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# Towards designing an interactive multi-player serious game for business education

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## Abstract

Learning through gaming has become a powerful tool towards understanding and supporting knowledge acquisition. Many educational games have been created to facilitate business and mathematical learning. They are often referred to as serious games due to its non-entertainment purposes. A serious game was developed that enables students to learn about business ecosystem formation and sustainability. This paper investigates the learning effects on the students. Feedback is collected from the students over a period of three years corresponding to three versions of the game. This qualitative data is analysed to further improve the game. Moreover, design guidelines are drawn-up that can find use in future similar game engines.

## Author Keywords

User interface, Game, Education, Design principles

## Introduction

The growth of the mobile industry and technological advances in gaming hardware have contributed to the rapid adoption of games. Over the years, the use of games has expanded from simply leisure in homes to educational purposes in schools and universities [6]. The introduction of social gaming through Massively multi-player online role-playing games (or MMORPGs) has connected gamers

around the globe and helped them to form teams, virtual identities, collaborate and chat online [5]. Playing games has been proven to facilitate learning in an individual [8]. Games are not only used to teach children arithmetic but are also used in business schools to understand how real world business cases can be tackled [3].

The Aalto University Network Service Business Game (NSBG) [2] is a multi-player business game that was created for an introductory course. The course introduces students to service science and facilitates their understanding of service networks. The game is a virtual simulation of a space tourism ecosystem. The participants must form ecosystems consisting of multiple companies with complementary roles in order to be able to serve customers. The most profitable ecosystem wins the game. The game provides for four company profiles viz. technology, marketing, operator and supply. Students are grouped into teams of 2-4 members and create their own company for one of the roles. Students then choose business roles (COO, CTO, CEO, VP Marketing and VP Sales) to explore the complexities and chaos involved in writing business plans, negotiating deals to form contracts and taking critical decisions that affect the chances of long-term success of the whole ecosystem. The administrator or the game master, who is normally the teacher, sets the scenario for the game and monitors and supports the students. The game is divided into three rounds and students need to complete a round to move on to the next.

The simulation is designed to mirror a real world experience: it is chaotic and complicated and students must figure out optimal strategies for success with limited information over the course of the game. To provide a real-life user experience, skeuomorphism [7] was used in

transitions and animations. Social networking sites were used as an inspiration for both interactive timelines and activity bars which helped participants keep track of their action history, upcoming activities, deliverables and deadlines. Detailed analysis of these considerations will be examined in detail in future papers.

The game was conceptualised and first developed in July 2012. Its 3rd version was successfully completed by August 2014. The game has been played three times with over 300 students participating in total. Every year, feedback was collected from students to improve the game and for research purposes. In this paper, we present interface design issues as reported by students and provide guidelines that will be useful for similar future games.

## **Evaluation**

With each release of the game, feedback on the game interface was collected from the participants. This feedback was important as it provided an insight into how participants perceived the game and what could be improved.

### *Participants*

The participants of this study were students of Aalto University who played the game. Their ages ranged from 18 to 30 years old. The participants had different educational backgrounds ranging from technology to design and business.

### *Data Collection*

Qualitative data in the form of game diaries, open feedback in the game's Facebook group and through online surveys from the participants was collected. The participants were encouraged to give honest feedback about their experiences with the game. More than 150 game diaries, 20 open feedback and 40 survey responses

were gathered. Data included the participants' game learnings, problems encountered, opinions and suggestions. This paper mainly focuses on data relevant to the user interface. However, the survey responses were used to validate the improvements made and were not used for data analysis.

#### *Data Analysis*

A qualitative research method was used to describe and aid in the deeper understanding of participants' experiences. Grounded theory [4] was used as the data analysis technique to group the results and provide design suggestions. This technique includes numerous methods such as open coding, memoing, comparative analysis and selective coding.

Open coding [1] was implemented to comprehend the collected data. Initially, relevant data was broken into chunks of text. These chunks were read multiple times and classified into various categories such as confusion, suggestion, problem, terminology and communication. Methods of comparative analysis [1] and memoing [1] were repeatedly performed to define possible new categories. When no further categories could be formed, axial and selective coding were applied to relate categories to each other and form theories.

Data analysis resulted in theories which were validated in the third version of the game. Validation was done through a survey.

#### **Discussion**

In this section, we discuss the results from the above analysis. First, the participants, in general reported a lot of confusion. Some participants reported that the terminologies were ambiguous. A participant clearly mentioned, "I could not review my Request for purpose

(RFP) because it was hidden under the category "Company briefcase", and I didn't know [...]" . Some participants were unfamiliar with the business terminologies used. This was unexpected because the terminology was covered during the lectures or was described in the game handouts. This indicated the need for high quality tutorials or hints that are clearly accessible or can be referred to later. The consideration of varied study backgrounds and cultures of students must be a design priority to avoid such problems.

Second, some participants were unsure of the games rules and functionality. To quote a problem faced, "I don't know if I can change the company name later [...]" , while there existed an option to edit the basic company info at any point. Another problem observed was that participants were unsure of the consequences of their actions. A design suggestion for future games is to make rules clear and the consequences of actions understandable.

Third, it is worth noting that communication is an important part of any multi-player gaming environment. In NSBG, communication among participants was left upto them except for the formal negotiation process which took place within the platform. Participants opted for Facebook as the primary communication tool for general updates or scheduling meetings. Skype was used for group video chats and Google Docs for collaboration. Phone calls and SMS's were exchanged in urgent situation such as hours before deadlines. Emails were exchanged as an alternative to Facebook for participants who did not use Facebook. Emails was also used for formal communication between different groups. A large number of participants requested for a primary communication tool within the game. The primary reason being that many were not

comfortable with using Facebook due to privacy concerns. Some users reported that one of their team members was not on Facebook and that they needed to send him email updates. Other participants reported, "I don't want to use Facebook for School purpose[s]" and "It (the lack of a centralised communication platform) made the information flow more decentralised with repetitive content and a lot of confusions". One participant suggested that a built-in communication tool would further help the teachers and developers in analysing communication logs which might aid in improvements. However, the development perspective dictates that a communication tool inside the game has its own costs and overheads. Already, Facebook, Skype and other third party tools have worked well and received positive reactions from students. The use of third party communication tools has its own pros and cons. Although there is no best solution or design alternative to communication, it is important to have a clear message about the working of the game before it starts, as demonstrated in our case. In NSBG, communication worked quite well even though there were disagreements as the rules of the game were made clear before the start. The fact that, in a real world situation, people will use a third party solution for communication was encouraged in the game by removing in-game communication channels.

## Conclusion

In this paper, a multi-player business gaming environment was evaluated to understand how future games can be improved. This paper focused on the usability of the games user interface. Qualitative data was used to determine the design decisions that needed to be taken while building and improving such a game. Grounded theory was used as the data analysis method. Three important factors were identified that could improve the

user experience. These were: understanding the backgrounds of all participants and designing for the limiting case; making the communication channel clear; and finally providing clear, visible feedback as well as stating the consequences of each action.

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