Teaching Systems Analysis and Design Using the Process Game

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ABSTRACT
The teaching of systems analysis and design to students with no background in IS development is notoriously difficult. Most students have great difficulty identifying with both the reasons for a development process and its importance. Many different techniques exist to illustrate both the need for process and the effect of poor process. We propose a fun and simple in-class exercise called “The Process Game”, a variation on the popular card game Rummy, which can be used to introduce both of these concepts to students. Experience indicates that students readily grasp the effect of changing specifications and processes on achieving the final goal. A pre-test and post-test experiment is proposed to measure the student subjects’ understanding of the concept of process in systems analysis and design, along with the importance of following a defined process.

Keywords: Teaching, systems analysis, process learning, experiential learning.

INTRODUCTION
It is a well known adage that experience is the best teacher. The teaching of systems analysis and design to students with no background in IS development is notoriously difficult. Most students have great difficulty identifying with both the reasons for a development process and why it is important. Adding an experiential component to the teaching of software systems analysis and design is also a difficult task as many of the concepts require an in-depth project, case study, or background.

Individuals attempting to teach systems analysis and design to students at all levels, from secondary school to corporate offices, have faced the same dilemma from the beginning: “How can I introduce this subject to my students in such a way that they grasp both the subject itself and its importance to the success of all types of information systems development projects?” The failure to grasp these facts has been shown to be a major contributor to the poor success rates of these projects (Standish 2004).

This paper proposes a method which uses a game to teach students the importance of one aspect of good analysis and design practice, communication, and shows the effect of less than optimal communication on the achievement of project goals. The balance of this paper consists of a brief review of earlier research on teaching systems analysis and design, an introduction to the game, a research question suggested by the use of the game, a proposed experiment to test the perceived effectiveness of the game, and a discussion of our future research agenda.

BACKGROUND
The struggle to teach the concepts of systems analysis and design (SA&D) to students who find it difficult to internalize either the concepts or the processes has been the subject of extensive scholarship spanning the information era. As early as 1982, Golden (1982) was describing how industry leaders were decrying the poor state of the then-current methodologies for teaching SA&D and the steps educators were taking to address the problems. Later, Ofman and Bostrom (1992) proposed expanding the viewpoint of the role of the analyst taught in the classroom to include facilitation skills and creative thinking skills. They also proposed the addition of experiential learning to the classroom. Larmour (1997) surveyed present and former students seeking to identify those areas where SA&D training was adequate and those areas where improvements could be made.

As the methodologies used in industry to develop information systems applications evolved, the course focus in SA&D also changed. Kendall et al. (1996) made a case for expanding the traditional SA&D to include experiential elements as proposed by Ofman and Bostrom (1992). The move to the object paradigm in industry should be reflected in a change of focus for modern SA&D courses. Although the evidence about the movement to object-oriented methodologies in industry is substantial, there is still an ongoing debate among educators and practitioners concerning whether to teach traditional structured design or object-oriented design (Mahapatra et al. 2005). Since the object paradigm seeks to create a representation of the problem space where object characteristics and behaviors model those of the actual problem, it is imperative that new SA&D students learn to use the object paradigm effectively. Brewer and Lorenz (2003) urged that “educational institutions must also begin educating analysts to create informative models based on OO principles” (54). To fully implement the teaching of object principles in the SA&D classes, many different approaches are being proposed, including Appreciative Inquiry (Avital 2005).

THE PROCESS GAME
As a possible remedy to the problem of students failing to grasp the reason and importance of using a defined process in systems analysis and design, we propose the use of a short, hands-on workshop called “The Process Game” to teach students about the importance of good communication and the consequences of insufficient communication. The game is fun, easy to play, and doesn’t require an in-depth project or any type of case study. The entire workshop can be completed in less than an hour. The game uses a variation of a well-known card game - something most students have experience with. In our experience, it has consistently proven to be a useful tool in helping students to better understand the importance of communication.

