FITC Institute Final Report
Appendix L

Curriculum Analysis Report:
Florida State University Information Technology Program

June 9, 2015

Jinxuan Ma, Ph.D., Post-Doctoral Researcher
Chandrahasa Ambavarapu, Graduate Research Assistant
Heather Kelleher, Graduate Research Assistant
Laura I. Spears, Research Coordinator
Charles R. McClure, Ph.D., Director, Information Institute
Marcia A. Mardis, Ed.D., Associate Professor
Susan C. Thomas, Program Coordinator

1. Introduction

1.1 Research Question

One of the tasks of the FITC Assessment project is to perform a comparative analysis examining computing curricula and relevant computing curriculum frameworks by conducting a syllabus analysis of the Florida State University (FSU) undergraduate information technology (IT) program. The learning outcomes listed in the course syllabi were compared to the learning outcomes specified in the Association for Computer Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) undergraduate IT curriculum guidelines (hereafter referred to as ACM/IEEE). This phase of the project asks one research question: To what extent are the learning outcomes extracted from the course syllabi in the FSU IT program similar to the learning outcomes in the selected curriculum guidelines?

1.2 Literature Review

Existing studies have used varied approaches when conducting curricula analyses to determine the strength of academic programs (Apigian & Gambill, 2008; Corlu, 2013; Madson, Melchert, & Whipp, 2010; Veltri et al., 2011). Despite the diverse methodologies and units of analysis, the importance of curriculum analysis in program assessment has been well recognized in the pursuance of program improvement (Veltri et al., 2011). Apigian and Gambill (2008) found it most beneficial to map a sample of information system (IS) programs' course titles which they gathered and categorized according to the 2009 ACM Information Science (IS) model curriculum framework based on the assumption that course titles accurately and adequately reflect course content. Increasingly, however, course syllabi are becoming the

preferred data source for curriculum analyses (Corlu, 2013; Madson, Melchert, & Whipp, 2010; Willingham-Mclain, 2011).

Recent studies support the argument that the syllabus is more than a mere "course outline," and instead conveys important information, often acting as "a contract between the instructor and students, a communication device that would connect the instructor to the students, an instructional plan for the instructor, and a cognitive map for the students," (Corlu, 2013, p. 2478). A syllabus outlines the course, denotes what students may expect from the course, and locates the course within the curriculum (Smith & Razzouk, 1993). Specifically, a syllabus is a summary of a course of study providing information about various aspects of the course, such as course objectives, learning outcomes, class schedule, recommended resources, tasks, and assessment methods, etc., and a course syllabus is commonly used by faculty to communicate with the students about course information (Smith & Razzouk, 1993).

It is for these reasons that the syllabus is an important source of data for conducting a curriculum analysis. Previous researchers have focused their efforts on extracting and analyzing the syllabi's "course description, course objectives and course activities" (Madson, Melchert, & Whipp, 2010, p. 553). However, it is important to note that a comprehensive understanding of a curriculum must include aspects of student learning beyond the course syllabus such as textbooks, assignments, course instruction, students' informal learning opportunities, etc. (Veltri et al., 2011).

2. Method

2.1 Data Collection

The FSU IT program of study[1] guides students' course selection through their four-year college degree program. To major in information technology (IT), a student must complete a minimum of 42 semester hours in information technology, including the 6 core courses, 6 electives and 2 capstone courses.[2] A total of 26 courses from IT major program of study are included in this analysis.

In this study, an individual course syllabus was used as the unit of analysis with the assumption that a syllabus adequately reflects the content of a course. Course syllabi from the required courses in the FSU IT program were collected from the term Fall 2014, resulting in a sample size of 26 (N=26).

2.2 Data Analysis

Python scripting language was employed as a way to automatically extract relevant portions of information from the syllabi to analyze the text. Because the syllabi exhibit a diverse array of formats, course learning objectives and topics were extracted from any potentially relevant section including the course description, course schedule, and course objectives. Ehe course learning objectives were extracted and were compared to the ACM/IEEE IT curriculum

[1] http://ischool.cci.fsu.edu/wp-content/uploads/2015/04/IT_Program_Rev01Apr2015.pdf
[2] http://registrar.fsu.edu/bulletin/undergrad/depts/info_studies.htm

guidelines to determine the extent to which the learning outcomes reflect the topics in the curriculum guidelines.

