The 8th International Scientific Conference
eLearning and software for Education
Bucharest, April 26-27, 2012
10.5682/2066-026X-12-152

STUDENTS' TIME PERSPECTIVE AND ITS EFFECTS ON GAME BASED LEARNING

Mireia USART, Margarida ROMERO
ESADE School of Law and Business, Av. de Pedralbes, 60-62, Barcelona, Spain
E-mail: mireia.usart@esade.edu, margarida.romero@esade.edu

***Abstract**: Previous research in face-to-face learning modality demonstrated that students' Time Perspective is related to motivation and learning performance. In concrete, results show students with a future oriented TP having higher motivation for learning, higher self-regulation and academic performance. By contrast, students' having a present oriented TP tend to engage in games and prefer instant reward activities. Despite the wide corpus of research on TP and learning, albeit Serious Games (SG) are widely used for professional development and lifelong learning, no studies have focused, up to our knowledge, on TP in GBL. The present study aims to explore this new field of research. We conducted a case study using the Serious Game MetaVals. Results of the experience show no significant differences in game performance among individuals with different TP. Furthermore, students with a future oriented TP foresee the future usefulness of the game compared to those focused on the present. These results might be useful for instructional designers and teachers, outlining the benefits, in terms of knowledge acquisition, of using GBL activities that could help different TP profiles to equally engage and better perform in the learning processes.*

***Keywords:** Game Based Learning, Serious Games, Time Factor, Time Management, Time Perspective, Learning Performance.*

I. INTRODUCTION

Continuing professional development and lifelong learning are vital to both individual and organizational success [1]. Present trends in management education are committed to active learning models including Serious Games (SG) in their curriculums. Especially, Game Based Learning (GBL) has long been used for management training courses, to safely practice key skills and competences in student's improvement [2]. Furthermore, the time factor plays an important role in these new learning scenarios [3]: students have to be aware of the existing time constraints in their life, and therefore manage time to take a real profit of their learning process. This study aims to analyze a specific aspect of the time factor, namely Time Perspective (TP). We analyzed students' TP in relation to learning performance, intention of use and usefulness of MetaVals, a SG on finance basics.

This study was developed within the context of a PhD, focused on adult students' Time Perspective and its possible effects in GBL activities, conducted in ESADE Business and Law School. The study is set within the Network of Excellence FP7 Games and Learning Alliance (GaLA), in the Special Interest Groups of Pedagogy and Psychology.

1.1. Game Based Learning

The use of SG in education is also called Game Based Learning (GBL). Following Zyda [4], GBL activities are designed to help achieving a balance between fun and educational value. GBL could enhance problem solving competence, decision making, knowledge transfer and meta-analytic

skills [5]. Especially, those games involving collaborative actions can help to put learning into an authentic and realist context allowing students to practice in a safe environment [6]. These authors also point to the fact that games can provide realism and motivation to players; they do it through a good pedagogical design that brings complexity, risk, role-play and access to information in the game.

It must be noticed that this scenarios may show a lack of effectiveness when no instructional measures or support are added in order to guide this process. In this respect, de Freitas and colleagues [7] affirm that negative learning transfer may occur with some game players in SG contexts, where an expectation for high fidelity environments may be related to negative learning processes. Collaborative GBL activities, as a type of Computer Supported Collaborative Learning (CSCL), demand participants to monitor and adapt their cognitive and metacognitive processes, such as temporal competence, to the changes in their motivational state [8]. Therefore, we can expect students' TP to play an important role for the achievement of optimal learning outcomes in GBL environments. Due to the lack of research in the field of TP in collaborative GBL, we aimed to focus on analyzing the relation of the students' TP to their game scores (game performance hereinafter).

