Final Report

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II. Introduction

IPRO 329 has a mission to fulfill. Our mission is to not only educate and entertain our audience, fourth-grade students, through computer games, but also to address national need to education today's youth in the core subjects taught in schools with a medium familiar to students, computers.

III. Background

These past two semesters, IPRO 329 turned its focus and efforts to the need for educational games that serve as supplements for classroom subjects and their trouble areas. Often times, students do not completely grasp certain focus areas within certain subjects. Hence, we plan to address this problem with the development of *Scholars of the Lost Exhibit*. In order to solve this problem, the team will use iterative design and development methods. Furthermore, the development team will use Flash and Action Script 2.0 to program the game. Overall, IPRO 329 focuses on using computer to solve the problems presented to them at the start of every project.

Other e-learning gaming companies have made games that are successful on the market such as Jump start, which uses two-dimensional animation. Thus, our IPRO had to do something to get a step above gaming companies like Jump Start.

During previous semester, the development team tried to implement a three-dimensional world, but that required too many intense mathematical calculations that some computers cannot handle. Hence, this semester, they decided to use a different two and a half-dimensional approach to the game, which has been quite successful and not really utilized in the gaming industry.

This particular IPRO had been very successful during its past semesters. Just recently, the team from Fall 2004 won an award from the Society of Technical Communications (STC) for their completion of *College Pursuit*, a computer game developed to teach high school students about college financial aid. Furthermore, this IPRO grew successful after its first game *CreditSafe* was published on the Illinois Secretary of State's web site. In addition, this game garnered an award from the same STC competition. Overall, IPRO 329 holds high standards and follows a strict process in order to achieve successful and award-winning results.

IV. Purpose

This semester IPRO 329 | Edutainment, turns its complete efforts toward an educational computer gaming suite targeted at fourth-grade students and the subjects these students struggle with most in school. It is tentatively entitled *Scholars of the Lost Exhibit*. Work on this project began last semester as the team completed their award-winning game *College Pursuit*. During this remaining half of the semester, we will focus on the design, development, testing, and marketing of *Scholars of the Lost Exhibit*.

There are multiple objectives and goals the team has set forth this semester:

- Complete the high-level architecture of the development portion of Phase II
- Research the user experience for the other subject areas through testing other computer games on elementary school children. The User Experience team decided upon this method because it will help produce better results for the design team to create games.
- Have button designs, business cards, brochures, and all other deliverables three-quarters complete by the end of mid semester. This will cut down on the amount of work at the end of semester.
- Create paper prototypes of the first portion of the Museum Lobby and Science wing
- Conduct peer evaluations each month
- Log team minutes in an orderly fashion. This objective was added because it makes it easier for the Management team to put together the Final Report.
- Construct a prototype of the Science wing for IPRO day

The development of *Scholars of the Lost Exhibit* education gaming suite is the main objective for this semester, but the team can only reach this objective through integrated participation and collaborative learning. To create this educational experience, every person must remember the importance of the overall team experience besides the objectives of the project.

In the future, the current IPRO 329 team hopes that each wing will be completed and user tested in a timely manner. Furthermore, they hope the design team keeps up fast and quality production of prototypes to test on fourth-grade students. In addition, the User Experience team is expected to continue testing Design's prototypes on fourth-grade students in elementary schools across the city to obtain diverse feedback. Overall though, the team hopes those in the future will continue to educate and entertain students through computer games all while focusing on the goal of integrating learning of the core subjects into computer games.

V. Research Methodology

There are a number of approaches to software development, each of which has a set of advantages and disadvantages associated with it. For our projects, we have chosen an

approach that we call the ***Pipeline Process*** model and the ***Iterative Prototyping*** process model. The ***Pipeline Process*** model follows a top down protocol, which is the reason the previous semester's team picked a vertical pipe as their metaphor.

When using the *Pipeline Model*, the team follows three phases, each of which has particular tasks associated with them. The team can keep track of which level of development the problem is at and determine a plan of completion in an organized manner. Furthermore, these phases provide a great basic structure for problem solving because the phases make time for research, development, testing, and marketing. Within this model, the developers use the *Prototyping Model*. While using the *Prototyping Model*, the developers will build a simplified version of the proposed system and present it to potential users for consideration as part of the development process. The users, in turn provide feedback to the designers and developers, who go back to refine the system to incorporate the additional information.

