

# **Preparing Information Systems Graduates for a Complex Society: Aligning IS Curricula with Liberal Education Learning Outcomes**

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## **ABSTRACT**

The purpose of this paper is to encourage Information Systems (IS) faculty to intentionally revise their curriculum to address (and assess) higher-order learning skills which are demanded by industry and society and are representative of a liberal arts based education. We substantiated the need for this proposed curriculum revision by first examining the extent to which learning outcomes of U.S. Information Systems (IS) programs are aligned with college learning outcomes, university liberal education learning outcomes and with those of the Association of American Colleges and Universities (AAC&U). Most IS programs focus on discipline-specific, course-level learning outcomes rather than considering ways IS courses could be integrated into a holistic academic package. We suggest that learning outcomes at the course level be aligned through the program and college levels to align with university-defined learning outcomes. Our hope is that this proposed design, coupled with a call from the Association to Advance Collegiate Schools in Business (AACSB) to prepare liberal arts educated business students, will increase awareness of the need for a liberal arts educated IS graduate and facilitate intentional curriculum revisions to address that need.

**Keywords:** Learning goals & outcomes, Curriculum design and development, Program assessment/design, Program outcomes

## **1. BASIS FOR STUDY**

Both the literature and a review of IS program websites provide justification for a design to align IS curriculum with liberal education learning outcomes.

### **1.1 Need for Liberal Arts Educated IS Talent**

The Association of American Colleges and Universities (AAC&U) has been warning business colleges that a new type of graduate is needed—a graduate possessing a “wide-ranging and cross-disciplinary knowledge, higher-level skills, an active sense of personal and social responsibility, and a demonstrated ability to apply knowledge to complex problems” (National Leadership Council for Liberal Education and America’s Promise, 2007, p. 11). Industry echoes this same warning (Korn, 2012) as 22- or 23-year-old business graduates enter the workforce with a presumed ethical, spiritual, social, cultural, and political maturity to make appropriate decisions (Harney and Howard, 2013) but perhaps without the requisite attention to developing that maturity. Tom Friedman, in his popular book *The World is Flat* (Friedman, 2007), challenges both students and

educators to rethink learning and teaching with a focus on developing innovative and creative ideas. Innovation extends beyond designing creative solutions to identified problems. Innovation includes critical thinking focused on challenging the questions and one’s perspectives (Conrad and Dunek, 2012; Harney and Howard, 2013). The type of education in demand by business and society from a university graduate is commonly known as a liberal arts education, or liberal education. Although some smaller, private institutions, based on a strong liberal arts foundation, integrate such liberal education into their curriculum across all disciplines (Fleming, 2008), most public education institutions still relegate liberal education to a set of core courses that must be checked off in the freshman/sophomore years prior to engaging in the “real” discipline-based learning in the junior/senior years. The result is an undergraduate curriculum profile that a Carnegie Foundation study (Colby, Ehrlich, Sullivan, and Dolle, 2011) likened to the shape of a barbell, with liberal education on one side and business education on the other side with slim connections between the two. Given the need for a liberal arts educated business graduate in today’s global society, one might argue that lack

of attention to developing a holistic undergraduate curriculum associated with a liberal arts education is irresponsible.

**1.2 Current Alignment of IS Programs with Liberal Education Learning Outcomes**

A challenge facing Information Systems (IS) programs is to design a curriculum that meets program and college accreditation requirements while simultaneously meeting university liberal education learning outcomes (assuming their university has defined and adopted liberal education learning outcomes). We examined a sampling of IS program websites to determine whether developing a design for aligning liberal education learning outcomes would be valuable to IS educators. Our exploratory findings support the need for our proposed design.

The foci of our exploration were program learning goals or outcomes, college/school learning goals or outcomes, and university learning goals or outcomes. We drew our sample of IS programs from colleges and schools accredited by the Association to Advance Collegiate Schools in Business (AACSB) (AACSB, 2011) under the Business category and MIS/CIS program name. Our sample ensures consistency with previous research (Bell, Mills, and Fadel, 2013), which examined the extent of adherence to the IS 2010 curriculum guidelines. We used a repeated random sampling to create a list of institutions for analysis. Our sample size of 83 institutions gives us a maximum half-interval of 11% on any estimate of the population proportion of institutions that satisfy any criterion or not; that is, there is at least a 95% probability that the true proportion of institutions is within  $\pm 11\%$  of our estimate (Glass and Hopkins, 1984).

