real MIS business problems provides students with a tangible means to apply core concepts and develop and practice MIS skills. This practice also deepens their understanding about how MIS differs from fields such as computer

science by showing that MIS majors design, select, configure, and implement IT tools to solve business problems, while computer science majors focus more on developing the IT tools.

6.1.1 Establish Unifying Constructs

In order to define "what MIS is", programs need consistent unifying constructs that define the scope of MIS, lay out the primary terms, and clarify how they relate. One can use these constructs to target all stakeholders such as business students, MIS majors, business faculty, MIS faculty, and employers. If used consistently, these constructs can incredibly effectively shore up the vague understandings that drive students' misperceptions. We use these unifying constructs in our courses and our promotional materials to create a consistent message and branding for our program. The constructs will vary from program to program, but one should establish them in partnership with key employers/MIS advisory boards. Once established, *all* faculty throughout the MIS curriculum should understand and use them. Examples of unifying constructs that we developed and use due to this research include a definition and model of information systems (what information systems are), the system development lifecycle (how information systems are designed and developed) and types of information technology systems businesses use (what the universe of IT systems is). Accordingly, we offer the following unifying constructs as examples.

Q: What are information systems?

A: The magic of the "information systems triangle".

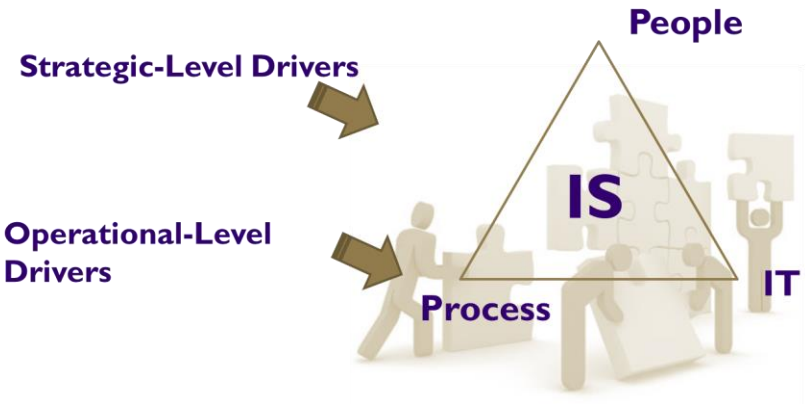


Figure 11. The Information Systems Triangle

This construct generally defines information systems as integrated sets of people, processes, and information technology that organizations implement to support their strategic goals and achieve operational efficiency. The information systems triangle constitutes the most fundamental concept for students because it frames any IS analysis they may conduct. It incorporates the information systems' socio-technical elements and, therefore, shows their technical and non-technical elements. One can use the construct to illustrate:

- High-level roles that students play as analysts/integrators in developing systems (integrating all three elements of the triangle)
- Process engineers, which focus on the process element but also consider the impact on people
- Software designers and selectors, which focus on the IT element but also software's impact on users and existing processes
- Change managers, which focus on the impact that systems have on various people/stakeholders
- The triangle also provides a macro-level understanding about how strategic goals and the need for operational efficiency drive system design and development.

We seek to help business and MIS students appreciate and leverage the IS triangle as a framework to initiate and guide all analyses and as a high-level tool to explain systems to actors at all organizational levels. Students need to understand their role in maintaining the delicate balance of the triangle. Through analysis activities, they learn that, as one element changes (e.g., acquiring a new ERP system), their role

as IS analysts focuses on ensuring that they maintain the balance through appropriate process changes and end-user change management. Due to this construct's all-encompassing nature, we require students to use it in most assignments, discussions, and activities.

Q: How do we develop information systems?

A: The system development lifecycle

Students also need to understand the process that MIS professionals use to develop systems. Most MIS programs use the system development lifecycle (SDLC) construct, so the idea is not new. However, we developed our version of SDLC in conjunction with our key employers and advisory board. We sought input from more than 10 key stakeholders and created a process that amalgamated their approaches. The stakeholders reviewed it, provided input, and signed off. As such, their input ensured our SDLC had widespread relevance and achieved external stakeholder buy-in. Our advisory board periodically reviews and updates the SDLC to ensure relevance. We recommend MIS departments follow a similar process. The SDLC construct should outline phases, actions taken in each phase, deliverables created, and tools used to create them (see Table 9).