The basic idea of the process game is to divide the students into a number of groups. Each group has a different communication method. Each participant in the group gets an incomplete set of rules for the card game. A few participants in the group get the remaining rules, but the game is set up so that no one individual (except a ‘user’) has a complete set of rules. Some groups will have a representative stand up in front of the class and explain their communication mechanism and the problems they had playing the game. After all of the groups have debriefed the class, the instructor must relate the communication methods to real world applications.

Variations Among Groups
There are 2 dimensions that are varied for each of the groups, communication mechanism and user involvement. The following table describes the mix for each group.
Communication Mechanism Descriptions
Groups designated as “Via Email Only” must communicate only in writing - no hand signals or speaking at all is allowed. One person in the group is selected as the mail server, responsible for routing emails between each player. Players do not hand the emails directly to other players, but hand them to the email server. Emails to more than one person will be routed (passed) by the mail server from one person to the next person. Players must also not email the rules between to other, but can email their interpretation of the rules. Note that students can’t see each other’s hands, the deck itself, or any discarded cards. This information can only be shared via email, therefore one of the participants in the group must be responsible for managing the cards in the deck.

Groups designated as “Via Telephone Only” can only communicate via telephone (speaking). The group cannot show each other diagrams, papers, write-ups, cards, or use hand signals. The groups can hold conference calls with multiple people. Members of this group cannot just read the rules, but must explain them. As with the Email group, students can’t see each other’s hands, the deck itself, or any discarded cards. This information can only be shared via telephone, therefore one of the participants in the group must be responsible for managing the cards in the deck.

Groups designated as “Open Communication” have free communication, essentially sharing anything the members have or know. As with the other groups, students in this category can’t just read the rules or pass them around, but must explain them.

User Involvement Descriptions
Users get an entire set of rules as well as a section of rules designated as variations. The goal of the user is to introduce a different variation for each round. The variations are not cumulative (only one variation per hand). The user is part of the group and can facilitate or assist in any way he/she would like as long as he/she conforms to the communication mechanism.

The group designated as “Open Communication” with a user involved until the last 5 minutes must be made aware that the user is going to be pulled from the group at the end, it must be unexpected both on the part of the group and the part of the user.

The user with ever-changing requirements.

Determining Groups
A group consists of 4 to 6 players. It is important to avoid selecting players who are already in informal social groups as that will effect their communication. Ideally, there should be six groups (24 - 36 students). If there are more than 36 students taking part, repeat the six communication methods - don’t create groups larger than six participants. If there are less than 24 students, limit the group communication by eliminating Group 6, Group 5, Group 4, and then Group 3, in that order. The game requires at least two groups (8 participants).

RESEARCH QUESTION
The Process Game, as a game, provides a fun-based means of interacting with others in various defined ways. The Process Game, as a teaching tool, is designed to expose students to the importance of having defined processes to follow in seeking to accomplish a task. The use of the game in a SA&D class to accomplish this goal suggests the following research question:

Rq: Does the use of the Process Game have a improve students’ understanding of the use of process in systems analysis and design?
is a new approach, to the best of our knowledge. After playing the game, they can evaluate the benefits realized by having defined communication process to exchange information.

PROPOSED EXPERIMENT

Research questions themselves are generally not testable. As a consequence, it is necessary to define a hypothesis that can be tested with an experiment. The testable hypothesis for our research question is:

H<sub>0</sub>: Playing the Process Game will have a positive impact on the student’s perception of the importance of process in systems analysis and design.

The Process Game itself does involve any specific outcomes, the value of which can be used as a construct to represent any change in the students’ understanding of the importance of process. It is necessary therefore to design a different type of measure that will generate the necessary construct. We intend to create a short questionnaire to be given to the students before and after participating in the Process Game. The questionnaire will list ten project related tasks, one of which is communication, that the students will assign a value representing its importance to the project. Our test for the hypothesis will be to evaluate the changes in the assigned values pre- and post-test.

CONCLUSION

We are currently conducting pilot tests of the test instrument and the experimental process. If we can secure sufficient numbers for statistical validity, we intend to report the full results of our experiment at the conference. If not, we will report the results of the pilot study.

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(Note: Complete Directions for the Process Game are available on request)
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