The ACM/IEEE IT curriculum guidelines follow a specific structure. The two organizations jointly determine what should comprise the *Body of Knowledge* for each computing discipline—that is, what each program might include to prepare graduates to work in a specific industry. *The Body of Knowledge* is then divided into *Knowledge Areas.* The 2008 ACM/IEEE IT curriculum guidelines identify 13 distinct *Knowledge Areas*:

- ITF-Information Technology Fundamentals;
- HCI-Human Computer Interaction;
- IAS-Information Assurance and Security;
- IM-Information Management;
- IPT-Integrative Programming and Technologies;
- MS-Math and Statistics for IT;
- NET-Networking;
- PF-Programming Fundamentals;
- PT-Platform Technologies;
- SA-Systems Administration and Maintenance;
- SIA-System Integration & Architecture;
- SP-Social and Professional Issues; and
- WS-Web Technologies.

Each of these *Knowledge Areas* is further broken down into *Knowledge Units,* which are comprised of individual learning outcomes related to that *Knowledge Unit*. Therefore, the course learning outcomes extracted from the 26 FSU IT course syllabi (N=26) were compared to the *Knowledge Units* in the ACM/IEEE IT *Body of Knowledge*.

The ACM/IEEE IT curriculum guidelines indicate the number of hours each *Knowledge Unit* requires to teach the topics or learning outcomes the *Knowledge Unit* contains. The hours required to cover a topic differ from course credit hours in that they reflect the number of lecture hours dedicated to the topic. According to the ACM/IEEE IT curriculum guidelines, the number of hours corresponds "to the in-class time required to present the material in a traditional lecture-oriented format" (Lunt et al., 2008, p. 66). For instance, a particular course may be worth 3 credit hours, but the number of hours needed to cover a *Knowledge Unit* in lecture may be 5. The total number of lecture hours for the IT program in the ACM/IEEE guidelines is 318. The ACM/IEEE IT curriculum guidelines also state that the number of hours of instruction required to cover a *Knowledge Unit* represents the minimum amount of coverage (Lunt et al., 2008).

The percentage of *Knowledge Unit* coverage for each *Knowledge Area* was determined once the topics or learning outcomes from the syllabi were compared to the learning outcomes in the ACM/IEEE curriculum guidelines. Once all the hours for each *Knowledge Unit* were

determined, that number was compared to the total number of hours for the *Knowledge Area* in order to generate a *Knowledge Unit* coverage percentage for that *Knowledge Area*.

3. Findings

A syllabus analysis of 26 FSU IT program courses (N=26) was conducted. Based on the syllabus analysis, it was determined that there was similarity between the course syllabi learning outcomes and the ACM/IEEE learning outcomes in 12 out of 13 (92%) *Knowledge Areas*. Additionally, 11 out of 13 (84.6%) of the *Knowledge Areas* specified in the ACM/IEEE IT curriculum guidelines contained *Knowledge Units* that were more than 60% covered in the FSU IT syllabi. The MS-Math and Statistics for IT *Knowledge Area* is the only *Knowledge Area* not represented in the FSU course syllabi analyzed.

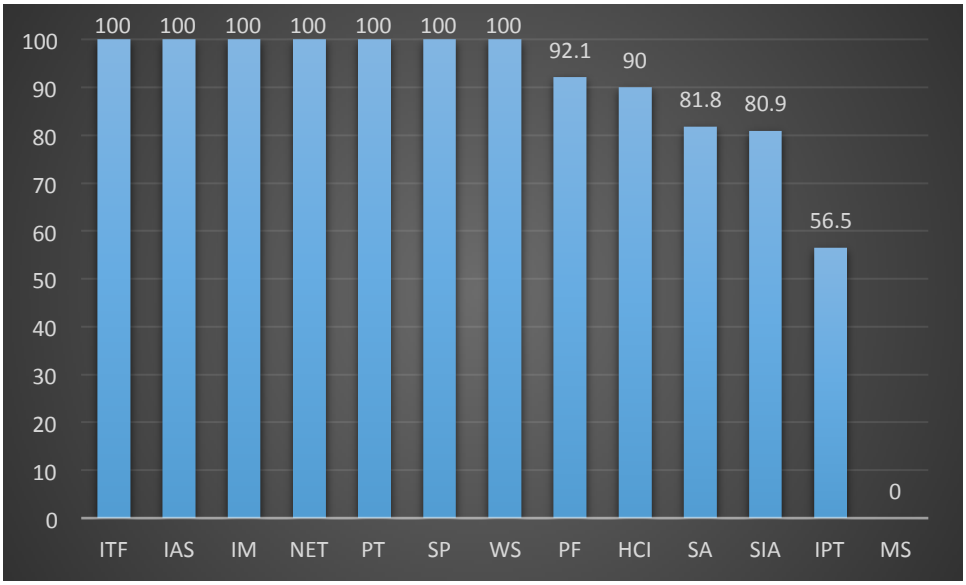

Figure 1: Percentage of ACM and IEEE IT Knowledge Units covered in FSU IT syllabi by Knowledge Area

