Applicability of Serious Games in Statistics Education

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Abstract

Approaches based on Serious Games can engage and involve students, workers, teachers, managers, trainers and others, with the purpose of developing new knowledge and skills. It is well known that Statistics topics, in a general way, are not popular among students. However, they provide important methods for decision-making processes. Thus, trying to follow the technological and the new teaching-learning methodologies developments, a group of Statistics teachers/investigators, wanted to: (1) identify the areas where the SG have been used, (2) perceive how students understand the use of SG and (3) understand how they can be used as a didactic tool in universities for Statistics topics. This paper describes the development of a serious game, to explore Statistics topics of a post graduate course, as a support for pedagogical activities. The story in the game is about a kidnapping where the most of clues are provide as statistical information. Several suspects are listed and should be eliminated using probability calculations, confidence intervals and hypothesis testing. Students must use some concepts acquired in classroom to solve that crime. As additional incentive, the student must hold the real guilty in a pre-defined period of time.

Keywords: Learning, Serious Games, Statistics Education

1 Introduction

"You can learn more about a man in an hour of play than in a year of conversation" Plato

Sentence even though quite ancient, describes in a way, the main theme of this paper: learning by playing. Nowadays, and subscribing Ulicsak' definition, "Serious games are the accepted term for games with an educational intent. They need to be engaging, although not necessarily fun, while the learning can be implicit or explicit" (Ulicsak & Wright, 2010).
Throughout the years, Serious Games (SG) has been developed as a special category of games devoted to increase a fun activity with specific content. Nowadays, the areas of applicability of SG has been expanded and applications can already be found in several and distinct areas, such as Education, Health, Advertising, Politics among others (Machado *et al.*, 2009; Zyda, 2005) Figure 1.

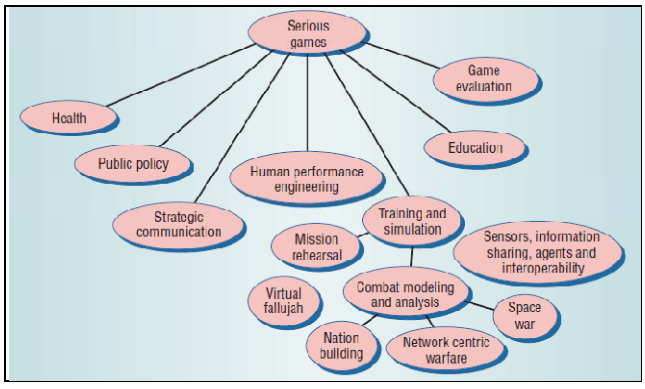

Figure 1: SG methodology different areas of application (from Zyda, 2005).

These games have a pedagogical purpose. In large part, since they promote the active learning and that they can analyze alternative answers through observations and experiences in virtual real applications. Thus, and according to Thompson

"*these games are examples of mediators capable of providing the player immersion, attention, working knowledge, goal setting, self-control, decision making, self-efficacy , internal motivation and feelings of competence and autonomy*", Morais et al., 2008.

The use of computers for games started on the 50's and, 30 years later, the SG firstly, developed as war simulators, namely as flight simulator, extended to the military vehicles' operation, were created. Nowadays, one field of application that had beneficiated of the SG as an important tool of training is the Health field (Machado *et al.*, 2009). As stated by Zyda (Zyda, 2005), the need for "*better computer characters and story increases with the complexity of visual displays and with the release of each new, more complex-than-ever game*". The author also mentioned that the game innovations are becoming a competitive necessity.

Following this idea and the technology developments, a group of Statistics teachers/investigators decided to develop a SG in Statistics Education in higher education level. The SG is still in development and, when finished, students will be encouraged to use and improve their knowledge of Statistics, as well as know applications of Statistics, just playing the game.

2 SG in Statistic Education: developments

The SG development could be a hard or even complex task, time consuming and costly (Nadoslsky et al., 2007). To help on the SG design, it is necessary that the pedagogical purpose and applicability of the SG be very well defined. In that way, the SG' several components and their relationships, the SG' based scenario and design complexity could be reduced. All of this specifications and methodologies are collected in a document named as "design bible". The "design bible" can be used as a guide of all the game development process. This document contains the guidelines of the SG, their artistic conceptualization, game details and instructions and interface definitions.

The Statistic SG will be a mystery game. The main idea is to engage the student to solve a kidnapping where most of the leads have statistical information, i.e., based on statistical knowledge, the student better understand and follow a specific lead, in the right direction. The game script is: a baby is kidnapping at his house and several suspects are identified and eliminated through probabilistic estimations, confidence intervals and hypothesis tests (first level on a Statistic subjects for engineering courses).

3 Conclusion

This paper tries to show the developments of a multidisciplinary team linking teaching, statisticians, informatics and students with the same main interest in the application of Serious Games in Statistics Education. This work is still under development, being only the stage (1), areas identification where the SG have been used, completed. The following two stages are in progress. They will allow understanding the students' perceptions in using SG as learning tool in universities for Statistics topics.

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