Experiential Learning in Systems Analysis and Design

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ABSTRACT

This paper describes the use of an experiential learning technique for the System Development Lifecycle (SDLC) as presented in the capstone course Systems Analysis and Design. Experiential learning is defined using the 4 step model of David Kolb. The System Development Lifecycle is explored using a modified version of the SDLC model described by Valacich – George and Hoffer. This experiential learning technique has been utilized and continuously improved since 1999 and the results have demonstrated an exceptional level of student learning, understanding and application.

Keywords: Systems Analysis and Design, Systems Development Life Cycle, experiential learning

1. WHAT IS SYSTEMS ANALYSIS AND DESIGN AT THE UNIVERSITY?

The overview of this course describes it as a study of the methods and techniques for conducting a systems project that solves business problems with information technology. The student will plan, analyze, design, implement and support a business system as a member of a project team. This course is a senior capstone course requiring the successful completion of the courses related to Business Application Development, Database Management Systems and Data Communications and Networking.

The objective of this course is to instill and apply the foundation of a systems analysis and design methodology. All businesses and organizations should use some defined methodology to develop information systems. Understanding and applying this methodology will provide the experience as a systems analyst or business professional. Systems Analysis and Design goals are ultimately focused on solving business problems with people, processes and technology. Additionally, these practices and techniques are applicable to the development of solutions outside the scope of information technology.

2. WHAT IS SYSTEM DEVELOPMENT LIFECYCLE?

Organizations use a systems development methodology to develop and support their information systems. A systems development life cycle (SDLC) is a common methodology for systems development, and each organization will use a slightly different version. The life cycle presented by Valacich, George and Hoffer in the textbook has four phases: (1) systems planning and selection; (2) systems analysis; (3) systems design; and (4) systems implementation and operation. (Valacich, George and Hoffer 2006) In our course we modified phase (4) by splitting out implementation from operation thus creating a phase (5) and renaming it systems support. The reasons for the modifications are implementation stands alone as it is the critical distinction between successful projects and failed projects. Support is living phase which runs parallel with the life of the system.

3. WHAT IS EXPERIENTIAL LEARNING?

Information is traditionally presented in the classroom via lectures, media or written exercises. The students take in this information through their eyes and ears and relay it back through their mouth or hand. References have been made that

only 20% of the information is retained in this traditional format. Experiential learning starts with the students using their eyes and ears but then transfers to doing or putting in practice what has been seen or heard. This form of student application encourages and motivates them to participate resulting in higher levels of learning and understanding.

In his book David Kolb describes learning as a four-step process. He identifies the steps as (1) watching and (2) thinking (mind), (3) feeling (emotion), and (4) doing (muscle). He draws primarily on the works of Dewey (who emphasized the need for learning to be grounded in experience), Lewin (who stressed the importance of a people being active in learning), and Jean Piaget (who described intelligence as the result of the interaction of the person and the environment).

4. WHAT IS THE RATIONALE?

In addition to comprehending and understanding the phases and activities of the System Development Lifecycle it is important for the student to develop the necessary skills to be successful in a business environment. Problem identification requires observation skills, listening and other interaction skills to actively and accurately define the problem. The Analysis phase requires interpersonal and judgment skills to document the current environment define requirements and generate alternative solutions. The nature of the work is gathering information through people, observations and outcomes. Lessons in these areas require practice to fully appreciate the scope of the activities within the phases thus the use of experiential exercises.

As an example the traditional textbook case clearly defines the company, the problem, the background and guides the student with specific questions. In the business world all of the above needs to be generated through the planning process by the systems analyst. In regard to problem identification some companies know they have a problem but can't provide specifics others don't know they have a problem that requires analysis. We have determined that experiential exercises are the best way for student skill development and to appreciate the complexities associated with the people, processes and technologies in business.

5. WHAT IS THE APPLIED TECHNIQUE?

On the first day of class the students are introduced to the defined Systems Development Lifecycle through a presentation by the instructor and supporting material available via the course website. At this point the students enrolled in Information Systems Analysis and Design are assigned to 5 person groups utilizing one of various methods. A common method used is for each student to submit a first and second choice for their desired phase. Once assigned to the groups, the groups meet and participate in team building exercises with results shared with the whole class. At the end of the first day each group is required to review the SDLC submit their selection of SDLC phase.

On the second day of classes the teams receive approval for their selections with presentation dates assigned. At this point students have been assigned to groups, groups have been assigned to phases (Planning, Analysis, Design, Implementation and Support) and group presentation dates are established.

