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A Topical Examination of the Introduction to Information Systems Course

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Abstract

The introductory Information Systems (IS) course is a critical course at the beginning of every IS/IT major's degree. While many textbooks exist that are focused solely on this course, they all vary in the covered topics and the depth of material. This research examined most major textbooks focused on the introductory course and, through qualitative and quantitative analysis, reached a final set of 14 themes that should be taught in this course. Implications are drawn and the groundwork for future studies are laid.

Keywords: Information Systems, introductory, foundations, textbook, competency, knowledge

1. INTRODUCTION

The introductory course in information systems continues to be a foundational course in the discipline. While there is an abundance of textbooks published on the subject matter used to teach the course, the core concepts covered in each text varies greatly. Despite the fact that "information systems touch almost every aspect of students' lives, […] students are often detached and uninterested in the introductory course" (Golub, 2015, p. 442). The dilemma of how to engage students, both majors and non-majors, in the subject-matter is an important problem that has not been examined in prior research.

The intro course is a major requirement for Information Technology (IT) majors as well as Management Information Systems (MIS) majors at a regional campus of an R1 university in Western Pennsylvania. In addition to those seeking IT or MIS degrees, students from non-technology majors also enroll in this course. This initial study is focused on eliciting from literature the core learning activities that should be present in an introductory course, leading to the sole research question:

RQ 1: What are the core knowledge areas that should be present in an introductory IS/IT course?

2. THE INTRO COURSE CONCEPT

Virtually every major has some form of introductory course: from slow-paced courses that ease students into a subject matter to hard-hitting "gatekeeper" courses (Gasiewski, Eagan, Garcia, et al., 2012; Mervis, 2010) that are

created to ensure only the best students progress to the next semester. Some courses are lucky enough to have textbooks published specifically for an introductory level of content while other courses get by without a textbook or any standard pedagogy (Cohen & Wang, 2016). One thing is clear, there are many challenges to teaching introductory courses: some "related to the students' characteristics, the teaching methods, or the nature of [the content]" (Alammary, 2019, p. 2).

Schwartz & Smith (2010) detail one of the largest issues for introductory courses: large lectures. When enrollment in courses exceeds 200 students, that, along with other intimidating factors, such as large lecture halls, make any kind of interaction between students or professors difficult. This only gets worse when universities do not allow room in the budget for recitation/discussion sessions, ensuring that "the course almost inevitably devolves into the dull lectures that fuel universal discontent" (p. 250). Their approach was to lessen the breadth of the content so that the more important concepts in the field can be examined. Additionally, certain pedagogical aspects were introduced that had success, even in courses with over 200 students. In-class surveys (typically by a show of hands), assignments that applied directly to life so that students could see "concrete manifestations" (p. 263), online discussion threads, and short pop quizzes were four tools that had the most success.

Many studies have been conducted focusing on "gatekeeper" courses and ways to present them such that more students complete the courses, and furthermore, their degrees. One such study found that only 33% of white students and 42% of Asian-American students actually complete their degree in 5 years. After overhauling their introductory courses, one university had a 15% increase in pass rates (Mervis, 2010). Such changes as replacing recitation sessions with small group problem solving sessions, adding teaching assistants, mandating attendance, and ensuring that remaining lecture sessions are taught by professors instead of grad students are just some of the changes that ushered in the increased pass rates.

Other studies have focused on the learning models used in teaching introductory courses. Such models as the flipped model, mixed model, flex model, supplemental model, and online-practicing model have undergone various levels of scrutiny. According to Alammary (2019), the mixed model, where mini-lectures and course assignments happen both online and in-person, contributes to better student performance.

Allos, Yakes, Fleming, Cutrer, Pilla, Clair, Fowler, & Miller (2018) added that "lasting impact[s] on students' attitudes and beliefs" (p. 1310) could be made by adding humanistic concepts to the course; "thoughtful and deliberate introductions to the profession" (p. 1310). Instead of merely teaching theory in the classroom, students should be introduced to the actual places in which their profession occurs. For medical students, this would mean trips to clinics. For IT students, this could mean trips to data centers.

3. THE INTRO IS/IT COURSE

Modaresnezhad & Schell (2019) argue that "students of all [technology-related] majors need to be given the foundation knowledge and then carry the appreciation for information systems into their careers" (p. 39-40). The introductory course, "in part because of its wide breadth and lack of depth, [...] remains one of the more difficult and challenging courses for faculty to teach" (Holmes, 2003). The textbook one chooses to use for such a course is critical due to its role for introducing the student to and focusing the core IS/IT topics (Hassan & Becker, 2007; 2003).