Table 9. SDLC Phases and Deliverables

Deliverable	SDLC phases				
	Current state analysis	Requirements definition	Application design	Application development	Implementation
System overview	X				
As-is use cases	X				
As-Is process flows	X				
Known issues list	X				
Project plan*	X	X	X	X	X
Risk assessment I	X				
To-be use cases		X			
To-be process flows		X			
Signoff I		X			
Risk assessment II			X		
Functional design write-up			X		
Site map			X		
Interface description			X		
Screen prototypes			X		
Backend description			X		
Database design			X		
Signoff II			X		
Prototype I				X	
Prototype II				X	
Application test				X	
Documentation					X
Final demonstration					X
Knowledge transfer					X
Migration					X

While we focus on the phases listed, we do not necessarily sequence them a pure "waterfall" methodology as the table may seem to imply. Our SDLC approach also integrates contemporary methodologies such as agile, which several different courses and key design phases cover. We capture information about our SDLC and deliverables and details on how to create them in a document called the *MIS Handbook*

(copies available on request), which the college distributes to all new MIS majors. As with the IS triangle, all program faculty must use this construct to ensure all stakeholders consistently understand the process. The introductory MIS class exposes business students to the SDLC on a rudimentary level to introduce them to the range of activities MIS professionals perform and the diversity of roles MIS professionals may hold (e.g., project managers, designers).

Q: What types of IT systems exist?

A: The "big three" information systems

We submit that MIS programs should define the scope/universe of IT software system types through an integrated systems architecture diagram (e.g., see Figure 12). This diagram lays out the three specific categories of IT software toolsets that MIS Professionals use: enterprise systems (ES), business intelligence systems (BI), and collaboration systems (CS). The diagram explains what MIS professionals use the tools for and how the tools form an integrated system from which to transact business (ES), promote decision making (BI), and share information (CS). This construct provides the most detailed/concrete view of the types of IT that IS professionals encounter in business. We tell students that, with few exceptions, all software fits into the big three framework, which paints a clear picture about the array of IT options available to them as future IS analysts. It also gives business students a clear idea about how IS support and shape various business functions and complement other business majors. For example, the BI suite has particular relevance to marketing majors looking for a way to differentiate themselves for the large number of marketing majors in the job market.

