

Teaching Tip

Interleaving Modeling and Writing Activities in Systems Analysis and Design

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ABSTRACT

A Systems Analysis and Design course should develop both the technical as well as interpersonal skills of each student. Each student must be able to develop and use the various lifecycle models and be able to communicate with end users through these models. By creating interleaved modeling and writing assignments within the Systems Analysis and Design course both objectives can be met. This paper presents a series of integrated modeling and writing assignments—used in a Systems Analysis and Design course—that have been developed to enhance both the technical and interpersonal skills of an IS student.

Keywords: Systems Analysis and Design, Integrated Modeling and Writing Assignments, Interpersonal/Communication Skill Development, Communication with End Users

1. INTRODUCTION

The Systems Analysis and Design course within Information Systems curriculum provides the student with the skills necessary to analyze and design information systems (Gorgone, Davis et al. 2003). One of the major objectives of this course is to have the student develop and use each of the models—either structured or OO—in the Systems Development Life Cycle (SDLC) (Hasan 2002). A second objective is to make each student aware of the interpersonal skills necessary for successful systems development (Guinan and Bostrom 1986; Gorgone, Davis et al. 2003). In particular, the Systems Analysis and Design course should emphasize “the factors for effective communication and integration with users” (Gorgone, Davis et al. 2003, pg. 29). In fact, the models developed in the SDLC are rendered useless unless “effective communication patterns are used by developers and users” (Guinan and Bostrom 1986, pg. 3).

These two objectives—model development and interpersonal/communication skills—are met simultaneously through series of assignments developed for a Systems Analysis and Design course. In the course, the student is required—individually and then as part of a group—to develop a series of SDLC models and write a corresponding memo that explains the purpose, use, and their understanding of each model. This article describes how these assignments

are used to meet these two learning objectives simultaneously.

2. SYSTEMS ANALYSIS AND DESIGN COURSE AND ASSIGNMENTS

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 is taught over a seven week period so only the activities within the planning, analysis, and design stages are addressed. The focus of the course is on the first objective—the development and use of the models in the structured approach—however, the course is regarded as a writing intensive course by the University; therefore a significant writing component must be incorporated into the course (Pomykalski 2005). Since this course, like nearly 75% of other Systems Analysis and Design courses, focuses on the structured approach, it should be useful to many instructors (Mahapatra, et al., 2005).

Each student is given a series of four models to develop throughout the course. The models are for economic feasibility (return on investment, breakeven analysis, and net present value), data modeling (an entity-relationship diagram), process modeling (a dataflow diagram), and database design (a database schema). As part of each modeling assignment, the student creates a two page memo

that explains the purpose, use, and specifics of the corresponding model in their own words. These individual modeling and memo-writing assignments are done using a straightforward case adapted from a textbook (Satzinger, Jackson et al. 2004). Each assignment is then graded and returned to the student.

In order to assess the learning from the initial assignment, the same assignment, using a more complex case study (similar to ABC Church (Cappel 2001)), is completed by student groups; typically 2-3 students per group. Each student group develops the model, and writes a corresponding memo, for economic feasibility, data modeling, process modeling, and database design. In this way, concept learning is assessed.

2.1 Assignment 1: Economic Feasibility

The initial assignment on economic feasibility involves—given a set of annual costs and benefits for a seven year project—the calculation of the return on investment (ROI), net present value (NPV), and breakeven analysis (BEA). After performing the calculations, by mimicking a textbook spreadsheet model (Valacich, George et al. 2004), a memo, addressed to a “CEO-level” client about their findings for the economic feasibility analysis is created. Each student is given the following directions concerning the memo’s content.

1. The opening paragraph of the memo should state—in one to two sentences maximum—the recommendation on proceeding with the project. This recommendation needs to be clearly stated and include a statement on the number of years that the project should remain feasible; it may be less than the seven years.
2. The second paragraph justifies of the recommendation using the results of the feasibility calculations. This is an assessment of the student’s knowledge of what ROI, NPV, and BEA indicate.
3. The third paragraph incorporates the intangible benefits of the project. In class, it is noted that intangible benefits are likely to be as important as the tangible benefits. The intangible benefits are to be used as further evidence toward the recommendation. This assesses the student’s use of qualitative information in making a recommendation.
4. The final paragraph includes a list of action items (modeling activities) that need to be performed based on their recommendation. In this paragraph, the student’s knowledge of the next steps within the SDLC is tested because the action items describe what models need to be developed next.

Note the benefits and costs in the individual assignment are designed so that the breakeven point occurs within the seven year period and the final NPV and ROI are positive. However, in the group assignment, the benefits and costs are modified so that the breakeven point is reached within the seven years, but the NPV and ROI at the end of seven years are negative; this forces the student group to consider a shorter project life recommendation.