A comparison of the IS 2010 and 2020 model curricula revealed that Foundations of Information Systems continued to be listed as a core course. This course:

> refers to the ability of students to understand the fundamental concepts of IS (including hardware, software, and information acquisition) and the support that IS provides for transactional, decisional, and collaborative business processes. They will also be able to understand the collection, processing, storage, distribution, and value of information and be able to make recommendations regarding IS that support and enable individuals in their daily lives as well as the management, customers, and suppliers of the enterprise. This competency includes the ability to conduct and organizational business analysis, and assess processes, and systems (ACM, 2020, p. 51).

Also of note is the method of instruction or other properties of the intro IS course. While much education literature touts the benefits of cooperative education, some studies have found that there was no positive effect on learning outcomes with the method (Wehrs, 2002). Other studies found that certain activities such as assigning non-IS authors to tell the IS story as

required reading, utilizing a plethora of writing assignments, and exposing the students to various exciting technologies had positive effects on their classes (Whelan & Firth, 2012). What is common amongst most scholars is the belief that the introductory course should have a wide breadth and that this course specifically impacts how students view the IS field (Akbulut, 2015).

4. METHODOLOGY & RESULTS

This research utilized a combination of qualitative and quantitative methods to elicit the required knowledge areas of the introductory Information Systems course.

An initial survey of the educational material landscape revealed nine prominent textbooks from highly regarded publishers aimed at the introductory IS course. Table 1 lists the texts that were analyzed in this process.

Title	Publisher
Information Systems	Chapman & Hall
Information Systems	FlatWorld
Information Systems for Business	Prospect Press
Introduction to Information Systems	MyEducator
Introduction to Information Systems	Pearson
Introduction to Information Systems	Wiley
M: Information Systems	McGraw Hill
Managing and Using Information Systems	Wiley
Principles of Information Systems	Cengage

Table 1: List of Analyzed Textbooks

A list of major topics from each textbook was recorded and inductively coded into major themes. The final themes list was arrived at through three rounds of coding. 32 themes emerged from the data. In order to narrow the focus to only those deemed critical, a frequency analysis was conducted on the themes. There was a frequency cutoff for inclusion in the final thematic list. This was done to ensure that only as many topics as can reasonably be taught in a standard, 15-week semester were selected. With this in mind, the frequency cutoff for the number of textbooks in which a topic was covered was five. This limited the list to 11 themes, which accounted for 66% of the total, as shown in Table 2.

Further analysis was conducted on the thematic data by comparing it to the core knowledge areas from three ACM model curricula: Information Systems 2010, Information Systems 2020 (Dec. draft), and Information Technology 2017. Understanding that solely relying on textbook publishers to tell faculty what they should be teaching in their courses is not prudent, these three model curricula most closely align to the majors in which an Intro IS course would be found.

Such a course would not be found in three of the five computing curricula maintained by ACM: computer engineering, computer science, and software engineering. Therefore, only the IS and IT model curricula were used as they lay the foundation to educate computing professionals who can "select, develop, apply, integrate, and administer secure computing technologies to enable users to accomplish their [...] goals" (ACM, 2017, p. 18) or support a business's "transactional, decisional, and collaborative business processes" (ACM, 2020, p. 52) from a hardware, software, and information acquisition standpoint.

These comparisons of the themes to the core knowledge areas of model curricula revealed the areas of each curriculum that were covered by the critical themes, thus lending credence to the theme as a topic critical to the Intro IS course.

Theme	Freq.	Cum. %
Security	12	9%
Analytics	11	17%
Data/DB	11	25%
Development	11	34%
Organization	7	39%
Overview	7	44%
Strategy	7	49%
Commerce	6	54%
Networking	6	58%
Acquisition	5	62%
Social	5	66%

Table 2: Critical Themes

As shown in Table 3, the 11 critical themes cover only five of the domains from the ACM Information Technology 2017 model curriculum. This, however, is more than the single knowledge area of coverage from the ACM Information Systems 2010 model curriculum, listed in Table 4.

Domain	Coverage
Information Management	
Integrated Systems Technology	
Platform Technologies	
System Paradigms	
User Experience Design	
Cybersecurity Principles / Cybersecurity Emerging Challenges	X
Global Professional Practice / Social Responsibility	X
Networking / Applied Networks	X
Software Fundamentals / Software Development and Management	X
Web and Mobile Systems / Mobile Applications	
Cloud Computing	
Data Scalability and Analytics	X
Internet of Things	
Virtual Systems and Services	

Table 3: IT 2017 Model Curriculum Coverage

As of December 2020, the IS model curriculum is undergoing revision and is in draft form. This update moves away from the previous Knowledge Areas to a set of required Competency Areas, which more closely align to the prescribed list of courses from the 2010 model. Listed in Table 5, the critical themes cover six of the 10 new Competency Areas (though one Area is a practicum that typically is not covered by any textbook).

