# Litmus for SimSYS:
## A User Study on a Serious Educational Game

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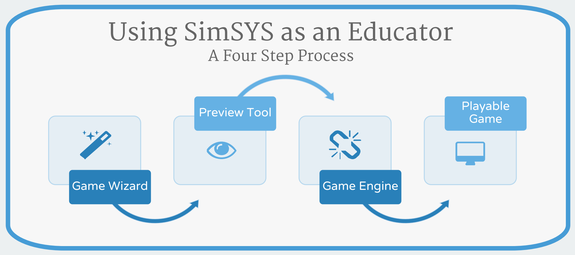
## Introduction

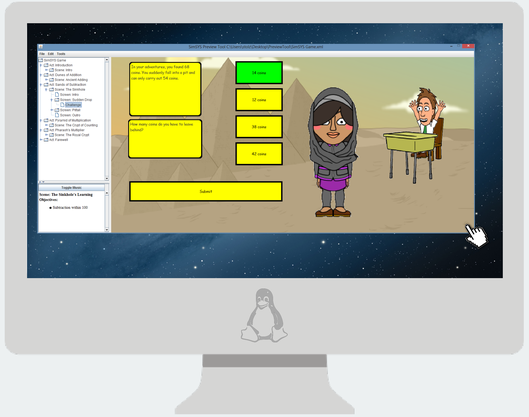
Our project focuses on SimSYS, software intended to one day be able to generate educational games on any topic, at any level, and with any set of learning objectives. The program, written in Java, loads information from an XML document (which can be a specification for anything from a senior level software engineering game to a 4th grade level geometry game) and uses it to create games with characters, music, and a good deal of interactivity and customization. For this study, we primarily worked on improving SimSYS's preview tool, which allows educators (experts in the game's content but not in the game's code) to preview the game and make any adjustments they need before the game is generated. We focused on the educator end of the preview tool by conducting a user experience study which combined elements from game user experience studies and software usability studies.

## Designing a Study

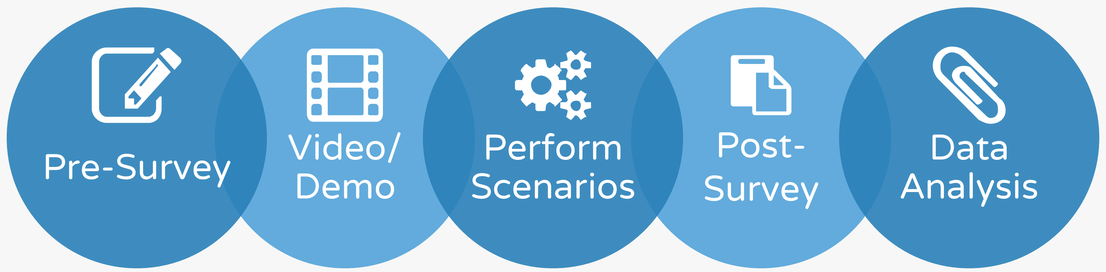
This usability study combines the foci and techniques common to software usability studies with those common to user studies on serious games. Software studies tend to pay more attention to usability, which is an abstract concept that depends very much on the context of the software. (Brooke, 1996) A particular piece of software, regardless of its interface, only exhibits a strong degree of usability if it is well suited to do what its users need it to do. These types of studies tend to use more surveys and focus groups. (Olsen, Procci, & Bowers 2011; Walker, Prytherch, & Turner, 2013) Serious game user studies are much more interested in user experience, where success is fully dependent on the satisfaction of the user (or better, the player) and not on whether or not a certain goal has been accomplished. Since the goal of these studies is to capture the experience of the player while they are in the game, studies are increasingly favoring "seamless evaluation" where all the assessment takes place during the gameplay and so the study does not use surveys and focus groups. (Hall et al., 2013)

The SimSYS preview tool is a hybrid of both categories since users must be able to use it for a particular purpose (to fine-tune the game for a specific context), and because the preview of the game retains many game-like qualities like interacting with a virtual environment and navigating the infrastructure of the game to make the necessary adjustments. Because of this, the study combines approaches to both types of studies. The users performed pre-determined tasks and answer questions in surveys so that data can be gathered on usability. User experience will be assessed through the data captured through video recording and screen recording. A combination of a user experience study and a usability study is well suited to the preview tool as a "hybrid" between the categories of software and serious games, and also because of the more holistic picture of the data will be able to provide.