1.2. Time Perspective and learning

This study is based on the definition and operationalization of Time Perspective (TP) by Zimbardo, Keough and Boyd [9]: "the manner in which individuals, and cultures, partition the flow of human experience into distinct temporal categories of past, present and future". These temporal frames are subdivided into five subscales. Past Negative (PN) individuals are those who present a pessimistic attitude towards the past and possibly the experience of sad events in their past. Past Positive (PP) individuals have a sentimental and positive view of "the old days". Present Hedonistic (PH) will for immediate pleasure, slight regard to risk without thinking of the consequences, while Present Fatalistic (PF) have no hope for the future and belief that external forces determine their fate. The fifth temporal dimension, the Future (FTP), is characterized by delay of gratification, as a result of the desire of future oriented individuals to achieve specific long-term goals. An ideal time orientation (high in PP, PH and FTP), is defined as balanced [10]. Individuals with a balanced TP can make plans for the future, consider the past for future successes and possible failures, and enjoy the present.

The importance of TP lies in its relation with different behaviours such as achievement, goal-setting and risk-taking [10]. TP has been object of study for educational psychologists because of its relation with learning processes and outcomes. According to Kauffman and Husman [11], TP is fundamental in understanding our activities, hopes, goals and motivations. It was studied that individuals with high Grade Point Average (GPA) are characterized by being future oriented [12, 13]. Some authors affirm that college students' thoughts about their future could have an impact on their academic achievement [14]. Using a self-report scale instrument, the Temporal Orientation Scale (TOS), Brown and Jones [15] found that past and present oriented students were likely to engage on social activities more than academic ones. Future oriented University students more easily anticipate the implications of their present classroom activities for the distant future [16]. In a study on TP and academic achievement conducted on African American high school students, Brown and Jones [15] observed that future oriented individuals saw education as more useful for future success in life and showed higher GPA.

Education is defined as a future oriented process because it involves processes oriented towards future goals and delay of gratification [17]. Due to this fact, the relation between TP and education has focused on the concept Future Time Perspective (FTP). Nevertheless, GBL, as a learning methodology focused on instant rewards, involving competition and social activities [18], is supposed to help present oriented individuals to improve their performance and engagement in these activities. Despite a lack of studies in GBL, present focused individuals perform better in instant feedback situations such as competitions while future oriented students may engage seeking for academic goals [11]. There is a need to study how different TP students perform in GBL and explore the possible relation between TP and learning performance.

1.3. Research question and hypotheses

According to the previously conducted experiences in TP and learning, there are empirical and theoretical reasons to affirm that no significant differences in a GBL scenario between present oriented

and future oriented participants. This could be due to two different underlying reasons; based on GBL studies, and as studied by Moreno-Ger and colleagues [19], the mix of fun and learning introduced by the GBL methodology could neutralize the heterogeneous learning outcomes expected from the results seen in classic learning activities. Focusing on motivation, present oriented students prefer instant-reward activities [20] while future and balanced individuals can foresee investment in learning as a source of future rewards. Therefore, we state two hypotheses: Hypothesis 1 predicts that both individual and collaborative game performance (dependent variable) are not correlated to TP (independent variable), that is, all students can perform equal in a GBL activity. Hypothesis 2 affirms that future oriented individuals foresee the learning usefulness of the activity in the future, while present oriented students play for fun, without taking into account the future usefulness of the GBL activity (Hypothesis 2a). On the other hand, as present oriented face MetaVals as a game, they may have a similar intention of use in the future as future oriented. Therefore, all students will have similar intention of use, albeit due to different reasons (Hypothesis 2b).

II. METHOD

2.1. Participants

Master students participating in this case study (9 women and 15 men, age $M = 31.90$, $SD = 4.09$, age range: 26-42 years) were engaged in an introductory finance course in ESADE Law and Business school. Names and personal data from participants are treated confidentially and they do not appear in the research. All the participants in the two expected experiences and the professor were informed of the study and its purpose. The professional profile of the participants in these programs was composed of marketing and sales, law and operations experts

2.2. Research Design

To study our hypotheses, the SG MetaVals was developed and implemented in an introductory finance course. The use of a pre-test on finance literacy, together with the GBL activity and a post-test, where students were asked about future usefulness and intentions of use of the game, composed the scenario. All the activities were set in the Moodle page of the course, and participants could access the contents since one week before the first face-to-face class, until one week after. Students played the MetaVals game on their laptops, in the context of the first face-to-face class.

