LEARNING OUTCOMES IN SYSTEMS ANALYSIS AND DESIGN COURSES

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ABSTRACT

Understanding and applying the information systems (IS) theories and concepts required in Systems Analysis and Design (SAAD) courses are especially difficult for students to learn. This research-in-progress proposes a benchmarking of the required SAAD courses for undergraduate and graduate management information system (MIS) programs. Information was collected from instructors through their syllabi and the textbooks identified for these courses. Three research questions focus on the critical success factors (CSFs), issues that must be addressed in teaching SAAD. The preliminary results illustrate that while there are some commonalities, there is also a wide variety of topics taught in SAAD courses.

Keywords: Systems analysis and design, systems development, project management

INTRODUCTION

When compared to other disciplines, the field of Information Systems (IS) is relatively immature. A lack of integrated and cohesive definitions in IS has led to difficulties in pedagogy and research (1). Models of IS development exist both in academia and in industry (2). IS faculty find that teaching the Systems Analysis and Design (SAAD) courses requires an understanding and application of IS theories and concepts that are often difficult to impart to students in an environment of rapid information technology (IT) changes. These theories and concepts are especially difficult for students to learn because ambiguity dominates their learning spaces. In addition, different universities teach these theories and concepts in different formats. Some curricula have two courses on SAAD while others have only one course. These courses may also be delivered in the regular semesters of 16 weeks; others are delivered in eight weeks, three weekends or even four Saturdays. Consequently, instructors have found it difficult to focus on those commonly agreed Critical Success Factors (CSFs) for SAAD.

The introductory foundation management information systems (MIS) courses in SAAD require the identification of a business problem or opportunity, information gathering, proposal of a solution to this problem/opportunity, and design of this solution, as well as the deployment of the solution to the users. The final stage of SAAD is continuous improvement with the incorporation of users' feedback to the development team. Most faculty find that they often agree on many of the topics that should be taught in these courses. However, there lacks a common list of CSFs for SAAD courses.

This research project proposes a benchmarking of the required SAAD course in MIS programs, both undergraduate and graduate. The content analysis of syllabi and relevant textbooks was

used to develop the list of CSFs for the SAAD courses in IS programs at different schools. An analysis of the topics in the textbooks and syllabi was conducted to surface the common CSFs.

METHODOLOGY

This study used the methodology utilized by an analysis of the required IS course in AACSB MBA programs (3). Content analysis of textbooks and syllabi were used to develop the lists of the IS topics taught in these courses. However, an assumption is made here that the instructors using these textbooks were also teaching the topics in them. No faculty member had yet been contacted to seek their input as to the validity of the list. Figure I (below) illustrates the initial framework for this research project.

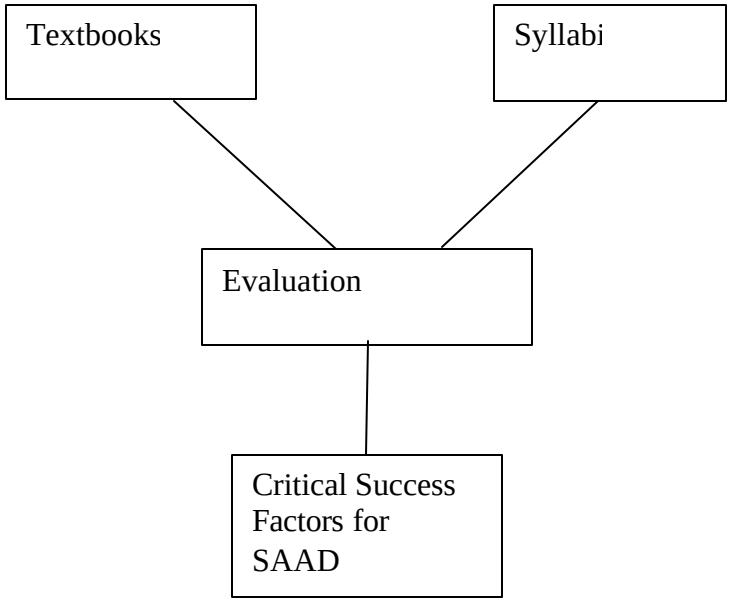

Figure I: Critical Success Factors for Systems Analysis and Design

Research Questions:

Three research questions were asked for this initial study:

1. What are the 10 most important CSFs in SAAD that are in the textbooks?
2. What are the 10 top CSFs in SAAD that faculty are teaching as identified in their syllabi?
3. Which top 10 CSFs in SAAD appear in both the textbooks and syllabi?

The next section discussed the textbooks and the CSFs for SAAD in them. The sample of books selected were relatively small.

TEXTBOOK REVIEW

Eight textbooks were reviewed and their topics were tabulated in a spreadsheet. All the textbooks had 10 common topics: systems development methodologies, systems development life cycle, project management, dataflow diagrams, CASE tools, user interface design, input and output design, documentation, testing, and implementation activities. Three books did not address the topics: feasibility analysis, process modeling, and entity-relationship diagram. At least two textbooks did not address each of the following topics: roles and responsibilities, joint-application development, structure charts, designing networks, distributed systems, and object-oriented analysis. It appears that most authors agree on the main CSFs for SAAD courses. However, more textbooks should be included to see if the 10 common topics were also included in them. The next section discussed the analysis of the syllabi collected from SAAD courses.