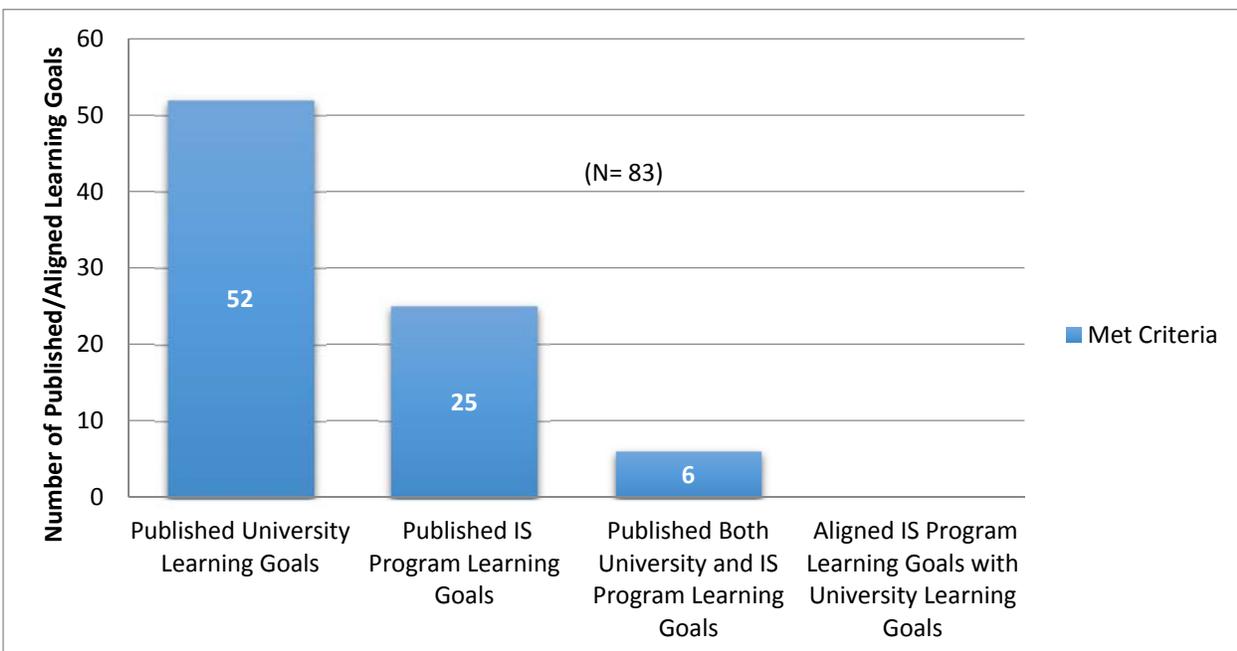
We searched each institution’s website using the following search terms: general education, outcomes, learning goals, educational goals, and liberal education goals/objectives. We took a three-step approach to our search: first, determine if institutions had adopted liberal education learning outcomes; second, identify any college/school-level learning outcomes; and third, identify

any IS program-level learning outcomes. When located, the learning outcomes or goals at any level were recorded for further analysis. The following objective guided our exploratory analysis: determine the extent to which the IS program learning goals/outcomes are aligned with the liberal education learning goals/outcomes published at a program’s institution.

Figure 1 illustrates the findings of the program/university alignment. Fifty-two of the 83 (62.66%) universities published their learning goals. Some of the common goals were communication, teamwork, globalization/diversity, creative thinking, analytical and critical thinking, and social responsibility.

Twenty-five of the 83 (30.1%) universities researched published their IS program learning goals or outcomes. IS programs vary considerably in their adherence to the IS 2010 curriculum guidelines (Bell, Mills and Fadel, 2013) but generally follow a similar discipline-specific approach. No college/school-level learning goals or outcomes were located. College/school-level learning goals and outcomes are generally internal documents. Most colleges/schools within our sample published their mission and perhaps their vision and values. However, our decision to select only AACSB-accredited schools ensures that a) the college/school has learning goals, b) those learning goals are aligned with the college/school’s mission, and c) program curriculum are aligned with both the school’s mission and its learning outcomes.

Out of the six (7.23%) universities that had both university and program learning goals published, none of them aligned their program goals with the institution’s learning goals. Obviously, much work is needed to strengthen the slim connections between professional and liberal education as encouraged by the 2013 Business Accreditation Standards (AACSB, 2013) in order to develop the talent necessary to thrive in today’s changing and global society. Prior attempts at aligning business course outcomes with liberal education outcomes have been limited to introducing liberal education outcomes in a freshman



**Figure 1. Alignment of Liberal Education Learning Goals/Outcomes cross all Levels**

seminar for business students (Harrison and Akinc, 2000), enhancing existing liberal education outcomes in an introduction to marketing course (Petkus, 2007), or introducing liberal education courses to a stand-alone management school (Harney and Howard, 2013). To date, no design of purposeful alignment from course-level outcomes to liberal education outcomes exists. The purpose of this paper is to provide a process and a framework by which IS educators can make purposeful connections between their discipline-specific courses and broader liberal education knowledge and skills.

The remainder of this paper is organized as follows. We start by describing three different agencies which guide IS program and curriculum development within AACSB-accredited schools at liberal arts based institutions. We then compare the similarities among their curriculum/outcome guidelines and use those similarities as the foundation for our design and approach to aligning IS program outcomes with college and university outcomes. We conclude with reasons why IS educators should integrate liberal education learning outcomes into their courses.