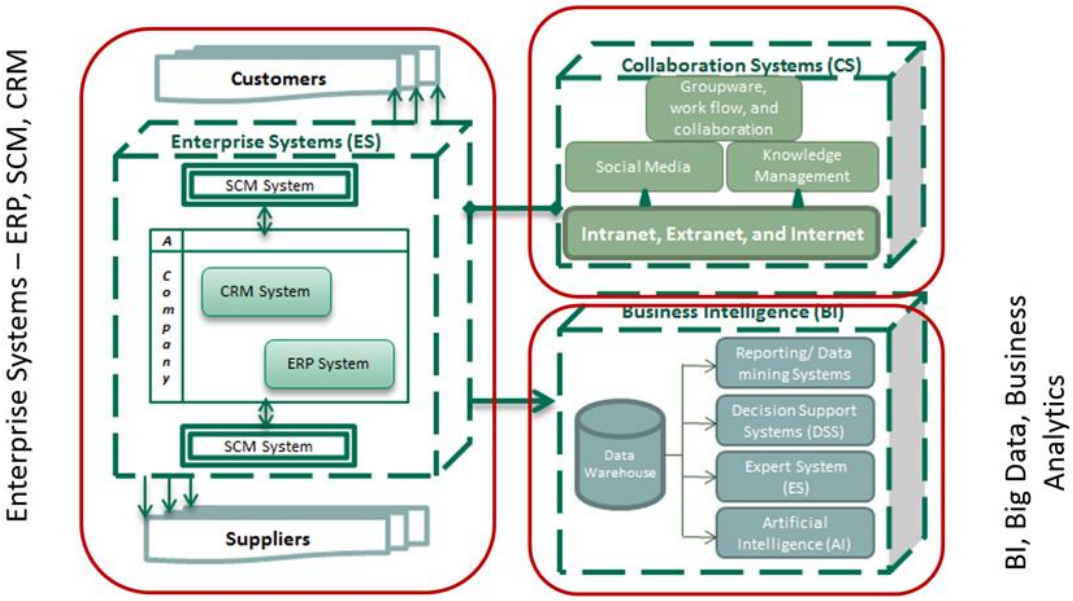


Figure 12. Utilize Recognized Big Three IT Software Tools

In order to create a more tangible experience for MIS and business students, students need to use recognized toolsets for each of the big three. Solutions such as SAP for enterprise systems, IBM Watson Analytics, Tableau business intelligence software, and Microsoft SharePoint for collaboration can provide business system examples that students can grasp readily. They help students understand how information flows across an integrated enterprise and their role in selecting and implementing these systems and in developing tangible technical software configuration and implementation skills. In our MIS curriculum, we have embraced the importance of the big three through a required class in enterprise systems (on the SAP platform) and electives in business intelligence (using IBM Watson Analytics, Tableau, and the Microsoft stack) and collaboration systems (on SharePoint). These classes have become popular with MIS students because they provide tangible and highly marketable skills. Employers consistently cite SAP, Tableau, and SharePoint experience as key differentiators on student resumes. To extend this differential advantage for our MIS students, we have begun working on a program that will prepare students for various certifications in SAP and SharePoint after completing related classes. We promote these differentiators to the business students in the introductory classes to also attract them to the major.

6.1.2 Leverage the Introductory Class to Promote Clarity

Our faculty decided early on that the MIS introductory class played a critical role in our strategy since it represented our first and best opportunity to recruit new MIS majors. With the class, we could also actively dispel misconceptions about the MIS program and careers by controlling the content and resulting perceptions. Thus, we decided to invest heavily in redesigning the introductory class to make it a microcosm of the entire IS major and possible MIS careers. With this anchor course, we provide students with a high-quality, comprehensive sample of the IS curriculum that our top instructors deliver. We designed the course to familiarize students with the unifying MIS constructs mentioned earlier and how they apply to contemporary business. In the context of our unifying constructs, students learn the language of MIS, experience the entire SDLC, and gain hands-on experience with IT toolsets. They learn to shed their fear of IT through carefully scripted and monitored exercises in which they use several IT/design tools (e.g., Adobe Photoshop, Microsoft Excel, Project, Access, and ASP.NET), Tableau analytics, and SAP applications to design and develop simple systems to solve business problems. They also participate in activities and discussions designed to apply these foundational concepts in the IS business world and analyze how core systems contribute to strategic and operational effectiveness. In performing these activities, they also begin to understand the various non-technical and technical roles that MIS professionals play in integrating people, processes, and IT (per the IS triangle) to improve businesses. We also use our instructors strategically to help optimize the experience. Accordingly, our best teachers who can also promote MIS careers well teach this course.

As with most MIS programs, women have been woefully underrepresented in our student base (women have comprised fewer than 20 percent of our majors). To address this gender equity issue, we have our top female instructors teach the introduction course as often as possible. Largely through the efforts of our female instructors, we have increased the percentage of female majors to nearly 40 percent over the course of three years.

By emphasizing the introductory course, we have actively recruited large numbers of new majors and effectively shaped how they understand MIS. We focus on ensuring that, through the MIS introductory course, students gain a solid grasp about what the MIS major and career entails and the quality of the curriculum and familiarity with the MIS faculty and department culture all in the interest of increasing enrollment.