Figure 1 illustrates the percent coverage of *Knowledge Units* in each *Knowledge Area* demonstrated by the FSU IT course syllabi. Based on the analysis, it has been determined that 100% of the *Knowledge Units* in the *Knowledge Areas* ITF-Information Technology Fundamentals, IAS-Information Assurance and Security, IM-Information Management, NET-Networking, PT-Platform Technologies, SP-Social and Professional Issues, and WS-Web Technologies were covered in FSU syllabi. All *Knowledge Units* in these *Knowledge Areas* were reflected in the FSU IT course syllabi (N=26), meaning that there is a great deal of similarity between the learning objectives stated in the syllabi and those listed in the ACM/IEEE IT curriculum frameworks in these *Knowledge Areas*.

Additionally, 90% of the *Knowledge Units* in HCI-Human Computer Interaction were covered in the syllabi, 56.5% of *Knowledge Units* in the IPT-Integrative Programming and Technologies *Knowledge Area* were present in the syllabi, 92.1% of the PF-Programming Fundamentals *Knowledge Area's Knowledge Units* were covered, and 81.8% of the *Knowledge Units* in the *Knowledge Area* SA-Systems Administration and Maintenance and 80.9% of the *Knowledge Units* in the *Knowledge Area* SP-Social and Professional Issues were present in the sample syllabi.

4. Discussion

4.1 Findings Discussion

This portion of the FITC Assessment project answered one research question: To what extent are the learning outcomes listed in the FSU IT course syllabi similar to the learning outcomes in the ACM/IEEE IT curriculum guidelines? In order to answer this question, 26 (N=26) course syllabi from the required classes in the FSU IT program were analyzed. It was determined that the syllabi demonstrated similarity to the ACM/IEEE curriculum guidelines in 92% of the *Knowledge Areas*. Furthermore the syllabi demonstrated more than 60% similarity to the ACM/IEEE curriculum guidelines for 84% of the *Knowledge Areas* specified in the guidelines.

4.2 Limitations

The curriculum analysis phase of the FITC assessment focuses on a course syllabus as a unit of analysis, limiting the view of the total learning outcomes delivered by the program curriculum. A more comprehensive analysis would require examination of additional aspects of student learning such as pre-requisite courses, textbooks, course instruction, and other course materials (Veltri et al., 2011). Furthermore, a *Knowledge Area's* occurrence in the ACM/IEEE curriculum guidelines does not imply that it become part of an IT program's required elements. Curricula must be responsive to industry needs and the expertise of faculty, and these learning outcomes may not be in high demand by employers. Use of the ACE/IEEE curriculum framework is just one standard that can be used to guide curriculum development. Further academic standards may be complemented with other means in order to develop effective pedagogy for IT learning outcomes delivery and assessment. Future research may also take into account a greater variety of aspects of the learning environment, as syllabi from the required courses in a program provide a limited understanding of any educational program.

5. Conclusion

The analysis of 26 (N=26) syllabi in the FSU IT program sought to determine the degree to which *Knowledge Areas* specified by the ACM/ IEEE IT curriculum guidelines are represented in the FSU IT undergraduate courses. In order to determine if the skills conveyed in the *Knowledge Areas* found in the IT syllabi are sought by local employers, the results from this analysis should be compared to the results of the job post analysis as well as the findings from the employer interviews.

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Appendix A:

List of Courses from FSU IT Program

Foundation courses

1. Technical communication for the information professions (LIS 3021)[3]
2. Technologies for information services (LIS 3353)[4]
3. Information science (LIS 3267)[5]
4. Research & data analysis for information professionals (LIS 3201)
5. Information organization & communication (LIS 3784)
6. Information systems & services (LIS 3706)

Design & development

7. Digital graphic design (dig 3118)
8. Information architecture (LIS 3793)
9. Advanced database management (LIS 3781)
10. Mobile app development & management (LIS 4381)
11. Website development with PHP (LIS 4368)
12. User experience design (LIS 4351)
13. Extensible enterprise solutions (LIS 4369)

Networking & security

14. Telecommunications (LIS 4482)
15. Network administration (LIS 4488)
16. Information security (LIS 4774)
17. Advanced information security (LIS 4777)

Social informatics

18. Social media management (LIS 4380)
19. Societal implications of the information age (LIS 4410)

Health informatics

20. Health informatics (LIS 4785)
21. Advanced health informatics (LIS 4776)
22. Intro to consumer health informatics (LIS 4772 or ifs 3037)

Capstone courses

23. Information technology project (LIS 4910)
24. Perspectives on it (LIS 4708)

Elective capstone courses

25. IT leadership (LIS 4480)
26. IT internship (LIS 4940)

[3] Manually coded course
[4] Manually coded course
[5] Manually coded course