2.3. Instruments and operationalization of variables

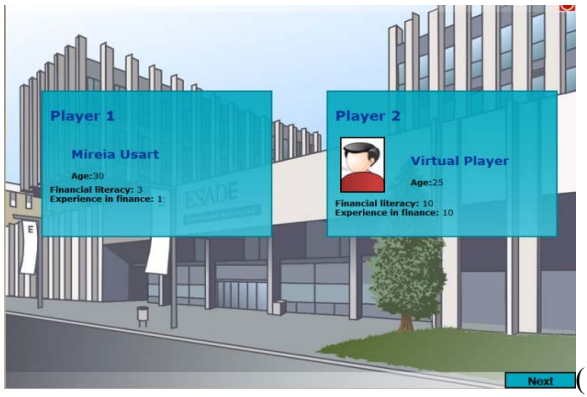
2.3.1. ZTPI

The analysis of the students' TP was conducted using the Zimbardo Time Perspective Inventory (ZTPI; [10]). 56 statements represent the five theoretically independent factors described by Zimbardo and Boyd [10]. Each statement is rated using a 5-point Likert scale (1 = strongly disagree, and 5 = totally agree). After its completion, the ZTPI shows a value of individual's TP. Following these authors, individuals tend to one of the five orientations or present a balanced TP. In our research, participants were found to be present, future and balanced. The Spanish version of the ZTPI was implemented in Moodle. This instrument had been previously validated through a psychometric study conducted by Díaz-Morales [21] among a reliable sample of Spanish adults (N= 756) and was used in the present study to be consistent with the theoretical approach of the chosen TP definition.

2.3.2. MetaVals

MetaVals is a computer-based Serious Game designed by ESADE in the context of the FP7 Network of Excellence Games and Learning Alliance (GaLA). MetaVals was adapted from an existing class activity used to practice basic finance concepts [22]. Despite the pedagogical interest of the initial activity, only some students actively participated, and it was difficult to incentivize discussion among peers in that context. Therefore, MetaVals was designed through a process that involved a first, paper-based release, and two computer-based versions of the game that were tested in different environments [23]. The present MetaVals is a sorting game where students play in dyads with a virtual peer, against the rest of the class. A welcome screen asks players to introduce their age and previous

knowledge on finance. It leads to a second screen with virtual peers' information (see figure 1). This key data can help players in the correction and discussion phases (e.g. a virtual peer with a low level on finance may give wrong answers). After general instructions are given by a virtual lecturer, the player starts playing individually by classifying 6 items as assets or liabilities (e.g. "Computer software", "Bank Loan"); after this first phase, 6 different items appear, but now the player has access to his virtual peer's answers. After this correction phase, a final discussion phase starts; the player has to decide if the 12 classified items were correctly classified; the dyad with a higher number of correct answers in less time, wins the game.



(1)

Figure 1. Screen showing the virtual peer's information in the MetaVals Game.

The present version of MetaVals implements a countdown in each classifying phase screen and a Mysql database, to monitor and record all the participants' individual and collaborative scores and time logs. Final scores are the operationalization of the game performance's variable.

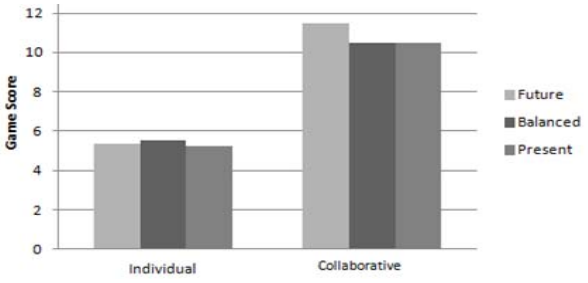
2.3.3. Future Usefulness and Future Intentions of Use operationalization

After the GBL activity, students were invited to fill a self-reported questionnaire on future usefulness and future intentions of use for the MetaVals. This instrument was based on the Technology Acceptance Model and had been previously studied in other contexts using MetaVals [23]. Four statements on the future uses of the game (3 months and 1 year time) had to be rated by using a 5-point Likert scale (1 = strongly disagree, and 5 = totally agree).