## **2. FOUNDATIONS OF AN INFORMATION SYSTEMS PROGRAM**

A fully integrated IS program within a liberal arts based institution is supported by multiple learning/instruction foundations. In this section we identify three agencies and compare their curriculum guidelines.

### **2.1 Agencies Providing Curricula Guidelines**

Industry members collaborate with faculty to design information systems curriculum guidelines through at least three types of agencies: discipline-specific professional organizations, AACSB, and AAC&U. The combined efforts of these three bodies provide a high-quality education at the program, college, and university levels.

**ACM/AIS.** Respected IS programs align their curriculum along guidelines developed by professional society curriculum committees in order to ensure graduates are prepared to meet the talent needs of regional, national, and global institutions expecting a consistent knowledge and skill set (Topi et al., 2010). Two professional societies for information systems are the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS). ACM is "...the world's largest educational and scientific computing society..." (Association for Computing Machinery, 2014). AIS is "...the premier professional association for individuals and organizations who lead the research, teaching, practice, and study of information systems worldwide" (Association for Information Systems, 2010).

IS curricula generally align with either the joint ACM/AIS curriculum guidelines (Topi, et al., 2010) or the ABET (abet.org) accreditation requirements for Information Systems (ABET, 2011). The ACM/AIS curriculum guidelines recognize the liberal arts foundation typical of schools and colleges accredited by the Association to Advance Collegiate Schools of Business (AACSB). In contrast, the ABET program criteria for IS was developed by the Computing Accrediting Commission and is more

computing-discipline specific. Therefore, we used the IS 2010 curriculum guidelines developed by ACM/AIS (Topi, et al., 2010) to compare IS program curriculum with AAC&U liberal education learning outcomes.

The IS 2010 curriculum guidelines represent a three-decade long process of continual improvement with input from the entire IS community. The need for the most current IS curriculum guidelines was prompted, in part, by many of the same reasons that propelled liberal education reform (Apigian and Gambill, 2010). Businesses indicated a need for effective communication skills, analytical and critical thinking skills required to solve problems, and an ability to design and implement creative solutions to improve organizational performance.

**AACSB.** Although IS programs can exist in other schools and colleges, our focus is on those IS programs housed within colleges or schools of business. AACSB accreditation ensures "best in class" recognition for accredited business schools. AACSB accreditation has been earned by less than five percent of the world's business programs, the majority of which are located in the United States.

The AACSB accreditation standards were updated in 2013. AACSB provides 15 accreditation standards that applicant and renewing schools of business must meet. Our focus for this research is on Standards 8 and 9 within the "Learning and Teaching" category. AACSB Standard 8 requires that accredited colleges of business specify timely and relevant learning goals, document ways that degree program curriculum is continually being revised to achieve those learning goals, and document how the specified learning goals have been met. AACSB Standard 9 specifies general skill areas (see Table 1) in which students should demonstrate proficiency upon earning a business degree.

**AAC&U.** The goal of AAC&U is to promote and guide the development and assessment of a high-quality liberal education. Membership in AAC&U is diverse, ranging from very small liberal arts colleges and community colleges to major research universities.

AAC&U launched a progressive initiative in 2005 to define a set of essential learning outcomes (Association of American Colleges and Universities, 2013) that would prepare college graduates to contribute meaningfully to a dynamic and complex global society. Titled "Liberal Education and America's Promise" (LEAP), this initiative drew upon the expertise from educational, business, community, and policy leaders to meet the economic and civic demands of the twenty-first century (Association of American Colleges and Universities, 2013). The essential learning outcomes comprising the core of the LEAP reform are applicable across all disciplines, thereby challenging the perspective that students must choose between the diametrically opposed paths of a liberal education or a professional education.

### **2.2 Overlap in Curricula Guidelines**

IS knowledge and skills are not taught in a vacuum; rather, they are taught within the context of experiences designed to develop more holistic thinking and skills. These contextual experiences can cross disciplines both within a college of business and across colleges within a university. As

indicated in Table 1, the authors of the IS 2010 Curriculum Guidelines deemed as important those liberal education concepts and skills categorized as foundational knowledge and skills (Topi, et al., 2010). Table 1 highlights the common terms (e.g., communication, analytical, team, ethical) used to describe the IS 2010 foundational knowledge and skills, the AACSB general skill areas and the AAC&U essential learning outcomes.

The IS 2010 foundational knowledge and skills and the AACSB Standard 9 general skills align nicely with the latter three groups of AAC&U learning outcomes. The first group of AAC&U learning outcomes emphasize liberal arts disciplines, which could certainly be integrated with IS content. Thus, a high-level comparison of IS 2010 curriculum guidelines, AACSB accreditation standards, and AAC&U learning outcomes indicates strong support for developing a design of integrated liberal education learning outcomes from an IS program level to a university level.