6.1.3 Leverage Upper-level Students to Provide Peer Inspiration

While excellent instructors have helped to dispel misconceptions and promoting the MIS major and careers, we found that students can play an even more critical role. Star junior and senior MIS students relate to and have more credibility with prospective majors in a way that instructors never can due to the peer connection they can forge. Upper-level students who have completed internships provide the most vivid image of a prospective student's future in MIS. Through a series of talks and activities in the introductory class and at MIS major marketing events, our upper-level students talk about the decision process and why they chose MIS. They discuss how they had similar misconceptions and how they turned out to be untrue and speak largely to the technophobic and extreme programming concerns students have. They speak in detail about the courses they have taken, the interesting projects they have worked on, the important concepts they have learned, and the quality of the courses and instructors. Most importantly, they articulate how what they have learned has positioned them for promising career opportunities. In these sessions, the students focus on diminishing misconceptions, inspiring prospective students to want to learn more, and to get them to at least consider the MIS major. The upper-level students also encourage prospective students to follow up with them after the sessions. Instructors have been particularly effective at sparking interest, but star students have been paramount in the final step of convincing students to actually pursue careers in MIS.

6.2 Strategies for the Real World: Understanding "What MIS Does"

Our experience shows that one also needs to leverage employers/practitioners and current MIS students to clarify "what MIS does" through real-world examples. We also create focus and clarity by concentrating primarily on how we position MIS students to serve as IS analysts. Frequent contact with MIS professionals and students working in various professional capacities illustrates the relevance of what they learn in the classroom and paints a clearer picture of potential MIS careers (particularly in various IS analyst contexts) and, thus, increases enthusiasm for the major.

6.2.1 Keep It Simple: Focus on the Role of the IS Analyst

As our research demonstrates, one of the most significant points of confusion for prospective students involves understanding the various roles that MIS grads can play in industry. In the past 15 years, our graduates have secured jobs in myriad technical and non-technical roles. As such, the MIS degree's versatility can serve as a selling point. However, we have found it also creates confusion about possible MIS career paths/options. To solve such confusion, we have focused on what we see as our program's core competency: creating IS analysts. Our IS analysts can further strategic goals and solve operational problems by developing and implementing information systems (integrating people, processes, and information technology as per the IS triangle). We use the SDLC construct to describe the role analysts play in this process and emphasize that they participate heavily in the planning, current/future state analysis, design, and implementation phases (while interfacing with computer scientists/software developers in the development phase). Focusing on the IS analyst role in the SDLC context illustrates the large and vital scope of non-technical and semi-technical roles that MIS professionals play. It also draws the key distinction between the roles MIS and computer science professionals play in business, which helps to eliminate common misconceptions that we identify in this study about MIS as a technical field and its similarity to the computer science major. We also emphasize the versatility of the IS analyst role as many industries require analyst jobs for a wide array of projects. We also provide students with the positive job projections (21% through 2024 versus 7% for all jobs) and high median pay projections ($85,800 versus $36,500 for all jobs) for systems analysts from the U.S. Bureau of Labor (2015b).

6.2.2 Design Activities That Use Real-world Examples

Students clearly crave what they perceive to be real-world knowledge and skills—especially in a business college where they constantly struggle to understand how what we teach translates into useful knowledge in a business context. As soon as we explain the relevance and importance of a concept in the context of a real business situation, something magical occurs: they understand it, they appreciate it, and they often want to know more about it. Therefore, we make it a goal to constantly use knowledge from our experiences to create that context for them. We effectively execute this strategy by integrating the following two practices:

- **Applying experience/relevance to the curriculum**: in line with the theme of keeping the experience real for our students, we feel that all courses, classes, and instructors need to address the simple question about all content they deliver: "Why is this important to business?". We remind ourselves that, if we cannot answer that question about everything we do in the classroom every day, then our students probably question its relevance. As such, we have worked diligently to incorporate our and our industry partners' industry knowledge and experience into our MIS curriculum model and its courses. We believe this relevance differentiates our MIS program from others.
- **Artfully using real-world examples:** similarly, one cannot easily contextualize any concept at any point in time using a real-world example. However, in our minds, it constitutes the most important tool we have to illustrate points, sell students on their importance, and engage them in discussions. We see contextualizing concepts with real-world examples as an art form rather than a skill as it involves creativity and improvisation. Often, it requires deviation from a planned lecture or "going off script", which can be difficult. However, by doing so, we can take advantage of an opportunity that arises from a student's question/comment or a relevant current event. We practice this art form with our students every day and also challenge them to do the same. We see contextualizing concepts in the real world as a key to their learning, appreciation, and engagement.