III. DATA ANALYSIS AND RESULTS

In order to study the two hypotheses, Analysis of Variance, or One-Way ANOVA was used. It is important to bear in mind the normality of the sample and equality of variances. Both assumptions were studied. First, the normality test on Origin8Pro (Kolmogorov–Smirnov) was run for the different dependent variables; the use of K-S test follows the method of different authors on TP that conducted similar experiences [17]. It confirmed the sample followed a normal distribution. The only variables providing an ambiguous result were game performances (both individual and collaborative), but as they were close to the significant level ($p=0.04 < 0.05$), we decided to use the parametric test.

Our first hypothesis aimed to study whether there was a relation among Time Perspective (TP) and both Individual and Collaborative Game Performance. Participants' scores in the individual phase of the game did not differ significantly across the three TP groups, $F(2, 21) = 0.14$, $p = .87$. Neither the collaborative scores were significantly different among groups, $F(2, 21) = 2.10$, $p = .15$. However, future oriented show a higher score for the collaborative phases (M=11.5; SD=0.9) than present (M=10.5; SD=1.51) and future (M=10.5; SD= 1.29) individuals (see figure 1). Due to the fact that the tendency is not significant, we can confirm the first hypothesis.



(2)

Figure 2. Average scores on the MetaVals Game for the individual and the collaborative phases, comparing the three different TP groups.

For the second hypothesis, students' answers on future Usefulness and Intention of Use in the Post-test were analyzed. Results showed that future oriented individuals believed the game would be useful within one year $F(2, 15) = 4.35$, $p=.03$ ($<.05$) when compared to present oriented participants. This result shows a significant, and therefore, it confirms hypothesis 2a. Nevertheless, when asked on future intention of use, no significant results showed, although a tendency was clear; future oriented students made explicit their future intentions of using the MetaVals within less than one year $F(2, 15) = 3.21$, $p=.07$; more studies should be conducted to confirm or reject hypothesis 2b.

IV. DISCUSSION AND CONCLUSIONS

The sample was composed of a 50% of future oriented students, a 33.33% balanced and a 16.7% present oriented. ANOVA results confirm hypotheses 1; there is no significant relation between TP and Game Performance, not for the individual neither for the collaborative phase of the game. Due to the lack of previous studies in the field of Game Based Learning (GBL) and TP, more research should be done to confirm the tendency of future oriented students to score higher than balanced and present oriented individuals. This could be faced with a greater sample size and a more difficult game activity that permitted a wider range of scores. Similar results shown among the three TP groups in the game could be confirming the idea that a mix of fun and learning introduced by the GBL methodology [19] neutralizes the different learning performances found in classical learning activities. The underlying reasons for these equal performances could be the fact that present-hedonists tend to engage in instant-reward activities [20]; they face a GBL activity as an amusing, challenging activity. On contrary, future oriented students could be engaging in the GBL activity not for fun, but thinking on the learning and future outcomes of playing in an educational context. Finally, balanced individuals adapt their time orientation to the needs of the present moment, having fun and thinking on their future learning gains [10]. The results in the post-test on future usefulness point to this direction; future oriented participants significantly foresee the usefulness of the game in one-year time, while present oriented individuals probably play for fun; although they think of playing again, they don't consider future the usefulness of the game [15].

This study could set the groundwork for future research in the field of TP and GBL. Results point to the importance of including GBL activities in management learning courses, which could lead to an equilibrium of performance among students, and enhance knowledge acquisition in present oriented individuals; this goals could be reached by engaging them in activities that give an immediate feedback, as GBL. These results should also serve as a base for educational psychologists to help individuals in managing their learning processes in terms of performance and usefulness.

4.1. Limitations of the study and future research

One of the limitations of the present study is the size of the sample. The fact that it was the second time that MetaVals was used in a real learning environment could be a handicap. Second, the voluntary fill in of the ZTPI questionnaire caused students to respond in a very irregular number. Researchers cannot generalize the results of the experience; therefore, increasing the size of the samples, and therefore decreasing the standard deviation is the goal of the researchers for the next

months. Concretely, in the context of GaLA, the MetaVals game will be adapted and implemented in Scotland and Rumania. The retrieval of data from different samples of adult students may also permit the study of GBL and TP, considering cultural differences between Western and Eastern Europe.