### 3. PROPOSED ALIGNMENT PROCESS

One approach faculty in an IS program could take to determine feasibility of aligning their courses with liberal education learning outcomes is to a) generate a list of liberal education descriptors, b) examine the distribution of liberal education concepts and skills across the IS core curriculum and then c) explore ways to align the liberal education concepts and skills from the IS curriculum to the university-level liberal education learning outcomes. In this section we

describe the process we used to develop an alignment design. In Section 5 we describe the process and implementation results at one university.

#### 3.1 Generate List of Descriptors

Any plan for revising an IS program must include courses, since it is through revising courses that faculty will move their IS program into alignment with liberal education learning outcomes. Therefore, we used the curriculum guidelines from the aforementioned agencies as a guide to derive a common set of terms for evaluating the IS 2010 core course descriptions. That is, we first identified commonalities among the foundations of information systems education: the IS 2010 curriculum guidelines, the AACSB accreditation standards, and the AAC&U essential learning outcomes. We defined six descriptors that captured the essence of common goals across all three standards: globalization and diversity, teamwork, communication, analytical and critical thinking, creative thinking, and social responsibility

Next, we generated from the IS 2010 core course learning objectives a list of word variations depicting each categorical descriptor (see Table 2). For instance, “creative thinking” is described by the following terms: complex(ity), creativ(ity) thinking, critical/thinking, innovat(ion), problem/solving, solve, solution. The purpose of this activity was to map the higher-level concepts and skills representative of a liberal education down to the core courses included in every IS program.

<b>IS 2010 Curriculum Guidelines: Foundational Knowledge and Skills</b>	<b>AACSB Standard 9 General Skill Areas</b>	<b>AAC&amp;U Essential Learning Outcomes</b>
<p><b>1. Leadership and collaboration</b></p> <ul style="list-style-type: none"> <li>a. Leading cross-functional global teams</li> <li>b. Managing globally distributed projects</li> <li>c. Working effectively in diverse teams</li> <li>d. Structuring organizations effectively.</li> </ul> <p><b>2. Communication</b></p> <ul style="list-style-type: none"> <li>a. Listening, observing, interviewing, and analyzing archival materials</li> <li>b. Writing memos, reports, and documentation</li> <li>c. Using virtual collaboration tools (such as wikis, blogs, shared collaboration spaces, etc.)</li> <li>d. Giving effective presentations.</li> </ul> <p><b>3. Negotiation</b></p> <p><b>4. Analytical and critical thinking, including creativity and ethical analysis</b></p> <ul style="list-style-type: none"> <li>a. Analyzing the ethical and legal implications of complex situations</li> <li>b. Analyzing the risks associated with complex systems</li> <li>c. Solving complex problems</li> <li>d. Using quantitative analysis techniques appropriately and effectively</li> <li>e. Enhancing innovation and creativity in oneself and others.</li> </ul> <p><b>5. Mathematics</b></p>	<p><b>1. Written and oral communication</b></p> <p><b>2. Ethical understanding and reasoning</b></p> <p><b>3. Analytical thinking</b></p> <p><b>4. Information technology</b></p> <p><b>5. Interpersonal relations and teamwork</b></p> <p><b>6. Diverse and multicultural work environments</b></p> <p><b>7. Reflective thinking</b></p> <p><b>8. Application of knowledge</b></p>	<p><b>1. Knowledge of Human Cultures and the Physical and Natural World</b> Through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts</p> <p><b>2. Intellectual and Practical Skills, including</b></p> <ul style="list-style-type: none"> <li>a. Inquiry and analysis</li> <li>b. Critical and creative thinking</li> <li>c. Written and oral communication</li> <li>d. Quantitative literacy</li> <li>e. Information literacy</li> <li>f. Teamwork and problem solving</li> </ul> <p><b>3. Personal and Social Responsibility, including</b></p> <ul style="list-style-type: none"> <li>a. Civic knowledge and engagement—local and global</li> <li>b. Intercultural knowledge and competence</li> <li>c. Ethical reasoning and action</li> <li>d. Foundations and skills for lifelong learning</li> </ul> <p><b>4. Integrative and Applied Learning, including</b> Synthesis and advanced accomplishment across general and specialized studies</p>

**Table 1. Comparison of Contributions from IS 2010, AACSB and AAC&U**

<b>1. Globalization and Diversity</b>	
civic engagement civic knowledge culture, cultural global, globally, globalized lead, leadership	manage, managing (people, projects) project, project management team, teamwork
<b>2. Teamwork</b>	
collaborate, collaboration diverse, diversity global, globally, globalized lead, leadership	negotiate, negotiation problem, problem solving team, teamwork
<b>3. Communication</b>	
analyze, analysis, analytical, analytic collaborate, collaboration, collaborating communication, communicate, communicating document, documentation interview	listen, listening literacy, information literacy observe oral present, presentation report write, written
<b>4. Analytical and Critical Thinking</b>	
analyze, analysis, analytical, analytic complex, complexity creative, creativity, creative thinking critical, critical thinking ethics, ethical	inquiry legal, legally mathematics negotiate, negotiation quantitative reflective risk, risks
<b>5. Creative Thinking</b>	
complex, complexity creative, creativity, creative thinking critical, critical thinking	innovate, innovation problem, problem solving solve, solution