2.2 Assignment 2: Entity-Relationship Diagram (ERD)

The second assignment requires the development of an Entity-Relationship Diagram (ERD). After developing the ERD, another memo, addressed to a “CEO-level” client about their development efforts surrounding the ERD is created.

1. The opening paragraph describes the purpose and role of the ERD within the development process. The student assumes that the client knows very little about database design and data modeling therefore it is important to state clearly the purpose and need for the ERD.
2. The second paragraph specifies the entities specified in the ERD and the rationale for collecting data on these entities.
3. The third paragraph describes the relationships that exist between the entities. The student must describe what the relationship is and its significance in the problem.
4. In the fourth paragraph the cardinality of each relationship and significance of the cardinality is discussed.
5. The final paragraph again consists of action items, i.e., modeling activities that need to be performed beyond the ERD.

2.3 Assignment 3: Data Flow Diagram (DFD)

The third modeling and writing assignment is to create a context diagram (Valacich, George et al. 2004); a high level DFD. After developing the context diagram, another memo, addressed to a “CEO-level” client about their findings with respect to the system scope is created.

1. The opening paragraph describes the purpose and role of a DFD, specifically a context diagram, within the SDLC; the same assumption about client knowledge of the process is made.
2. The second paragraph specifies the external agents that interact with the proposed system.
3. The third paragraph describes the nature of the interactions between the external agents and the system. The student must describe what type of information is either being provided to the system or requested from the system by each of the external agents.
4. The final paragraph again contains of a statement of action items. These activities must include some discussion of the functional decomposition of the system that still must take place, i.e., the development of lower level data flow diagrams.

2.4 Assignment 4: Database Schema

The final assignment involves the development of the database schema. The database schema is an important data model developed in the design phase of the SDLC that acts as the blueprint for the database itself (Valacich, George et al. 2004). After developing the database schema, the student must explain their model to the “CEO-level” through a two page memo which contains the following:

1. The opening paragraph of the memo describes the purpose and role of the schema. The student must also describe the relationship between the schema and the ERD.

2. The second paragraph begins the discussion of how the ERD was converted into the corresponding database schema by describing how each of the entities of the ERD was transformed into a database table including the identification of primary keys.
3. The third paragraph describes how the relationships of the ERD are represented within the database schema; this is primarily the discussion of the use of foreign keys.
4. The fourth paragraph explains, on a table-by-table basis, the normalization process and the transformation of each table into third normal form.
5. The final paragraph is the same as in each of the previous assignments, a discussion of the activities that need to be completed beyond the design stage.

3. ASSIGNMENT GRADING

The grading of these assignments focuses mainly on the written deliverable; the model itself is graded for form, accuracy, and completeness. The University guidelines for writing assignments in a writing intensive course state that at least 25% of the final grade must be on the writing assignments themselves. In addition, the writing assignments must be graded on organization, writing style, and grammar and spelling; this constitutes about 40% of each assignment grade.

The purpose for having students write memos is twofold: (1) memos are still—despite the introduction of EMail—the most widely used form of formal business communication and (2) memos are intended to be short, concise, and to the point—these assignments are to be no more than two pages in length. Therefore within the content portion, the students are assessed on the conciseness and accuracy of their memo with respect to the corresponding model.

4. OUTCOMES OF THIS APPROACH

“Writing is both a process of doing critical thinking and a product of communicating the results of critical thinking” (Bean 1996). These memos, interleaved with the Systems Analysis and Design modeling activities, enable students to gain a critical understanding of the purpose, role, and content of each model as well as the process necessary to develop each model. Through the development and explanation of each of these models the student is not only practicing the modeling activities within the SDLC but also must demonstrate their knowledge of the SDLC models. In addition, through the grading process, each student is obtaining feedback on their progress in developing their business communication (interpersonal) skills.

Models are often seen as a source of communication between users and developers. “The real reason we need to build and play with prototypes [i.e., models] is to get a better understanding of ourselves and our priorities” (Schrage 1999, pg. 21). Through the creation of models developers and end users gain better insight into problems and develop richer, more innovative solutions (Schrage 1999). The memo

can be seen as a method to begin that dialogue toward innovation.

Pedagogically, the main reason for interleaving the modeling activities within Systems Analysis and Design with memo writing is to fulfill the goal of all educators: “to plan how our students will engage in learning activities” (McKeachie 1986). These modeling and writing assignments assist to accomplish the two primary course objectives—model development and interpersonal/communication skills—simultaneously.

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