The *Pipeline Model* consists of the following phases:

- **Phase I -** Create, analyze, research, and select game ideas based on successful gaming criteria
- **Phase II -** Using aforementioned iterative methods, the game is brought from preliminary design to final development and then to user testing.
- **Phase III -** Through various outlets, the game is introduced to the public and any legal issues are resolved

Although this is only the second semester of implementation of this model, it has already proven to be imperative to IPRO 329's success. As IPRO 329 continues to grow in size, this model provides one great advantage:

- Team members have a way to stay organized and know where each group (Development, Design, User Experience, and Management) is with the research, design, development, testing, and marketing of the project.

The ***Pipeline*** model allows for even development and proper implementation of the *Prototyping Model.*

Overall, the ***Pipeline Process*** model emphasizes that the team take a business approach to projects. Furthermore, it ensures that the project is being managed properly, production remains flexible, and effective communication is achieved. The pipeline lets everyone know where every other team is at and what needs to be completed next.

The *Prototyping Model* consists of the following looping steps:

- **Requirements Definition/Collection.** The information collected is usually limited to a subset of the complete system requirements.

- **Design.** Once the initial layer of requirements information is collected, or new information is gathered, it is rapidly integrated into a new or existing design so that it may be folded into the prototype.
- **Prototype Creation/Modification.** The information from the design is rapidly rolled into a prototype. This may mean the creation/modification of paper information, new coding, or modifications to existing coding.
- **User Testing.** The prototype is presented to possible users for review. Comments and suggestions are collected from the users and reported back to the team.
- **Prototype Refinement.** Information collected from the customer is digested and the prototype is refined. The developer revises the prototype to make it more effective and efficient.
- **System Implementation.** In the traditional model, the system is rewritten once requirements are understood. In the *Iterative Prototyping* process, the results of the tests are used to guide the changes to the system. As some parts or phases of the software are implemented, other parts are prototyped and tested.

The process model we use has proven successful to the needs of similar past projects of ours. There is one major benefit of this approach:

- Creation of the major user interfaces without any substantive coding in the background gives the users a “feel” for what the system will look like and uses their feedback to refine the system at a very early stage.

The iterative nature of development allows for parallel progress of several tasks – different system features are being designed, tested and implemented at the same time.

VI. Assignments

In order to better manage ourselves, IPRO 329 divided itself into four team at the start of the semester—Design, Development, Management, and User Experience. Each team worked on different aspects of the game, which ensured that the entire IPRO made maximum progress throughout the semester. Furthermore, the division of responsibility made it easier for each team to understand their position in the project. The following chart provides the information about which team completed each task throughout the course of the semester.

Task	Design	Development	Management	User Experience
Project Plan				
Meeting Minutes				
Netnography				
Character design				
Dialogue design				
Mid-term Progress Report				
Isometric tile-based				

movement design and implementation				
IRB application				
User Testing at elementary schools				
Consent forms				
Poster design				
Presentation design				
Presentation content design				
Team CD				
Team Website				
Blog				
File Depository				
Team Forum				
12-point character design				
Coding of games				
Abstract				
Business Cards				
Brochures				
T-Shirt design				
Design binder for display for IPRO Day				
User testing video for display on IPRO Day				
Final Report				

VII. Obstacles

Design

Suffered miscommunication with user experience when trying to determine when prototypes were needed. Lost team leader with only three weeks left in the semester, but pushed forward without her.

Development

Each team member suffered their own obstacles within this team.

Megha

- Writing code to allow for an arbitrary number of stars
- Getting objects to display correctly with an isometric perspective
- Using trigonometry necessary for the planets to rotate

- Setting the depths of objects correctly based on their position in pseudo-three-dimensional space.
- Using inverse-trigonometric functions to obtain the angle to move the stars so that they are moving in the direction opposite the mouse.