**Table 2. Common Liberal Education Descriptors Within IS 2010 Core Courses**

**3.2 Examine Distribution of Liberal Education Concepts/Skills across IS Curriculum**

The next step was to examine the distribution of liberal education concepts and skills across the IS 2010 model curriculum. IS faculty will recognize the seven discipline-

specific core courses listed in Table 3 under Courses. The content in these courses must be covered at some level in order for a program to be recognized as an Information Systems program. Table 3 identifies the quantity of unique keywords (or variations thereof) from Table 2 contained in each of the IS 2010 core course learning objectives. As expected, all liberal education concepts/skills are not embedded within all core courses. For instance, the content of an Enterprise Architecture course would probably not address social responsibility knowledge. Conversely, IS Project Management incorporates the most liberal education concepts and skills, with five unique terms representing the first three descriptors and two unique terms representing the latter three. Table 3 clearly demonstrates that aligning the IS curriculum with progressively higher-level learning goals/outcomes is feasible.

**3.3 Explore Alignment of Liberal Education Concepts/Skills**

The final step was to explore the possibility of aligning the liberal education concepts and skills from the IS curriculum to the university-level liberal education learning outcomes. The IS 2010 curriculum guidelines stop short of recommending alignment of course-level outcomes through the university-level liberal education learning outcomes. As illustrated in Figure 1, most IS programs do not align themselves with higher-order learning goals. The lack of purposeful alignment across the levels—combined with the dependence upon each level to provide the IS student with a specific set of knowledge and skills—results in the “barbell” effect reported by the Carnegie Foundation (Colby, et al., 2011). We propose a purposeful integration, such as depicted in Figure 2, across all levels of a student’s academic career. The number of learning goals at any level will be determined by faculty. The focus of Figure 2 is to illustrate the purposeful connection of learning goals across levels.

Figure 2 illustrates how the tentacles of a truly integrated liberal education learning baccalaureate program extend through the program and connect directly with courses within an IS program. Learning outcomes associated with the seven IS core courses could be aligned with IS specific and/or College of Business (COB) and/or university liberal education learning outcomes. One course is likely to be aligned with two (or more) outcomes at the IS program level. Outcomes representing the foundational knowledge and skills at the program level should align with college-level outcomes, which should align with the university-level

Liberal Education Concepts/Skills	Courses						
	Foundations of IS	Data & Information Management	Enterprise Architecture	IT Infrastructure	IS Project Management	Systems Analysis & Design	IS Strategy, Management & Acquisition
Globalization and Diversity	3	0	0	0	5	1	3
Teamwork	2	0	0	2	5	1	2
Communication	2	1	2	2	5	4	1
Analytical and Critical Thinking	2	3	2	2	2	4	2
Creative Thinking	0	1	0	1	2	1	0
Social Responsibility	1	1	0	0	2	3	1

**Table 3. Quantity of Common Liberal Education Descriptors in IS 2010 Core Courses**

outcomes. As an example, liberal education goal #3 is aligned with COB goal #1 and IS goal #1 and IS courses 4, 5, 6 and 7. Likewise, liberal education goal #2 is aligned with COB goal #3, IS goal #5, and IS courses 2, 4, 5 and 6. Not all courses will align with COB learning goals; not all COB learning goals will align with liberal education learning goals. For example, IS course #4 aligns with only an IS learning goal. Some courses (e.g., IS course #7) would align with an IS learning goal and could then align directly with a university learning goal, bypassing a COB learning goal. COB goals 2 and 4 are unique to a college of business and are not aligned with liberal education learning goals.

We omitted goal and course titles in the model in order to retain focus on the model rather than on the specific learning goals at one university. However, since many universities have some version of an Effective Communication goal (liberal education goal #3 in our model), we use Effective Communication in Section 5.2 to illustrate more concretely the alignment of liberal education and COB learning goals with IS course outcomes.

#### 4. PRACTICAL APPLICATION OF PROPOSED ALIGNMENT

Revising an IS program to align with liberal education learning outcomes is a major undertaking. This section describes the alignment process undertaken at a Midwestern university. We also provide key practices to help faculty and administrators at other institutions align their programs with liberal education learning outcomes.

The College of Business at this institution had recently completed a successful re-accreditation by AACSB. The university was preparing for a regular, upcoming accreditation review by the Higher Learning Commission (HLC). The university was discussing liberal education

reform both in terms of assessment—as required by the HLC—as well as in terms of preparing the talent required of a global society.

#### 4.1 Map the Curriculum

The IS program at this institution was based on the ACM/AIS curriculum guidelines and contained the requisite courses. However, the authors of the IS 2010 curriculum model acknowledge that the actual course content will differ among programs based on local and regional talent needs (Topi, et al., 2010). Furthermore, changes in department staffing and input from an IS Industry Advisory Council resulted in changes to content in IS courses over the years. Therefore, identifying current course content was a necessary first step to determining which learning outcomes were addressed by which courses.