The next step is to determine the business problem to be solved. Historically, the best results have been from student driven business problems such as parking systems, course registration, book purchases, spring break, personal computer purchases and food or beverage service. It is the responsibility of the Planning team to solicit ideas and present recommendations. The final selection process is either voted on by the class or in rare instances identified by the instructor. Once the problem statement has been identified the project officially begins with presentations every 2 weeks.

Each team is responsible to complete the activities and produce the outputs identified for each phase. The teams can all begin in parallel learning and understanding the activities and outputs of their assigned phase but must work linearly in regard to the project. As each phase is presented all documentation and outputs are turned over to the next phase. Therefore it is a building process from team to team with each team providing added value to the previous teams work.

Planning Phase – The initial phase of the SDLC whose objective is to scope and plan the project. Incorporates the following activities and outputs:

- Define the Problem – Problem Definition
- Confirm Project Feasibility – Feasibility analysis using TOPLES model
- Produce the Project Schedule – Project schedule
- Staff the Project – Resource chart and assignments
- Launch the Project – Kickoff meeting

Analysis Phase – One phase of the SDLC whose objective is to understand the user's needs and develop requirements and solutions
- Gather Information of current environment – documentation of interviews, processes and systems
- Define System Requirements – Requirements via RAD or JAD
- Build Prototypes for Discovery of Requirements - Prototype
- Prioritize Requirements – Priority survey and ranking
- Generate and Evaluate Alternative Solutions – Solutions presentation and criteria
- Review recommendations with Management - Presentation

Design Phase – The phase of the SDLC in which the system and programs are designed
- Design and Integrate the Network – Network schematic
- Design the Application Architecture – Application design document or diagram
- Design the User Interfaces – Screen shots of the interface
- Design the System Interfaces – System integration diagram
- Design and Integrate the Database – Entity Relationship diagrams
- Prototype for Design Details - Prototype
- Design and Integrate the System Controls – Systems Controls Document

Implementation Phase – The phase of the SDLC in which the new system is built, tested and ready for installation
- Construct Components - Application
- Verify and Test – Test results
- Develop Prototypes for Tuning – Prototype for testing
- Convert Data – Populated database

- Train and Document – Training plan and material
- Install the System – Installation plan

Support Phase – A phase that occurs after the system is installed
- Providing Support to End Users – Training program and Helpdesk
- Maintaining and Enhancing the Computer System – Process for recommendations

Each presentation is peer reviewed via a student evaluation submission document that is used for the grading in conjunction with the instructors input. Each student receives an individual grade which consists of 80% of their group output and 20% of their individual performance. The evaluation document includes the following categories: Presentation Skills, Relevance to the Phase, Visual Aids and Supporting Material, Entertainment Value and Creativity and Team and Inter-team Interaction.

As the semester progresses and the phases evolve the students witness the project from idea to implementation and support.

6. STUDENT LEARNING

A number of projects have been developed by the students in this course with some taking on a life beyond the course and being further implemented by the students outside the classroom on their own or in a business environment. The students are encouraged to include this project on their resume and discuss it during interviews. This project has been effective in securing students full time employment as well as introducing companies to the SDLC methodology as a way to improve project successes. In the classroom testing involving identification of the SDLC phases, activities and outputs have higher than average results. In the business world feedback from our alumni has included references in regard to this project and the SDLC.

Additionally this assignment meets the following Learning Goals that have been established for the Perdue School of Business at Salisbury University.

Learning Goals:
1. Knowledgeable about business concepts and able to apply that knowledge

Students will be:
   a. Knowledgeable about core business concepts and topics
   b. Able to apply business knowledge to new problems and situations
2. Effective decision maker
   Students will:
   a. Use critical and analytical thinking skills to solve business problems
   b. Use technology as a tool in reaching business decisions
   c. Analyze changes in the external and internal business environment
   d. Employ creative thinking to develop new business solutions
   e. Articulate the ethical and international dimensions of a business decision
3. Effective communicator
   Students will:
   a. Communicate effectively through oral, written, graphical/visual, and technological means
4. Effective team member
   Students will:
   a. Function successfully in a team environment and make positive contributions to team outcomes
5. Able to function professionally in an organizational environment
   Students will:
   a. Demonstrate the professional behaviors and attitudes expected in business
   b. Demonstrate self-awareness and the interpersonal skills necessary for success in business
   c. Demonstrate ethical awareness on a personal level

7. CONCLUSIONS

An experiential learning project in an Information Systems Analysis and Design course is an efficient and effective technique learning and applying knowledge in a form that is easily transferable not only from the instructor to student, but to student to student and student to employer. Studies have shown that the rate of learning can be increased by at least 4 times via experiential as opposed to lecture.

8. REFERENCES

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