Josh

- Learning the language as we were implementing it (being resolved through
- more use and experience)
- Having separate classes exchange information (resolved through using event
- handler)
- Time issues
- Debugging issues

Tom

- Unfamiliarity with programming environment
- Some hardware problems
- Time constraints (from other classes and obligations)

Kevin

- Learning the syntax of Action Script 2.
- Finding and understanding various quirks that AS2 has.
- Getting the objects to display on the screen the way that they are supposed to.
- And most recently trying to figure out how a text field works.

Steve

- Learning flash and figuring out how to use it
- Trying to figure out the best way to architect the software
- Understanding depth on an isometric grid
- Representing world, script and saved game data

Management

One member could not complete a task on time due to time constraints from other classes. The team had trouble obtaining presentation content from other teams.

User Experience

User Experience suffered the following obstacles during the semester:

- Parent Consent Form
    - Constructing a detailed consent form that meets the IRB standards.
    - Receiving the consent forms on time so that we could proceed with the user tests.

- Online Training
    - Completing the online training course so that all members will be certified and able to complete the user tests.
- Pending Approval from IRB, which caused delays in user testing
    - Received approval from IRB and went into schools shortly after
- Creating and editing the video to get rid of background noise

VIII. Results

The Design Team completed the game storyline, and with the help of the Development Team, they chose the Isometric (two and a half dimensional) view the game would played in. The Design Team created characters and three mini-games for the science wing of the game. The made mock-ups and screen shots in order to assist the Development Team in visualizing the finished result of the game.

The Development Team decided to program the game in Flash because it is platform independent, has native graphics processing, and a small learning curve, which means next semester's students should be able to learn the language easily. The Development Team also created a game engine in order to establish code that can be used in the future. In addition, they chose an Isometric view because it gives the illusion of a 3-D world but is actually 2-D.

The Management Team compiled all deliverables, conducted peer reviews, and marketed the IPRO. The Management Team developed a standard form of naming documents to ease the organization of files. Furthermore, they created t-shirts, buttons, and business cards with a new, standardized logo in order to better market IPRO 329.

The User Experience Team found that the vast majority of fourth graders play games on computers and have computers in their homes. The User Experience Team also created the necessary documents in order to go in front of the Institutional Review Board and conduct research on minors.

IX. Conclusions/Recommendations

The recommended next step for the project include

1. Further the design details
2. Further the design of individual games
3. Code the design of the games
4. Continue programming and removing bugs from the current prototypes
5. Conduct user testing of all the wings as they are completed by the Design team
6. Continue satisfying our mission

7. Search and pursue possible sponsors for the game including the Museum of Science and Industry as well as the Chicago Public Schools
8. Create more marketing material
9. Enter some design contests in the Society of Technical Communications

In order to achieve these tasks, IPRO 329 must enroll more than 12 students. This semester the IPRO had 18 students, which allowed for the most production for our project. Hence, recruitment must occur to ensure success on the next IPRO Day.

X. References

Chicago Public Schools - http://www.cps.k12.il.us
Chicago Public Schools website provided useful information about math deficiencies.

DiscoverySchool - http://school.discovery.com
DiscoverySchool has activities and educational tools for students, teachers, and parents.

Elementary School Teachers' Place - http://mathforum.org/teachers/elem/
Elementary School Teacher's Place is a forum where math teachers communicate with one another to share tips, projects, and activities that are fun.

Human Participant Protections Education for Research Teams
http://cme.cancer.gov/clinicaltrials/learning/humanparticipant-protections.asp
Members must take a quiz on Human Subjects' Rights before conducting research.

IIT UTEC Lab - http://www.iit.edu/~utec/
To learn more about the Usability Testing and Evaluation Center that we have been using to conduct our usability tests, this is the website to visit!

Institutional Review Board - http://grad.iit.edu/research/OSRP/irb.html
All research procedures, methods, and tests subjects must be presented to the Institutional Review Board for approval.

Teachers.net - http://www.teachers.net
Teachers.net provides chat rooms and chat boards on a variety of subjects from the teachers' perspective.

XI. Acknowledgements

Dr. Susan Feinberg, Faculty Advisor
IIT IPRO Program
Judith Lederman, Math & Science Education
Joan Jones at Solomon Elementary

Pam Pifer, Director of Curriculum at The Ancona School

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