## Overall Study Design




### Gauge Tech Experience
Educators will primarily be high school STEM teachers

### Tool Background
Educators are familiarized with the basic functions as well as the overall purpose of the tool

### Usability Surveys
Versions of standard usability surveys tailored to the task

### Analyze The Data
Combination of all surveys, screen captures, and video

## Method

We administered pre-surveys to get a sense of each participant's IT experience, asking them basic questions about common computer programs they might have used, what kind of educational software they are accustomed to, and so on.

We then showed each participant a brief instructional demonstration with information on how to use the preview tool, including moving elements and loading games.

For the study, we used laptops from Marquette University's Center for Teaching and Learning which have built-in webcams and allowed us to serve as many as twenty participants at once.

Then we had our study participants sit at computers and interact with the preview tool.The participants were given a prepared list of scenarios which they were instructed to work through using the preview tool. These included instructions for things like moving and resizing text boxes, inserting images ("props") into the game, and swapping questions.

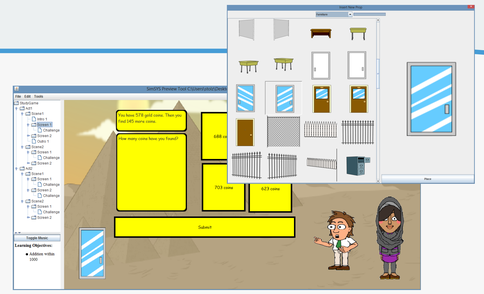
While the participant worked with the scenarios, screen capture and webcam software ran to record their reactions and interactions. The scenarios the users will work on as they interact with the preview tool were be coordinated with very specific stages in the program (following the Act, Scene, Screen structure) and this will allowed us to observe and take notes on the video of the user interaction with the different scenarios by looking at which part of the game the user is currently in.

Then we administered a final questionnaire for the participants to take so that they can provide feedback on using the tool. This is based on the Questionnaire for User Interface Satisfaction (QUIS,) a widely used questionnaire in software user experience research.

## Conclusions

At present (early August 2015) we have not had sufficient time since the study to analyze all of the data. We have parsed through the information and will publish our results in the paper, "Towards a Lightweight Approach for Modding Serious Educational Games: Assisting Novice Designers," which has been accepted at the Visual Languages Conference (VLC).

The Preview Tool allows educators to swap character images and set character emotions.



Educators can insert objects into the game to tailor it to their individual educational context

## References

Borges OJ Jr. Young Yim,Doh. Designing for human-centered curricular experience: A study on engaging academic career management system interface design. 2012 International Symposium on Ubiquitous Virtual Reality (ISUVR), Adaejeon, South Korea.

Gonzalez CS. Collazos C. Gonzalez JL. Toledo P. Blanco,F. The importance of human factors to enhance the user experience in videogames. 2012 International Symposium on Computers in Education (SIIE 2012), Andorra la Vella, Andorra.

Hall L. Jones SJ. Aylett R. Hall M. Tazzyman S. Paiva A. Humphries,L. (2013). Serious game evaluation as a meta-game. Interactive Technology and Smart Education, Vol.10, no, 2-UK.

Hayes, A. T. (2014). An approach to holistic development of serious games and learning simulations. Learning and Collaboration Technologies. Technology-Rich Environments for Learning and Collaboration. First International Conference, LCT 2014, Heraklion, Greece.

Olsen T. Procci K. Bowers,C. (2011). Serious games usability testing: How to ensure proper usability, playability, and effectiveness. Design, User Experience, and Usability. Theory, Methods, Tools and Practice. First International Conference, DUXU 2011, Orlando, FL, USA. (Held as Part of HCI International 2011. Springer-Verlag. 2011) pp. 625-634.

Peixoto DCC. Resende RF. Padua,C.I.P.S. Evaluating software engineering simulation games: The UGALCO framework. 2014 IEEE Frontiers in Education Conference (FIE), Madrid, Spain.

Serrano, A., Marchiori, E. J., del Blanco, A., Torrente, J., & Fernandez-Manjon, B. (2012). A framework to improve evaluation in educational games. Global Engineering Education Conference (EDUCON), 2012 IEEE, pp. 1-8.

Walker, S., Prytherch, D., & Turner, J. (2013). The pivotal role of staff user experiences in moodle and the potential impact on student learning. E-Learning and e-Technologies in Education (ICEEE), 2013 Second International Conference on, pp. 192-197.