Faculty should plan on investing a full academic year (or an intensive retreat) into the curriculum mapping activity. For each course, we addressed the following questions:

1. Is there appropriate and spiraling repetition in the curriculum?
  - a. Within this course [number of course]?
  - b. Within the IS curriculum?
2. Is all the content that is needed to achieve the outcome being taught?
3. Is there content included that is not critical to the outcome?
4. Is there enough time to adequately teach the critical content?
5. Is there enough practice time with real and honest feedback for students to achieve the outcome?

We realized several benefits from the curriculum-mapping activity. First, each IS faculty member increased his

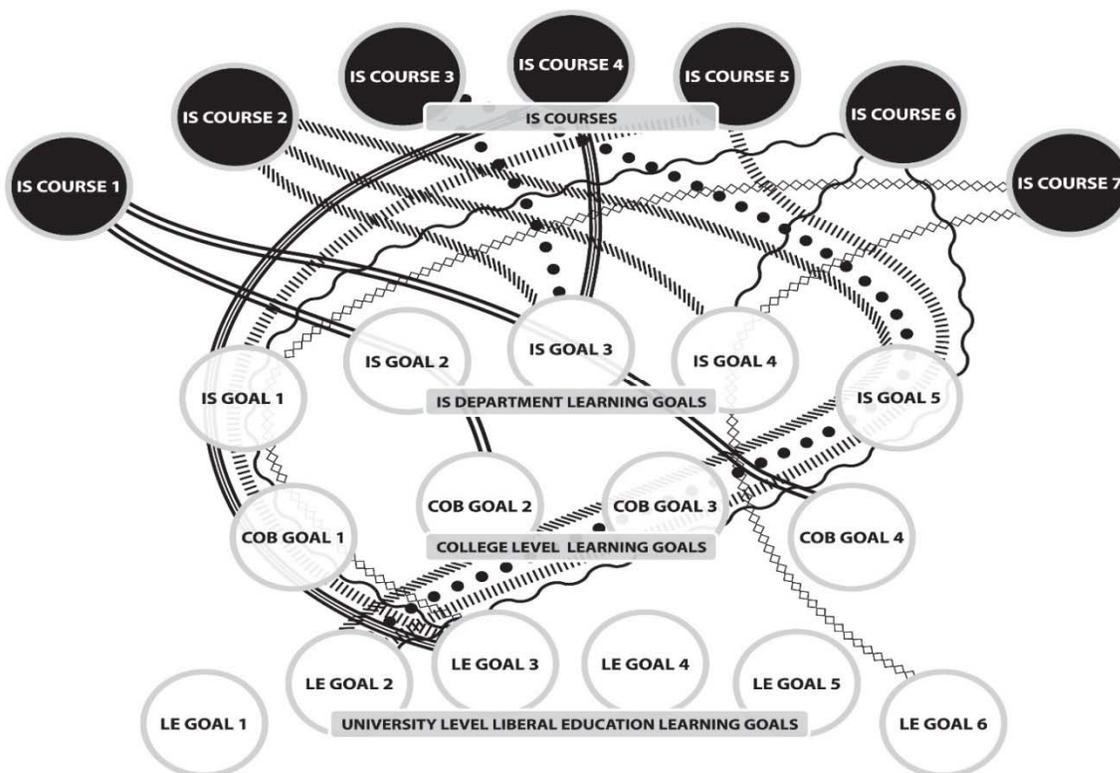


Figure 2. Proposed Design for Aligning IS Curriculum with Liberal Education Learning Goals

or her understanding of what content was taught in each course. This knowledge improved academic student advising. We also identified gaps in the curriculum and areas of content overlap that could be reduced. The curriculum-mapping activity also provided us with an opportunity to discuss future directions for our program so that we would be prepared to respond to requests for collaboration across programs. In this case the department had received requests to provide course support for big-data marketing analytics, geospatial information systems and healthcare informatics: three different directions. An IS program with limited faculty resources must be able to define their competitive niche and direction for growth.

**4.2 Revise Program and Course Outcomes**

Simultaneously with mapping the curriculum, the IS faculty reviewed and evaluated existing program- and course-level learning outcomes. This process required a number of iterations. The Higher Learning Commission requires that outcomes be assessable, which means that the curriculum should be goal-driven so as to focus on specific outcomes and that students submit one or more artifacts demonstrating their proficiency with given outcomes. The difference between “address” and “assess” was significant, as illustrated by the following example. Many of the courses in the IS program involved teams working collaboratively on projects, so IS faculty listed teamwork as a learning goal and developed corresponding learning outcomes (e.g., “Students will work in teams to develop an information system for a client in the community”). The artifact student teams submitted at the end of a project was IS discipline-specific (e.g., code, modeling diagrams). Minimal instruction was devoted to team processes; no artifacts were collected to assess teamwork. AAC&U (Association of American Colleges and Universities, 2013) provides a rubric for their teamwork essential learning outcome. Faculty examined the AAC&U teamwork rubric and discussed the merits of a) revising part of their course curriculum to focus on teamwork and assessing student proficiency in teamwork or b) addressing teamwork as an important process but not teaching teamwork nor assessing student proficiency in teamwork. Faculty reduced the quantity of assessable learning outcomes for each course from 5 or 6 to 2 or 3.