6.2.3 Leverage Practitioners and Upper-level Students to Provide Career Clarity

Taking the power of real-world illustrations a step further, we have found that nothing creates clarity and enthusiasm better than interaction with passionate MIS professionals who do interesting work. Accordingly, we plan various activities each year that give our business and MIS students the opportunity to network with experienced practitioners and upper-level students involved in internships. These events concretely illustrate various industry options, career paths, and typical "days in the life" of MIS professionals. Specifically, we regularly schedule classroom visits from individuals and practitioners who discuss various careers at their firms and specifics of the work they do. We also work with firms to plan interactive classroom activities, such as mock interviews, Q&A sessions, and the critiquing of student

analysis presentations. As often as possible, we try to integrate current students who have recently interned with one of the visiting firms into the classroom, which provides a perspective from "one of them" that other students can readily identify with. Students can also interact with MIS professionals via our quarterly MIS advisory board meetings. Board members have direct interaction with current and prospective students in the context of structured activities, program/curriculum focus groups, and panel discussions. Our "MIS day" every semester represents our most extensive event for raising awareness about the MIS major. This day-long event, held in the September-November and March-June quarters each year, includes panel discussions, activities, and a luncheon for faculty and select students and culminates in a networking social. Though this event requires a fair amount of coordination, the return on this investment has been significant. Current and prospective students regularly cite it as the event that "pulled it all together" for them, that helped them understand the MIS major and identify possible career options, and that convinced them to major in MIS.

7 Limitations

As with all single longitudinal case studies, our study has limited generalizability, and researchers need to conduct further comparative studies to analyze perceptions about MIS. We took steps to ensure that other researchers can replicate and assess our methods and interventions for further understanding. Further, we could not collect post-intervention measurement data to assess the impact that our interventions had on students' perceptions and enrollment. Future research that explicitly assessed the interventions over time on both perceptions and enrollment would strengthen our model. Nonetheless, we believe our study provides a unique rich and longitudinal context to deepen perspective on perceptions about MIS in one program.

8 Future Research

We see ample opportunities for future research. First, we see opportunity to continue our longitudinal study and deepen the qualitative approach in order to better understand the nature of IS students' perceptions. We also see the opportunity to extend the qualitative study to multiple MIS programs using the same methodology to compare and contrast across programs, university settings, and other organizational factors that may reveal differences in MIS perceptions. Future research should include questions about environmental factors (e.g. media exposure, knowledge of current IT events) and personal influences (e.g., parents and family members' knowledge of IT) in order to gain a more complete picture of MIS perceptions and how they change over time. We also see an opportunity to assess the efficacy of our interventions by studying perceptions pre- and post-intervention with the same student groups. Finally, we have begun leveraging our results to from this study to develop a quantitative instrument to delve more deeply into the factors that drive perceptions about the MIS major, careers, and our field's future among students, faculty, advisors, and parents.

9 Conclusion

Ashcraft, McLain, and Eger (2016) have predicted that U.S. degree recipients could fill only 41 percent of all computing-related jobs in 2024. Therefore, the academic and practitioner communities need to pay special attention to understanding and addressing any misperceptions that limit enrollment in IS programs nationwide. Our study provides a longitudinal account of the changes in perceptions about MIS in one college of business (COB). With our findings, we created comprehensive strategies that propelled our MIS program to success. Others can use our strategies individually or in aggregate as part of a larger strategic initiative like ours to help MIS programs grow and continuously improve. Strategic planning, collaboration among faculty, event coordination, and the cultivation of external relationships all constitute vital elements that will help one succeed when implementing these strategies. Our success in addressing misperceptions about the MIS major through these strategies flowed from a coordinated effort over nearly 10 years. Fortunately, we had leadership that cultivated a collaborative culture. Further, we had a team that proactively addressed misperceptions. They did the work necessary to turn an MIS program amid an enrollment crisis into one with a top rank. We encourage other researchers' feedback on our research and strategies. We are happy to share more details on our approach to addressing misperceptions about MIS should readers inquire since we had to omit some due to space limitations. Finally, we welcome opportunities for collaboration with colleagues across the globe as we continue our collective quest to help people better understand MIS.