Knowledge Area	Coverage
IS Management and Leadership	
Data and Information Management	X
Systems Analysis & Design	
IS Project Management	
Enterprise Architecture	
User Experience	
Professional Issues in Information Systems	

Table 4: IS 2010 Model Curriculum Coverage

In summary, the critical themes cover 36% of the IT 2017 domains, 14% of the IS 2010 areas, and 60% of the IS 2020 areas.

5. DISCUSSION

This research produced many interesting findings. The comparison of the critical themes to the three model curricula was surprising. While the focus of this research was Information Systems, many university programs offer a mix of IS and IT. The critical themes covered more topics from the

Competency Area	Coverage
Foundations of Information Systems	X
Data/Information Management	X
IT Infrastructure	X
Secure Computing	X
Systems Analysis & Design	
Application Development / Programming	X
Ethics, Use, and Implications for Society	
IS Management & Strategy	X
IS Project Management	
IS Practicum	

Table 5: IS 2020 Draft Model Curriculum Coverage

2017 Information Technology curriculum than the 2010 Information Systems curriculum. This leads one to believe that the introductory IS course is not strictly in the IS silo but consists of a broad arrangement of topics in order to be used as an entrance course for different technology-focused programs.

When analyzing the 2010 IS curriculum along with the draft 2020 curriculum, a shift in terminology and content arrangement is noticed. The concept of Knowledge Areas from the 2010 curriculum is no longer present in the 2020 curriculum. The newer model takes what used to be simply a list of courses and massaged them into broader Competency Areas. These Areas are more similar to the Domains in the IT model than the Knowledge Areas in the original 2010 IS model. For this reason, a more accurate comparison is between the 2017 IT model and the 2020 IS model. It is when reviewing theme coverage between only these two models that one can see a common assumption manifest: intro IS textbooks cover topics in line with the IS model curriculum.

Focusing on the textbooks themselves, while one may have expected all textbooks created for the introductory IS course to cover the same, or at least mostly similar, topics, that was not the case. Nine textbooks produced 32 different themes. Almost half (15) of those themes only appeared in one or two textbooks. Although assumptions cannot be made about each author's intentions, it is clear that the intro course has different purposes for different authors. Some authors write their text as a general overview of the field, some wrote their text from a management perspective, and others wrote their text to focus on only a handful of critical areas, such as development. This disparity may seem in

opposition to the purpose of this research; however, it offers the unique insight that there is no single way to teach the introductory IS course. Recalling the previously explained crossover between IS and IT topics, educators must be open-minded. Universities should be welcome to package the introductory course in a way that best fits their program rather than constraining the topics to one particular silo.

Theme	
Security	
Analytics	
Data/DB	
Development	
Organization	
Overview	
Strategy	
Commerce	
Networking	
Acquisition	
Social	
Management	*New*
Mobile/Cloud	*New*
Infrastructure/Hardware	*New*

Table 6: Final theme list

With that in mind, Table 6 presents an updated list of critical themes. The original list contained 11 themes elicited from the source material but did not cover all aspects of any model curriculum. Additionally, some topics that did not make the cut are crucial for anyone entering the IS or IT field.

Included in the Management theme are not only discussions from a manager/supervisor perspective but also the foundations of systems analysis/design and project management. These concepts are critical in collaborative work environments and are typically required learning in the later years of one's degree. Another skillset all but required by employers is knowledge of networking infrastructure and hardware. With many sophomore-level and higher courses assuming an understanding of the fabric on which digital business is conducted, one would be remiss not to cover such information minimally at a basic level. The last addition to the theme list used to be considered new and emerging technology but has proven itself a mainstay of the digital world: mobile and cloud computing. With the introduction of Amazon EC2 in 2006 and the modern smartphone (iPhone) in 2007, mobile and cloud computing have been prevalent for over 15 years. They can no longer be classified as new or emerging. Only being covered by two of the textbooks analyzed in this research is a disservice

to the IS/IT student who needs to have a solid understanding of how these technologies fit into and shape our world.

