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TEAM (Teamwork Evaluation and Assessment gaMe): A serious game for developing soft skills

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Abstract

It is known that education and the development of teamwork skills can maximize productivity, build a positive culture, and promote harmony. But apart from their importance to organizations, one might consider them particularly useful in their everyday life. Enhancing and improving soft skills in teamwork is a promising field that becomes considerably important. The aim of this work is to develop a game capable of simulating realistic situations for the development of skills useful in the professional field and in particular teamwork skills. The principles of gaming-based learning and the technological tools for game support and development, which are widely disseminated in support or replacement of traditional teaching methods, can be used to achieve this goal. A significant part of the time was devoted to reviewing available technologies and specific applications that can serve the purposes of the system and to assess the strengths and weaknesses of each solution. The engine chosen to develop the game is Unity 3D. The additional Fungus visual novel and storytelling tool was used. Through this process a two-dimensional game has been implemented that allows the user to play and through it develop teamwork-oriented skills that will help him in the professional field.

Keywords: Game-based Learning, Soft Skills, Teamwork skills, Serious Games

Introduction

Researchers in the 21st Century (Glenn, 2008, Mitchell et al., 2010) pointed out that, employers want to recruit candidates who have both strong interpersonal skills (soft skills) and hard skills. Unfortunately, it seems that young graduates do not meet their expectations. Although companies regard such skills as important, they pay little attention to train their employees and as a result human resources experts complain about. They claim that soft skills are essential to the success of every organization (Klaus, 2010). For this reason, educational institutions slowly start to train their students in order to develop the necessary soft skills. They emphasize on developing teamwork skills because students, as future employees, will cooperate with their colleagues in their workplace (Evenson, 1999, Robles, 2012).
Video games seems to be an ideal solution for engaging the users as well as for supporting them to develop their soft skills by playing. Video games appeared for the first time in the late 50s, but on a large scale they became more popular in the early 70s. Children are really passionate for video games and as a result, that causes great concerns to both parents and teachers. They believe that children's frenzy for video games will make them unsocial and uninterested in every other aspect of their life as school or sports. The truth is that video games are a social phenomenon and around them has developed a profitable industry [1].

Nowadays, there is a developing tendency to investigate and exploit the philosophy and practice of digital gaming for developing soft skills. This trend is characterized as game-based learning and aims to the design, development, implementation and evaluation of digital

games with a specific learning goal. Games can combine the ability to learn a specific aspect and have fun at the same time and allow players to have the satisfaction that they receive for playing a game.

A game experience is always a learning experience, as each player has to learn the rules and adapt to the game environment and create new strategies in order to accomplish his goals and win the game. Up until now, computer games are used as educational tools in various fields. Those kind of games are called Serious Games.

This paper presents and evaluates a serious game for supporting the development of soft skills. The game has been implemented in the context of GOAL Erasmus + project.

The paper is structured as follows. The next section demonstrates the motivation for creating such a game and the related work on serious games, and soft skills development. Afterwards the development process and a technical evaluation of the serious game is presented. Finally the conclusions and future work are outlined.

Motivation and Related Work

This section presents the motivation for the implementation of this game as well as the related work.

Motivation

As already referred, this game has been developed and evaluated in the context of GOAL (Gamified and Online Activities for Learning to Support Dual Careers for Athletes) Erasmus + project (http://goal.csd.auth.gr/). The project GOAL aims to support active and non-active athletes in the development of their professional endeavors, after the end of their athletic career. The project attempts to create awareness on dual careers by providing an enabling environment for addressing athletes' dual career incommensurable goals whilst leveraging athletes' skills and competencies (e.g. problem solving, decision-making, communicating, teamwork and leadership) as means to help their integration in education, training and open labor market.

Serious Games

The movement towards the use of serious games as training and learning is proliferated by the perceived ability of such games to create a memorable and engaging learning experience. Various commentators and practitioners alike argue that serious games may develop and reinforce 21st century skills such as collaboration, problem solving and communication (Galarneau et al. 2007). While in the past, practitioners and trainers have been reluctant in using serious games for improving skills and competencies there is an increasing interest, to explore how serious games could be used to improve specific skills and competencies. The overarching assumption made is that serious games are built on sound learning principles encompassing teaching and training approaches that support the design of authentic and situated learning activities in an engaging and immersive way.

Developing serious games based on activity-centered pedagogies that enable trainees to engage actively with questions and problems associated with sport activity and dual careers is an empowering approach with benefits for subject learning as well as for developing a wide range of important high-order intellectual attributes including the notion of 'transferability – that is being able to situate specific skills in different settings and contexts, a competence much

needed for active and non-active athletes as means to establish their own business and being competitive European citizens and role models for the society.
The serious games and gamification mechanics of GOAL will be based on scenarios that will bring-up gameplays tied up to athletes' attempts to start their own sport business and playing a sport either individually or collaboratively. Aspects of how to create their idea to practical implementations on how to create and run a business will be introduced in a fun and educative way. The games will target athletes at the end-of-sporting career including those who leave the system earlier than planned with the objective to re-integrate athletes into education and labor market and transform them into highly qualified employees on the European labor market.

In order to develop personal skills and based on the statistical analysis, it was decided to create adventure games and especially interactive movies.

Storytelling games / Visual novels

Visual novels are distinguished from other game types by minimal gameplay in general. Typically, the majority of player interaction is limited to repetitive mouse clicks for keeping text, graphics and audio in motion (many recent games offer "play" or "fast-forward" commands that make this unnecessary), while making narrative choices along the way.

Soft Skills

The question "What exactly are soft skills" is not easy to answer, because the perception of what a soft skill is varies from field to field. A skill can be considered "soft" in a particular area and can be considered "hard" in another. Even internationally recognized encyclopedias have little to say about soft skills.

According to Wikipedia (https://en.wikipedia.org/wiki/Soft_skills), Soft Skills are a combination of people skills, social skills, communication skills, character traits, attitudes, career attributes, social intelligence and emotional intelligence quotients among others that enable people to effectively navigate their environment, work well with others, perform well, and achieve their goals with complementing hard skills. Harper Collins (Collins English dictionary, 1994) defines the term "soft skills" as "desirable qualities for certain forms of employment that do not depend on acquired knowledge: they include common sense, the ability to deal with people, and a positive flexible attitude.

Teamwork

The changes in the industry's field brought changes in the field of education as well and thus changes in the traditional way of teaching, which didn't promote the idea of human interaction (Frank, 2003). Due to these changes passive learning is no longer sufficient as graduates have high technical but limited team and communication skills (Hoyt, 2003 refers to Karamudin et al, 2012).

Therefore, universities have to create graduates who can work and adapt to different languages, cultures and ethics so as they can work with other people. But to do so, they need to be educated in teamwork. The team consists of a group of people who work together, coordinate roles and responsibilities, and share the same goal. Due to the development of technology the communication and collaboration are facilitated (Duarte, D. & Snyder, 2001; Gatlin-Watts, et al, 2007), so as individuals can work together without obstructing spatial and temporal distances. Therefore, graduates of universities should be ready to work in global organizations where they have to work effectively and solve problems as a team member. In

order for a team to work harmoniously and effectively, its members must have some skills. Thus, a fully equipped team member should:

1. Listen to the ideas of the other and supporting his comments
2. Ask questions to trigger interaction through the discussion
3. Respect the opinions of others, support the ideas and efforts of others
4. Persuade or be convinced about the exchange of ideas
5. Help other members of the team
6. Share his ideas and report the conclusions
7. Participates in the work of the team

Technology selection

The main technology to be used is a game engine. Therefore, the technology selection is focused on the evaluation of existing game engines suitable to create these types of games, an evaluation table was created and importance points were assigned to features that are needed on the platform. Importance scale is 1 to 3, 1 slightly important, 2 important and 3 very important. If a game engine qualifies for a feature it was assigned an X on the table. The values are summarized at the bottom of the table.

Table 1. Game Engine Comparison

Features	**DF**	**Visual Studio**	**GM**	**Ren'Py**	**eAdventure**	**AGS**	**Unity +Fungus**
Dialogs tools	3	X	X	X	X	X	X
Graphic tools	3	X	X	X	X	X	X
Audio tools	2	X	X	X	X	X	X
Variables	3	X	X	X	X	X	X
Free export to WEB	3	-	-	-	-	-	X
Free export to MOBILE	3	-	-	-	-	-	X
Script editor	3	X	X	X	X	X	X
VLE integration	1				X		
Cross-platform – Free export	3	X	X	X	-	X	X
Total		17	17	17	15	17	23

As, can be seen from the evaluation, the game engine that most suits the needs of the project is the Unity engine with the Fungus plugin (https://unity3d.com/).

Game design and development

The purpose of this study is to create a storytelling game. This game offers the user a profile based on the questionnaire's seven types of teamwork skills. Players through the use of the game have the opportunity to develop, improve and practice their teamwork skills. Creation of the game requires the following requirements to be met:

- to integrate a realistic and interesting scenario
- to create a database for the storage of users and their results
- to recognize the user and customize the game
- to provide a graphical presentation of the results for displaying the progress

The first step is to create the script, which is based on the chosen questionnaire. The user undertakes the role of a member of a group of traditional dances, which must organize a sports event. Based on the player's selections specific values based on a grading model will be assigned to the questions in the similar scale with the questionnaire. After the player has completed the game for the first time, the game creates a user's profile based on the seven kinds of teamwork skills. A basic requirement for the user is to create a game account so the game will be capable to store the user's data and results.

Scenario and scoring model

The game is based on a questionnaire from the University of Kent (https://www.kent.ac.uk/careers/sk/teamwork.htm), which consists of 28 questions. For each question on the questionnaire a script was created, in which the user is asked to make a decision. After the script was created, it was reviewed by experts in order to see if the situations described in it were realistic. The grading model of the game should capture the four different values of the questionnaire's scale for each one of the user's choices. The user will have to choose between two bad choices and two good ones. The model for each question is shown in the figure below (Figure 2).

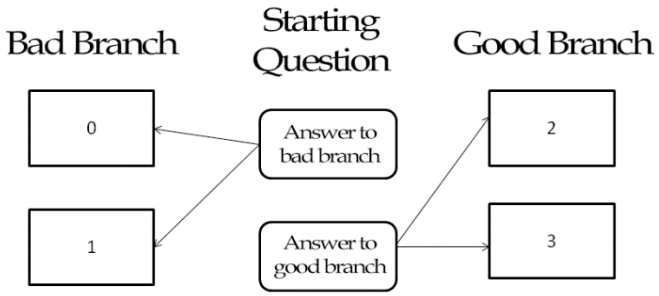

Fig. 2. Scoring Model

Main game screen

Each player is the one who controls the flow of the game and interacts with the game by choosing among the available options in each situation. On the main game's screen the script's characters appear in the center of the screen and below them the dialog box that contains the script's dialogs. When the user has to choose between the four possible options, the options are displayed in the center of the screen. If the user has played the game before, seven bars are displayed at the left of the screen, showing the results of his previous attempts. For each type of team skill, there is a bar, which increases dynamically according to the choices made by the user in his current effort. The main game screen is displayed in Figure 3(a).

Results screen

The last screen of the game is about the display of the results. After the user completes his / her attempt, the users' profile is displayed based on the seven types of teamwork skills. The results screen is displayed in Figure 3(b).

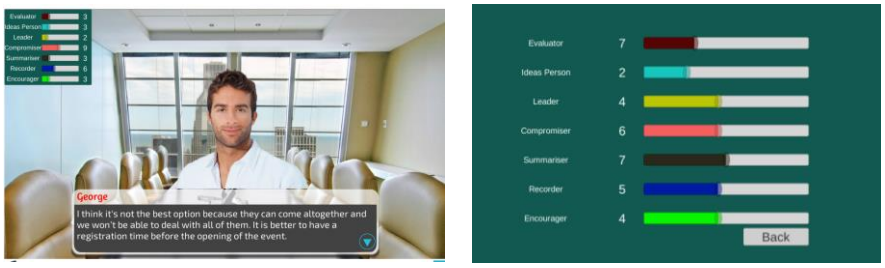

Fig. 3. (a) Main screen (b) results screen

Evaluation

In this part a review of the evaluation methodology is presented as well as the evaluator profiles, the heuristic rules used and the evaluation process.
After that for every group of interactions that a user can engage in:

- The results of the heuristic evaluation are presented as well as the relevant comments from the evaluators
- The positive points of usability of the system are mentioned
- A brief description of the problems and suggested solutions are described

Methodology

For the evaluation of applications in which user interactions cannot be accurately predicted and the user is not a novice, general practices in the lab for the measurement of usability and design control are required. This requirement endeavors to be satisfied by the heuristic evaluation method (HE). This particular method is not analytical, but has a subjective character and is based on empirical rules and findings that are well known and are related to good interface design. Another term used to describe a heuristic evaluation is Usability Inspection (UI), since in practice it is an inspection process by experts on interface characteristics based on heuristic rules.

The heuristic evaluation, (as mentioned in the bibliography), was conducted by external evaluators and not by the system designers as to ensure impartial judgement and a second opinion on the design. Furthermore, as mentioned in the bibliography, an optimal number of evaluators has been adopted (i.e. 8), whose opinions accumulate cumulatively.
In the next section are presented:

- The heuristic evaluation results
- Good usability practices on the platform
- Problems and suggested solutions

Results

The following table presents the results of the heuristic evaluation. The first column of the table presents the heuristic rule. The columns "E1" to "E8" present the evaluation results of

each evaluator (from Evaluator 1 to Evaluator 8, respectively). The column "S" (under each evaluator) presents the Severity (0: Low; 4: High) of the usability problem. The column "F" (under each evaluator) presents the Frequency (0: Rare; 4: High) of the usability problems.

Heuristic rule	E1		E2		E3		E4		E5		E6		E7		E8	
	S	F	S	F	S	F	S	F	S	F	S	F	S	F	S	F
	(0-4)															
Aesthetic and minimalist design	0	0	0	0	0	0	0	0	0	0	4	2	0	0	3	3
Match between system and the real world	0	0	0	1	0	1	0	1	0	0	0	0	2	1	0	0
Recognition rather than recall	0	0	0	0	0	0	2	0	0	0	2	1	2	0	2	3
Consistency and standards	0	0	3	4	2	0	2	0	0	0	0	0	0	0	1	1
Visibility of system status	3	4	0	0	1	0	0	0	0	0	4	4	2	3	0	0
User control and freedom	4	4	4	4	3	2	3	3	2	4	4	4	3	3	2	4
Flexibility and efficiency of use	2	4	0	0	2	0	2	0	0	0	1	4	2	4	0	0
Help users recognize, diagnose, and recover from errors	0	0	3	0	0	0	1	0	0	0	2	2	2	0	0	0
Error prevention	3	2	4	0	0	0	0	0	1	4	0	0	2	2	0	0
Help and documentation	1	1	0	0	2	0	2	0	0	0	4	3	0	0	3	1

Good usability practices on the platform

- Good UI design without elements that distract a user from his task
- Understandable use of language without difficult technical terms that might confuse the user
- All the dialogue screens are organized and presented the same way. There is consistency.

Problems and suggested solutions

- Most of the comments indicate a lack an undo button to reverse to a previous state.
- Some evaluators found a lack of a user guide accompanying the game, so that users are informed what they can achieve and how to play.

Conclusion and Future Work

It is well known that people growing up tend to focus more on gaining knowledge and acquiring hard skills required for their work. Most of the educational institutions provide the necessary theoretical background and practical skills. But what is often required in most of the 21st century jobs are soft skills. Because soft skills are strongly connected with the personality of the individual, it is hard to obtain them and thus, are high in demand. For many years a lot of business focused games were created for training. Most of these games are a simulation of managing a store or a company, focusing more on the decision-making skills by removing the human interaction part. TEAM tries to simulate realistic situations and

encounters in the workplace, in an everyday level through a visual novel – storytelling experience. It can help the player assess and improve his skills overtime in a pleasant and interesting environment. The next big step of this project is evaluation. The user interface will be evaluated, and some case studies will be conducted. After the feedback and the improvement of the application, additional scenarios will be implemented to keep the interest of players in high levels. Also, the game was developed in such a way that this concept can be applied to various domains with little effort.

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References

Duarte, D. L., & Snyder, N. T. (2001). Mastering Virtual Teams (2nd ed.). San Francisco: Jossey-Bass.

Evenson, R. (1999). Soft skills, hard sell [Electronic version]. Techniques: Making Education & Career Connections, 74(3), 29-31.

Frank, M., Lavy, I. & Elata, D. (2003). Implementing the Project- Based Learning Aproach in an Academic Engineering Course. International Journal of Technology and design Education. 13, 273-288.

Galarneau L. and Zibit M. (2007). Online games for 21st century skills. Games and simulations in online learning. Research and development frameworks, vol. 59-88, pp. 35-43. 2007

Gatlin-Watts, R., Carson, M., Horton, J., Maxwell, L., & Maltby, N. (2007). A guide to global virtual teaming. Team Performance Management, 13, 47-52.

Glenn, J. L. (2008). The "new" customer service model: Customer advocate, company ambassador. Business Education Forum, 62(4), 7-13.

Hoyt, B., Prince, M., Shooter, S., & Hanyak, M. (2003). Engineering Education a Conceptual Framework for Supporting Faculty in Adopting Collaborative Learning. Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition.

Kamarudin, S., K., Abdullah, S., R., S., Kofli, N., T., Rahman, N., A., Tasirin, S., M., Jahim, J. & Rahman, R., A. (2012) Communication and Teamwork Skills in Student Learning Process in the University. Procedia - Social and Behavioral Sciences 60 (2012) 472 – 478

Klaus, P. (2010). Communication breakdown. California Job Journal, 28, 1-9.

Mitchell, G. W., Skinner, L. B., & White, B. J. (2010). Essential soft skills for success in the twenty-first century workforce as perceived by business educators. Delta Pi Epsilon Journal, 52, 43-53.

Nielsen, J. (n.d.). 10 Heuristics for User Interface Design. Retrieved from https://www.nngroup.com/articles/ten-usability-heuristics/

Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today's workplace. Business Communication Quarterly, 75(4), 453-465.

V. Komis, A. Mikropoulos "Computing in Education," Published by Greek Open University, 2001.