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Appendix A: Phase One (2006) Survey

The following statements concern individuals majoring in information systems and the type of work they do in school. We also ask some questions ask about the future of information systems. For this survey, information systems refers to the terms commonly used interchangeably such as management information systems (MIS), information technology (IT), and information systems (IS).

Please rank the following statements according to your level of agreement (1 = strongly disagree, 5 = strongly agree).

An information systems major:

1) Spends most of his/her time working alone.
2) Spends most of his/her time in front of a computer screen.
3) Are extremely technical (are a "techy").
4) Spends most of his/her working time writing computer programs.
5) Spends most of his/her working time interacting with other persons.
6) Interacts mostly with other information systems people.
7) Helps managers make strategic business decisions.
8) Entered the field with a strong prior background/interest in computers.

Industry:

1) A significant number information systems jobs are being outsourced to places such as India.
2) Available information systems jobs are declining.
3) MIS majors are required to be very good at math.

In your opinion, rank the following skills in order of importance to an information systems major (1 being most important, 12 being least important):

____Communication
____Personable
____Quick learner
____Positive attitude
____High GPA
____Computer skills
____Ability to work in teams
____Leadership
____Analytical skills
____Time management
____Programming
____General business knowledge

Appendix B: Phase Two (2010) Survey

This survey is being conducted as a part of a study of people's perceptions of the information systems major. The following statements pertain to the information systems major, the type of work these students do in school, and their careers after school. We also ask questions about the future of the information systems field.

Note: for the purposes of this survey, information systems refers to the terms commonly used interchangeably such as management information systems (MIS), information technology (IT), and information systems (IS).

General info

Academic year

○ Freshman ○ Sophomore ○ Junior ○ Senior ○ Graduate

Gender

○ Male ○ Female

Graduation year_____

Major selection

What is/was your primary major?

○ Accounting ○ Finance ○ Marketing ○ Management ○ MIS

○ Pre-Law

What is/was your secondary major?

○ Accounting ○ Finance ○ Marketing ○ Management ○ MIS

○ Pre-Law ○ N/A

When did you declare your major(s)?

○ Freshman ○ Sophomore ○ Junior ○ Senior ○ Before attending college

○ Quarter 1[1] ○ Quarter 2 ○ Quarter 3 ○ Quarter 4

When you declare major how positive were you?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

How influential were your **parents** in declaring your major(s)?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

[1] The university was on the 10-week quarter system at the time of this study.

Perceptions of the MIS major

Please rate the following statements according to your level of agreement with them using the following scale: strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5).

A student in the information systems major:

1) Spends most of his/her time working alone.
2) Has to take courses that are more difficult than other majors.
3) Spends most of his/her time in front of a computer screen.
4) Are extremely technical (are a "techie").
5) Spends most of his/her working time writing computer programs.
6) Spends most of his/her working time interacting with other persons.
7) Interacts mostly with other Information Systems people.
8) Helps managers make strategic business decisions.
9) Entered the field with a strong prior background/interest in computers and technology.
10) Are required to be good at math and other quantitative areas.
11) Has more job possibilities than other majors.

Careers in information systems:

1) Are fewer because a significant number of information systems jobs are being off-shored to places such as India.
2) Are more readily available in today's business environment.
3) Pay more than other business disciplines.

Skills of an MIS major

In your opinion, rate each of these skills to an Information Systems major (1 = most important, 5 = least important):

____Interpersonal skills
____Ability to learn quickly
____Positive attitude
____High GPA
____Computer skills
____Ability to work in teams
____Leadership
____Analytical skills
____Time management
____Programming
____General business knowledge
____Technical skills

Please add any other comments you have regarding your perceptions of the MIS major.

Appendix C: Phase Three (2013 and 2014) Survey

1) In your own words, define management information systems.
2) Name two current information systems areas/topics that you are interested in learning more about.
3) Describe one current information systems issue that you think is important and explain why.
4) What types of jobs do you think are available for MIS majors?
5) Are you considering majoring in MIS or adding as a second major? Why or why not?
6) What concerns (if any) do you have going into this class?

About the Authors

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