SYLLABI REVIEW

Syllabi from various educational institutions were reviewed in order to get a perspective on which systems analysis and design topics are being emphasized in actual course delivery and also to get a perspective on features used as a course enhancement, e.g., a group project or a prototype of a system. A sample size of 52 syllabi were chosen randomly from colleges and universities in the United States, Europe and Asia. The review was focused on undergraduate courses where the name of the course was "Systems Analysis and Design" (SAAD) or something similar.

In a few instances, a syllabus indicated that two semesters/courses were used to teach SAAD. Systems Analysis was taught in the first of the semesters while Systems Design was taught in the followup semester. The majority of situations, however, indicated a one semester course for teaching both analysis and design.

Once the syllabi were collected, an examination was made to determine the topics which were being emphasized in the classroom. If a syllabus contained a weekly schedule of topics that list of topics was the primary source of information. If a syllabus contained no weekly schedule then the *Course Objectives* or *Expected Outcomes* was the primary source of information about topics for the class. Terms identifying the topics to be emphasized were used as stated. No editing was done on the terminology at this stage of the research.

After all the syllabi had been examined, a spreadsheet was used to enter the data from each syllabus. The spreadsheet format consisted of a unique column for each syllabus reviewed and a unique row for each topic or enhancement that was specified. No attempt was made to edit the data that was entered into the original spreadsheet. For example, "graphical user interface" was specified in some syllabi as a topic of interest. In others, "input" and "output" design were specified. Yet, in others, "interface design" was identified as a topic of interest. These were entered as individual entries into the spreadsheet. Similarly, in some papers, "object-oriented concepts" was identified as a topic of study while, in others "object-oriented modeling", "object-oriented analysis" and "object-oriented design" were identified more specifically. Totals for each topic or feature were calculated and used to determine the percentage of syllabi in which that topic or feature was specified.

In subsequent revisions of the data some items were collapsed together where the concepts were similar and the majority of entries specified what could be considered a broader, umbrella term. For example, a very small number of entries identifying "PERT/CPM" as a topic of interest were added to the entry of "Project management" which is larger in scope.

Finally, topics and/or features that had fewer than four occurrences were dropped from the list. These entries were not deemed to be universally significant by themselves or could be assumed to be contained in a broader umbrella term. For example, "Network design", while certainly an important topic, could be assumed to come under the more general topic of "Systems design". The final version of the table, showing the results by descending percentage of emphasis, is shown in the Syllabi Evaluation Table (Table 1).

The goal of this research is to narrow the list of Critical Success Factors (CSFs) to ten. This list of topics provides a narrower group of topics than was derived from the syllabi but does not yet provide a specific list of ten topics. What this does provide is the starting point with which to begin communication with specific instructors. This communication is needed to clarify instructors' definition of the topics, perspective of scope and relative importance in students' experience in SAAD classes.

In comparing the top 10 CSFs from the textbooks with the top 10 CSFs, it is noted that while there are similar topics, many of the topics are also different. Interface design, project management, process modeling/DFDs, and SDLC appeared in the top 10 CSFs in both lists. While feasibility analysis, CASE, implementation, and database design did not appear in the 10 CSFs, they were close to them. Thus, more analysis and data collection are necessary before an in-depth comparison may be made.

CONCLUSION

The quality of information systems depends largely on the quality of the skills that are used to develop systems. The quality of hardware is also a factor but is beyond the scope of this study. To guide students into improving their skills for system development is imperative. Whether SAAD is taught in one semester or two, a finite time span exists for conveying knowledge to students. Utilizing this time span efficiently has the potential for impacting systems development projects in a positive way.

While SAAD courses are difficult to teach, it is expected that most instructors would agree on the most important CSFs that their students should learn. What is crucial is the identification of those learning outcomes that students should understand and master, regardless of the delivery formats. Consequently, this work-in-progress is critical in an attempt to understand how to deliver SAAD courses in an environment that maximizes student learning. Future research will seek input from MIS faculty teaching SAAD courses. Another future enhancement to this research project would be to ask companies that hire graduates from this MIS program to evaluate the CSFs in the workplace.

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	Systems Analysis and Design Topics/Features	Number of Occurrences	Percentage of Occurrences
	Sample size	52	
1	Interface design	35	67.3%
2	Project management	33	63.5%
3	Requirements elicitation/development	29	55.8%
4	Project-based (group)	27	51.9%
5	Process modeling/DFDs	25	48.1%
6	Data modeling/ERDs	22	42.3%
7	Systems analysis	22	42.3%
8	Systems design	22	42.3%
9	SDLC	19	36.5%
10	Prototyping	16	30.8%
11	Feasibility study/analysis	15	28.8%
12	CASE	14	26.9%
13	Implementation	14	26.9%
14	Database design	13	25.0%
15	Testing	12	23.1%
16	Specifications definition	10	19.2%
17	Systems development processes	9	17.3%
18	Object-oriented concepts	9	17.3%
19	Documentation	7	13.5%
20	Project-based (individual)	7	13.5%
21	Object-oriented modeling	7	13.5%
22	Object-oriented analysis	7	13.5%
23	Object-oriented design	7	13.5%
24	Rapid application development (RAD)	6	11.5%
25	Systems development methodologies	6	11.5%
26	Cost benefit analysis	6	11.5%
27	UML	6	11.5%
28	Systems planning	6	11.5%
29	Structured methodologies	4	7.7%
30	Use-case analysis	4	7.7%
31	Functional modeling	4	7.7%

Table 1: Syllabus Evaluation