6. LIMITATIONS & FUTURE RESEARCH

One limitation of this research is the selection of textbooks. While every effort was given to locate all current textbooks on the subject through publishers, retail outlets, literature reviews, and web searching, it is possible that some were not found. Additionally, IS courses are sometimes found in business schools and sometimes found in engineering/science schools, as is the case with the authors. Because of this the goals of this research might differ from the reader's due to the placement of their course.

This study acts as a stepping stone to the ultimate goal of determining a proper set of learning activities for the introductory IS course that will purposefully engage and stimulate the student's mind. Now that the required topics for this course are established, future studies can explore experiential learning activities. Additionally, individual case studies for implementation of this research and longitudinal studies on the effectiveness of these findings are possible.

7. REFERENCES

ACM. (2017). *Information Technology Curricula 2017*. Retrieved on May 18, 2021 from https://www.acm.org/binaries/content/assets/education/curricula-recommendations/it2017.pdf

ACM. (2020). *IS2020: Competency model for undergraduate programs in information systems, draft*. Retrieved on from https://is2020.hosting2.acm.org/wp-content/uploads/2021/06/is2020.pdf

Akbulut, A. Y. (2015). The impact of the introductory IS course on students' perceptions of IS professionals. *Journal of Information Systems Education, 26*(4), 295-304.

Alammary, A. (2019). Blended learning models for introductory programming courses: A systematic review. *PLoS ONE, 14*(9), 1–26.

Allos, B. M., Yakes, E. A., Fleming, A., Cutrer, W. B., Pilla, M., Clair, W., Fowler, M., & Miller, B. (2018). Framing Medicine as a Moral Practice. *Academic Medicine, 93*(9), 1310–1314.

Baltzan, P. (2017). *M: Information Systems, 4th edition.* McGraw-Hill Education.

Belanger, F., Van Slyke, C., & Crossler, R. E. (2022). *Information systems: An experiential approach, Edition 4.0.* Prospect Press.

Cohen, M. M. & Wang, G. (2016). Teaching the introduction to American studies course: A dialogue. *American Quarterly, 68*(2), 347-354, 499, 506.

Gallaugher, J. (2013). *Information systems: A manager's guide to harnessing technology, Edition 2.0.* FlatWorld.

Gasiewski, J. A., Eagan, M. K., Garcia, G. A. et al. (2012). From Gatekeeping to Engagement: A Multicontextual, Mixed Method Study of Student Academic Engagement in Introductory STEM Courses. *Research in Higher Education, 53*, 229–261.

Golub, B. (2015). Teaching intro IS with a learner-centered, experiential approach. 2015 Proceedings of the Information Systems Education Conference (vol. 32), Orlando, FL.

Hassan, N.R., & Becker, J.D. (2007). Uncovering conceptual gaps in introductory IS textbooks. *Journal of Information Systems Education, 18*(2), 169-182.

Keith, M., Gaskin, J., & Dean, D. (2021). *Introduction to information systems.* MyEducator.

Mallach, E. G. (2015). *Information systems: What every business student needs to know.* Chapman & Hall.

Mervis, J. (2010). Better Intro Courses Seen as Key to Reducing Attrition of STEM Majors. *Science, 330*(6002), 306-306.

Modaresnezhad, M. & Schell, G. (2019). The soul of the introductory information systems course. *Information Systems Education Journal, 17*(5), 39-46.

Pearlson, K. E., Saunders, C. S., & Galletta, D. F. (2015). *Managing and using information systems: A strategic approach, 6th edition.* Wiley.

Rainer, R. K. & Prince, B. (2017). *Introduction to information systems, 7th edition.* Wiley.

Schwartz, M., Smith, R. T. (2010). Beyond the Core: The Hot Topic(al) Alternative to the Survey-Based Introduction to Sociology Course. *American Journal of Sociology, 41*, 249–276.

Stair, R. & Reynolds, G. (2021). *Principles of information systems.* Cengage.

Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K. M., Nunamaker, Jr., J. F., Sipior, J. C., de Vreede, G. J. (2010). IS 2010: Curriculum guidelines for undergraduate degree programs in information systems. ACM. https://www.acm.org/binaries/content/assets/education/curricula-recommendations/is-2010-acm-final.pdf

Wallace, P. (2015). *Introduction to information systems, 2nd Edition.* Pearson.

Whelan, E. & Firth, D. (2012). Changing the introductory IS course to improve future enrollments: An Irish perspective. *Journal of Information Systems Education, 23*(4), 395-406.

Whers, W. (2002). An assessment of the effectiveness of cooperative learning in introductory information systems. *Journal of Information Systems Education, 13*(1), 37-50.

Editor's Note: