

In this issue:

## Teaching Systems Analysis and Design as a Writing-Intensive Course

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# Teaching Systems Analysis and Design as a Writing-Intensive Course

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#### Abstract

Writing and critical thinking skills are paramount to the future success of Information Systems professionals. The Systems Analysis and Design course affords the opportunity to practice writing and thinking skills by interleaving assignments that include a significant writing component. Each Information Systems student must be able to communicate their technical work to business professionals who act as clients, end-users, and stakeholders in the development work. In this paper, the development of the Systems Analysis and Design course into writing assignments to meet the needs of students and be considered, by the University, as a writing-intensive course is described.

Keywords: systems analysis and design, writing, technical communication, memoranda

#### 1. INTRODUCTION

Writing and critical thinking skills are as important to information systems professionals as their technical skills, because the inability to write and think critically information systems put professionals at risk of being let behind in a rapidly changing technological environment (Nelson 1992; Merhout and Etter 2005). "Good writing ability, like good manners, is developed through consistent practice over a long period and that the teaching [and assessment] of writing should be done in courses across the curriculum" (Paik and Norris 1983, pg. 107). These are only two major reasons why more writing should be incorporated within information systems courses.

The IS 2002 Model Curriculum makes it clear that IS students should take pre-requisite or co-requisite courses that stress communications skills; both oral and written (Gorgone, Davis et al. 2003). However, since technical skills are often stressed over communication skills in IS programs, many information systems majors do not see writing as important to their career. In addition, due to budget concerns many employers "faced with an immediate need for technology expertise" (Robert Half Technology 2004) and therefore hire based on technical skills.

In addition, nearly half of the CIOs polled by Robert Half Technology "said their companies do not provide IT professionals instruction business with in and communication fundamentals" (Robert Half Technology 2004). However, Katherine Spencer Lee, executive director of Robert Half Technology states that "instruction in business, management and communication can greatly enhance the team's productivity as well as their ability to collaborate on everyday challenges solving such as improving efficiency and competitiveness" (Robert Half Technology 2004). In fact, a recent report from The National Commission on Writing concludes that writing deficiencies cost American business as much as \$3.1 billion annually (The National Commission on Writing 2004). It is therefore incumbent upon information systems faculty to do their part and include writing within the information systems curriculum.

However, writing does not seem important in most Systems Analysis and Design

In a recent survey the topics courses. covered in Systems Analysis and Design courses, Russell, Tastle, and Pollacia (2003) concentrated only on the technical topics covered in many courses. Their findings indicate an inconsistency between topic importance and time spent teaching the modeling topics—namely data tasks. However, one method to correct this imbalance—and many faculty may already be doing this—is to create writing assignments to increase the student understanding of these topics.

The focus of this paper is the design of the Systems Analysis and Design course as a writing-intensive course. The Systems Analysis and Design course is taught to both business and information systems majors as a foundational course within the current undergraduate business curriculum. In the next section, the nature and focus of the Systems Analysis and Design course at Susquehanna University; including what the University requires from a writing-intensive course is examined. In section three, the motivation for transforming the Systems Analysis and Design into a writing-intensive course is discussed. In the fourth section, the modeling and writing assignments are introduced. These assignments ask students to create a memo that serves as a technical and business communication to the project stakeholders; namely clients, end-users and other stakeholders. Lastly, conclusions and future work areas, including how these modeling and writing assignments might be included in other IS 2002 Model Curriculum courses, are addressed.

#### 2. THE SYSTEMS ANALYSIS AND DESIGN COURSE

In a typical Systems Analysis and Design course, topics range from planning to design and development activities, including the implementation of a database or other information system. However, this course only covers the activities within the planning, analysis, and design stages; this course is taught over a seven week period and therefore time is an issue. The focus of the course is on the major models that are used to describe the information system development effort. These models include: the Baseline Project Plan, Business Case, Statement of Work, the models of economic feasibility, the Gantt and PERT charts, the entity-relationship diagram (ERD) and the data flow diagrams (DFD) as well as the process models in design and finally the database schema. In particular, the students are asked to develop the following both on an individual basis and then—using a different case study—on a team basis:

- Feasibility analysis, focused on economic feasibility;
- Process modeling and the development of a high level data-flow diagram (DFD);
- Data modeling and creation of the entity-relationship diagram (ERD); and
- Design activities in developing a normalized database schema.

Each department at Susquehanna University is required to offer students a number of alternative courses to fulfill a writingintensive course requirement of eight semester hours. The School of Business requires that each student must take at least 12 semester hours of Information Systems courses within their Business The School of Business has Foundation. designated a number of courses within this Business Foundation, including the Systems Analysis and Design course as writing intensive courses so that upon completion of the Business Foundation each student would have satisfied the University requirement.

A writing intensive course, as defined by Susquehanna University, must meet the following requirements:

- 1. Require writing assignments amounting to approximately ten (10) typed pages 3000 words. Examples: or research/term essay-length papers, writing done in or out of class; including exams, or various written reports: lab including reports. These assignments must be at least one page.
- 2. Writing requirements must include either multiple assignments or, if only one paper, rewriting.
- 3. Written assignments must be evaluated and graded on writing skills (organization, clarity, grammar) as well as content.
- 4. Written assignments describe above must count for at least 25% of the course grade.

Each of these requirements has been met by the assignments in the current Systems Analysis and Design course.

However, beyond the University requirement there are many other benefits, for both the faculty member and the student for transforming Systems Analysis and Design into a writing-intensive course. In the next section, some of the motivating factors for transforming Systems Analysis and Design in our curriculum into a writing-intensive course are examined.

#### 3. MOTIVATION FOR A WRITING-INTENSIVE COURSE

There are three major motivating factors for including writing into a Systems Analysis and Design course: better learning, skills development, and other disciplines.

"Maybe it's time to redefine the 'three R's'they should be reading, 'riting, and reasoning. Together they add up to learning" (Zinsser 1988, pg. 22). Writing aids in the development of a student's critical thinking skills, as well as their understanding and memory (Bean 1996; Coffin and Others 2003) because "writing is both a process of doing critical thinking and a product of communicating the results of critical thinking" (Bean 1996, pg. 3). This research has been affirmed by the writingacross-the-curriculum and writing-in-thediscipline movements (Purdue University Online Writing Lab 2000). The goal of all educators is "to plan how our students will engage in learning activities" (McKeachie 1986, pg. 23); this means tying the writing assignments to course learning objectives. Writing about Systems Analysis and Design activities and models give students a better understanding of the processes and role of the models in the systems development life cycle (SDLC). This is obviously one of the major learning objectives of this course.

The communication skills of information systems professionals are as important to their future development as their technical skills. IS professionals are expected to work with and communicate with business professionals to craft successful information systems solutions to business problems (Solomon 1999; Dillich 2000; Surmacz 2005). If IS professionals cannot communicate with business professionals their jobs would be in danger of being outsourced; developing their communication skills would lessen that danger (Feeney and Willcocks. 1998). Their ability to write effectively needs to be developed throughout their education (Hilson 2002).

Writing-intensive courses are prevalent in a number of other business disciplines (Bennett and Rhodes 1988; Darian, Hoff et al. 1992; Simpson and Carroll 1999; Kennedy 2001; Hardin 2004). Overall. faculty members in these courses have found the students achieved more and were better prepared for a professional career. In a study of economics courses at Davidson College, the faculty concluded that "brief assignments geared toward different audiences, such as analyses of readings, opinion pieces, and cover letters, are more helpful for professional life. Longer research papers requiring quantitative analysis are more effective for learning economics" (Simpson and Carroll 1999, pg. 402).

Other non-business disciplines have also shown the benefits of adding writing assignments to their courses. Chemistry (Hermann 1994; Van Ryswyk 2005), physics (Allie, Buffler et al. 1997), engineering (Gruber, Larson et al. 1999 70), and even nursing (Moore and Hart 2004) are just four "technically-oriented" disciplines that have successfully incorporated writing-intensive courses within their curriculum.

So while writing-intensive courses have many benefits for students and faculty and it has been shown that communications skills are as important for information systems professionals as their technical skills, the question facing information systems faculty is: "Where are the writing-intensive courses in Information Systems?"

This question could partly be answered by many long standing excuses such as: writing will take away from the content of my courses or I don't know how to teach writing (Boice 1990; Bean 1996). However, both Bean (1996) and Boice (1990) offer many different suggestions to overcome resistance to writing for both the faculty member and the student.

In the next section, the various types of assignments (short memos) that are used in the Systems Analysis and Design course are described.

#### 4. SYSTEMS ANALYSIS AND DESIGN COURSE ASSIGNEMNTS

The Systems Analysis and Design course at Susquehanna University is a business foundation course required of all business majors. The course is usually taken during the sophomore year and prepares the business students for an E-Commerce course—taken in the junior year—and an IS Strategy course in the senior year.

In this course students engage in the activities in the SDLC through two different case studies. A simple case study is used to assess the individual student capabilities in understanding the modeling activities and a second more complex case study is used as a group assignment.

Within each of these assignments the students are asked to construct the appropriate model and then craft a two page memo that explains the purpose and findings of the modeling effort.

The first assignment deals with the issue of economic feasibility. The students are asked to calculate the return on investment (ROI), net present value (NPV) and breakeven analysis (BEA) for the given case study; these numbers are change slightly each time the course is taught. After performing the calculations, using a textbook model for the spreadsheet calculations, the students are asked to construct a memo to the client (usually a fictitious CEO) about the economic feasibility of the project. The students are given directions on how to create the memo both in format and content. Within the content portion, the students are assessed by conciseness, accuracy, and writing skills—namely grammar, spelling, and organization—of their response. The students are directed that the opening paragraph of the memo should state—in one sentences maximum-the to two recommendation on proceeding with the The second paragraph discusses project. the results of their findings from the feasibility calculations. The third paragraph has the students incorporate the intangible benefits of the project and the final paragraph includes a list of action items (activities) to perform for the remainder of the planning stage. A copy of this assignment is included in Appendix A; this assignment also includes a grading rubric.

The second assignment deals with the development of the ERD. The students are required to create the appropriate ERD and write a client memo that describes how the ERD was developed and its elements. The first paragraph of the memo tells the client the purpose of the ERD within the development process. The next paragraphs detail the entities selected, the relationships between the entities, the cardinality of each of the relationships and conclude with action items that need to be performed after acceptance of the ERD.

The third assignment is to create a context diagram for the case study. In the accompanying memo, the students discuss the purpose of the context diagram and the nature of the events that make up the diagram grouped by corresponding agent. This memo also concludes with action items beyond the DFD.

The final assignment involves developing the database schema. The students must go through, and discuss in the memo, the conversion of the ERD into a corresponding database schema. This includes describing the foreign keys as well as the normalization of each table within the initial schema. The final paragraph also includes action items.

Through the development and explanation of each of these models the students are not only practicing the modeling activities within the SDLC but also must be able to grasp the rationale for each of their choices and be able to describe what activities come next. In this way, the students appreciate Systems Analysis and Design as a process that is followed to create a successful database application.

### 5. CONCLUSIONS AND FUTURE WORK

Writing assists students to improve their thinking skills "because a person must mentally process ideas in order to write an explanation" (Zinsser 1988). This, in turn, leads to better understanding and more learning on the part of the students. By including a memo with each modeling assignment the student must understand and explain—the purpose for and steps in the creation of each model. In addition, by including the action items the student gains a better appreciation as to the connections between each model and its place in the SDLC.

Each time these assignments are given to students the feedback from the students is incorporated into the next version of the assignment; leading to better clarity of the assignment and hopefully better memos from the students.

Other IS courses within our curriculum are also listed as writing intensive courses, including the senior-level IS strategy course, and therefore these courses are candidates for writing assignments. Further development of the writing assignments for Systems Analysis and Design and the IS strategy courses is on-going.

Another area that needs to be addressed, that was not explicitly addressed above is changing the attitudes of students toward the writing assignments (Hilgers, Hussey et al. 1999). Despite the best efforts of the faculty in these courses, many students do not see the value of these writing assignments to their learning. This is a problem that needs to be addressed at a higher level, namely in getting other courses across the business foundation to include writing assignments as part of their learning experience.

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## APPENDIX

Assignment: Economic Feasibility Analysis

Due Date: Tuesday, March 29, 2004

Deliverable: A written one to two page memo (addressed to CEO of XYZ Corporation, Mr. Steve "The Bear" Wiltkermoon) explaining your recommendations as to whether or not this project should proceed. XYZ Corporation uses an 8% discount rate for economic feasibility analysis. You should use the questions listed below to guide your recommendations. You are to support your recommendation by referring to the Excel spreadsheet with your analysis. You should include your spreadsheet in your deliverable; not in the memo but in a separate file.

The memo should be structured as follows:

Header:

TO:	(XYZ CEO)
FROM:	(You)
RE:	(Subject)
DATE:	(Due date)

Paragraph 1: Your recommendation.

Paragraph 2: Justification of your recommendation.

This is where you should refer to your spreadsheet calculations (results) to back up your recommendation.

Paragraph 3: Incorporation of Intangible Benefits/Costs

Paragraph 4: Statement of action items.

Subject:

A new production scheduling information system for XYZ Corporation could be developed at a cost of \$80,000. The estimated net operating costs and estimated net benefits over the operational life (the useful life of the system may be as long as 7 years) are as follows:

Year	Estimated Net Operating Costs	Estimated Net Benefits
0	\$80,000	<b>\$</b> 0
1	6,900	18,000
2	6,600	22,000
3	6,100	30,000
4	6,500	35,000
5	8,200	51,000
6	9,800	42,000
7	12,500	40,000

Your memo should address (directly or indirectly) the following items:

- 1. Your recommendation of the useful life of the production system;
- 2. Assuming an 8 percent discount rate, the payback period for this investment;
- 3. The annual ROI (return on investment) for the project;
- 4. The net present value of the investment if the current discount rate is 8 percent;
- 5. The incorporation of key intangible benefits such as:
  - Improved quality of the product
  - Improved inventory control

- A more timely ordering process
- Better, more timely information on status of unfinished and finished goods as well as work-in-progress
- Improved skill sets of key employees

**Discount Factors:** Use the table below to find the appropriate discount factors.

Year	5%	6%	7%	8%	9%	10%	12%
1	0.9524	0.9434	0.9358	0.9259	0.9174	0.9091	0.8929
2	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.7972
3	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7118
4	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6355
5	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5674
6	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5066
7	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4523
8	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4039
9	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3606
10	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3220

	ieling/memo w	Assigning Assigning		
Objectives	Low Performance	Average	High Performance	%
Spreadsheet Calculations	<b>0 – 1 Point</b> Errors evident— Wrong or missing formulas; distracting	2 – 3 Points Minimal errors— Wrong formulas; incomplete; not distracting	<b>4 – 5 Points</b> Error-free; Complete	15%
Recommendation	<b>0 – 1 Point</b> Unclear/Non- existent statement.	<b>2 – 3 Points</b> Statement present—too wordy, unclear.	<b>4 – 5 Points</b> Clear, concise, complete statement.	10%
Justification	<b>0 – 1 Point</b> Simplistic; incomplete; not all measures discussed	2 – 3 Points Complete but confusing or wordy	<b>4 – 5 Points</b> Strong, concise, complete statement.	15%
Intangibles	<b>0 – 1 Point</b> Simplistic or Incomplete discussion	2 – 3 Points Minimally Complete; most components exist—wordy	4 – 5 Points Fully developed, concise; multiple components examined	10%
Action Items	<b>0 – 1 Point</b> Minimal or non- existent	2 – 3 Points Restatement of recommendation; Sufficient & accurate	4 – 5 Points Detailed; accurate; convincing	10%
Organization	<b>0 – 1 Point</b> Confusing; Mixed	<b>2 – 3 Points</b> Easy to follow; logical	<b>4 – 5 Points</b> Complex; well designed	10%
Structure, Format & Transitions	<b>0 – 1 Point</b> Errors evident; distracting	<ul> <li>2 – 3 Points</li> <li>Minimal errors;</li> <li>not distracting</li> </ul>	<b>4 – 5 Points</b> Error-free	10%
Grammar/ Spelling	<b>0 – 1 Point</b> Careless; distracting	2 – 3 Points Present but do not interfere with meaning	<b>4 – 5 Points</b> Error-free	15%
Audience	<b>0 – 1 Point</b> Ignores; Show lack of concern	2 – 3 Points Some clarification necessary	<b>4 – 5 Points</b> Addressed appropriately	5%
GRADE				

# **Modeling/Memo Writing Assignment Rubric**