From an AACSB perspective, addressing important concepts and skills throughout the entire curriculum is important. Whereas the focus of a lower-level course could be on teaching a fundamental concept or skill, the focus of a higher-level course would be on using that concept or skill. The concept or skill would be assessed at the lower level and addressed at the higher level. Although the focus for this paper is on the liberal education learning outcomes, the same is true for discipline-specific content and skills. For example, the systems development life cycle (SDLC) is introduced but

not assessed in Foundations of Information Systems, taught and assessed in Systems Analysis and Design, addressed but not assessed in IS Project Management.

The program-level outcomes evolved from the course-level outcomes. The existing program learning outcomes had to be revised, since they no longer aligned well with the course-level learning outcomes. IS faculty might be tempted (as we were initially) to define the program-level goals and outcomes first and then ensure the courses supported the direction of the program. However, our experience lends support to the process of letting the program goals evolve organically and iteratively from the rich discussions surrounding the course-mapping activity and associated course-level outcome development. As faculty discussed what concepts and skills they were including/excluding from their courses and why, their discussion intertwined with a related discussion on program direction. The program-level discussion also provided a solid foundation for additional college-level discussions related to AACSB accreditation and assessable contributions from each COB program.

**4.3 Revise Curriculum and Develop Assessment Rubrics**

Curriculum revision with an intentional focus on liberal education learning outcomes and the development of corresponding assessment rubrics is an ongoing process. Faculty must make hard choices about what content to omit in order to make room in a course for new (or extended) content that supports a learning outcome. Faculty work collaboratively within the department and across the COB departments to ensure that successive courses can build upon foundational knowledge and skills developed in previous courses. This outcome-mapping activity mirrors the curriculum-mapping activity except that it is focused specifically on the learning outcomes (both discipline specific and liberal education).

Applying some goal and course labels to Figure 2 illustrates the resulting alignment. The university-level liberal education goal #3 is Effective Communication, which maps perfectly to the COB goal #1: Written and Oral Communication and the IS goal #1 Effective Communication. The university-level communication outcome states that students will “write, read, speak or listen effectively in various contexts using a variety of means including appropriate information sources and technologies.”

Designing instruction and developing assessment rubrics are complementary activities. The rubrics accompanying the AAC&U essential learning outcomes represent collaborative efforts from academia, the business community, and accreditation agencies for engineering, business, and nursing and teacher education; therefore, faculty can save time and effort by using those rubrics as a starting point to developing their own rubrics.

Element	Capstone 4	Milestones		Benchmark 1
		3	2	
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced, but is not explicitly stated in the presentation.

**Table 4. Central Message Element of the AAC&U Oral Communication Rubric**

Element/Course	IS 4XX	IS 3XX	IS 2XX
<b>Central Message</b>	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.

**Table 5. Central Message Element Target Proficiency Levels by Course**

The same rubric for a given learning outcome should be used throughout the entire program (and ideally, throughout the entire college and university). Using the same rubric enables each level (program, college, university) to demonstrate scaffolding in learning; aggregate student proficiency on a learning goal in a lower-level course is expected to be lower than what is demonstrated in a higher-level course. For example, the Central Message element from the AAC&U Oral Communication rubric demonstrates graduated levels of proficiency, as illustrated in Table 4. (The full rubric, containing five elements/rows is available from the AAC&U website. Only one element/row is used here to preserve space.) A course could include purposeful instruction on presenting technical information to lay audiences. Student presentations would be graded as part of their course work, but those presentations would also be assessed quickly using an outcome rubric. The rubrics are not used for grading purposes; rather, the grade associated with a student submission influences the assessed level of proficiency. The overall percentage of presentations earning

a “4” from an IS capstone course like IS Strategy, Management and Acquisition is expected to be much higher than the percentage of presentations from a Foundations of Information Systems course. The important information is the increase in aggregate scores at the higher levels of proficiency as students advance in their coursework. Individual student proficiency is not tracked; aggregate student performance is.

Faculty can make the rubrics more program specific by using course numbers in the rubrics column headings and applying a met/not met assessment of student work. During the outcome-mapping activity, faculty collaboratively decide upon appropriate target proficiency levels for each course addressing a learning outcome, as illustrated in Table 5. The final rubric for a given course would include only the target-level column for that course, as illustrated in Table 6. Tailoring the rubrics to track only the highest level of proficiency expected from a given course simplifies a rubric and the resulting assessment process. For a rubric with 5 elements/rows, a faculty member needs to keep in mind

Element/Course	IS 4XX
<b>Organization</b>	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.
<b>Language</b>	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.
<b>Delivery</b>	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.
<b>Supporting Material</b>	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/authority on the topic.
<b>Central Message</b>	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)

**Table 6. Oral Communication Rubric for a 400-Level Course**

criteria specified in only 5 cells versus the 20 cells in the original rubric. A student’s submission either does or does not meet the criteria specified for the given course specified in the course column.

Use of the same rubric also introduces opportunities for cross-discipline and cross-college collaborations. For example, the teamwork learning goal referenced previously is both a program- and a college-level learning goal. Teamwork principles and skills comprise a major component of an Organizational Behavior course taught in the Management department. Faculty teaching that course worked with faculty from the other COB departments to create a cross-disciplinary teamwork rubric.

**4.4 Develop an Assessment Plan**

Aggregate scores from student artifacts are collected at the program level and forwarded to both the college and university as part of an assessment plan. Most universities are accredited by some body. The host institution for this IS program is the Higher Learning Commission (<http://www.ncahlc.org/>), which is responsible for accrediting post-secondary educational institutions in the North Central region of the United States. Per HLC requirements, every degree program in the university must be assessed on a regular basis. Each program in the university submits program learning goals and outcomes and identifies in which courses student artifacts will be collected

and assessed to determine proficiency of the learning outcomes. Alignment with the liberal education learning goals is not required by HLC, but the terminology included in the HLC “Teaching and Learning” criterion are almost identical to those published in AAC&U’s essential learning outcomes. Some discipline-specific IS learning goals (e.g., acquire technical skills) are not aligned with liberal education learning outcomes. However, as illustrated in Table 1 and through the example provided in this paper, IS courses based on the IS 2010 curriculum guidelines are provided with a natural foundation for aligning with liberal education learning outcomes, so demonstrating that alignment via assessment of student artifacts as part of a university-wide initiative for re-accreditation is logical.

Faculty workload is always an issue, so faculty decided in which semesters and years (within the required assessment window) they would contribute aggregate proficiency scores—based on assessment of student artifacts—to the university’s assessment director and to the college’s AACSB coordinator.

## 5. IMPLICATIONS FOR IS EDUCATORS

Integrating liberal education learning outcomes into the curriculum is the right thing for IS educators to do for many reasons, not the least of which are that IS educators are responsible for developing leadership talent, are held accountable by diverse stakeholders, and are required to produce assessable evidence of program quality.

As IS educators, we are responsible for developing the next generation of leadership talent needed to solve the complex problems of a global society. Graduates from liberal arts based institutions are prepared to advance quickly into leadership roles. The graying of the workforce intensifies the need for the liberal arts educated IS talent described in the introduction of this paper. The ubiquitous nature of information systems means that IS graduates will be leaders in every government, industry, educational, non-profit, and other employment sector. It is our responsibility to ensure IS graduates have the appropriate knowledge and skills to lead effectively and appropriately.

As IS educators, we are accountable to many stakeholders. As implied in the previous paragraph, we are accountable to our students to equip them with the knowledge and skills necessary to advance successfully in IS careers. We are accountable to employers who “say they want colleges to place more emphasis on helping students develop five key learning outcomes, including: critical thinking, complex problem-solving, written and oral communication, and applied knowledge in real-world settings” (Hart, 2013, pg. 1). We are accountable to a global society which expects our graduates to design ethical and responsible solutions to the increasingly complex problems both locally and internationally. A discipline-specific silo approach to curriculum design falls short of preparing the type of graduate needed in today’s industry and society.

As IS educators within accredited institutions of learning, we are continually assessing and improving our instruction and programs. Liberal education learning goals exist as part of the IS curriculum, as well as college- and university-level accreditation. The shift for some IS educators will be in

placing a purposeful and intentional focus on the liberal education learning goals by providing course-level opportunities to assess liberal education learning outcomes. Incorporating liberal education learning outcomes into the assessment routine demonstrates IS program contributions to both the college and the university.

In summary, the process and framework described in this paper helps bridge the gap between discipline-specific and renaissance-type learning to provide a holistic approach to IS curriculum design. This design extends previous research focused on mapping courses within an IS program to ensure alignment with the IS 2010 curriculum guidelines (Veltri, Webb, Matveev, and Zapatero, 2011) or implementing direct assessment at the program level to align the IS program with AACSB learning outcomes (Attaway, Chandra, Dos Santos, Thatcher, and Wright, 2011). We have illustrated the feasibility and benefits of aligning course-level learning outcomes with college- and university-level liberal education learning outcomes. The end result is a curriculum that develops liberal arts educated information systems talent.

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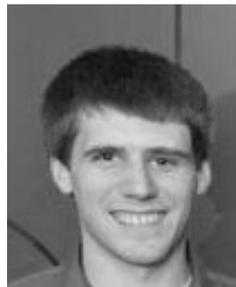
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