Another limitation of the study is the short time period in which the research was conducted. Following Nurmi [24], a consequence of the lack of longitudinal data in TP studies is that very little is still known about the antecedents and consequences of TP in learning. In the following months, we will study if GBL performance significantly means an improvement in student's knowledge within a long-term perspective. A longitudinal study on the two masters should help understanding if observed performances are related to deep learning processes, and if self-reported future intention of use is confirmed in these prospective studies.

References

[1] Wall, J. & Ahmed, V. (2008). Use of a simulation game in delivering blended lifelong learning in the construction industry - Opportunities and Challenges. *Computers and Education, 50*(4), 1383-1393.

[2] Mawdesley, M., Long, G., Al-Jibouri, S. & Scott, D. (2011). The enhancement of simulation based learning exercises through formalised reflection, focus groups and group presentation. *Computers and Education, 56*(1), 44-52.

[3] Gros, B., Barberà, E. & Kirshner, P. (2010). Time factor in e-learning: Impact literature review. *ELearnCenter Research Paper Series, 0*, 16-31.

[4] Zyda, M. 2005. From visual simulation to virtual reality to games. *IEEE computer*, *38*(9), 30–34.

[5] Kirriemuir, J. & McFarlane, A. (2004). Literature Review in Games and Learning. *Nesta Futurelab series* (8; Bristol).

[6] Leemkuil, H., de Jong, T., de Hoog, R. & Christoph, N. (2003). KM Quest: A Collaborative Internet-Based Simulation Game. *Simulation & Gaming, 34*(1), 89–111.

[7] de Freitas, S., Rebolledo-Mendez, G., Liarokapis, F. Magoulas, G. & Poulovassilis A. (2010). Learning as immersive experiences: using the four dimensional framework for designing and evaluating immersive learning experiences in a virtual world. *British Journal of Educational Technology, 41*(1), 69-85.

[8] Azevedo, R. (2008). The role of self-regulation in learning about science with hypermedia. In: Robinson, D., Schraw, G. (eds.) Recent Innovations in Educational Technology that Facilitate Student Learning (pp. 127–156).

[9] Zimbardo, P. G., Keough, K. A. & Boyd, J. N. (1997). Present time perspective as a predictor of risky driving. *Personality and Individual Differences, 23*, page 1008.

[10] Zimbardo, P. G. & Boyd, J. N. (1999). Putting time into perspective: A valid, reliable individual differences metric. *Journal of Personality and Social Psychology, 77*, 1271 1288.

[11] Kauffman, D. & Husman, J. (2004).Effects of Time Perspective on Student Motivation: Introduction to a Special Issue. *Educational Psychology Review, 16*(1), 1-7

[12] Mello, Z. R. & Worrell, F. C. (2006). The Relationship of Time Perspective to Age, Gender, and Academic Achievement among Academically Talented Adolescents. *Journal for the Education of the Gifted, 29*(3), 271-289.

[13] Ozcetin, N. & Eren, A. (2010).The effects of perceived instrumentality and future time perspective on students' graded performance and attitudes regarding English class. *International Journal on New Trends in Education and Their Implications, 1*(4), 5.

[14] Shell, D. F. & Husman, J. (2001). The multivariate dimensionality of personal control and future time perspective beliefs in achievement and self-regulation. *Contemporary Educational Psychology, 26*, 481-506.

[15] Brown,W. T. & Jones, J. M. (2004). The substance of things hoped for: A study of the future orientation, minority status perceptions, academic engagement, and academic performance of black high school students. *Journal of Black Psychology, 30*(2), 248−273.

[16] Phalet, K., Andriessen, I. & Lens, W. (2004). How Future Goals Enhance Motivation and Learning in Multicultural Classrooms. *Educational Psychology Review, 16*(1), 59-89.

[17] de Bilde, J., Vansteenkiste, M. & Lens, W. (2011). Understanding the association between ftp and self-regulated learning through the lens of self-determination theory. *Learning and Instruction, 21*(3), 332-344.

[18] Bateman, C. M. & Boon, R. (2006). 21st century game design. Hingham, Mass: Charles River Media.

[19] Moreno-Ger, P., Burgos, D., Martínez-Ortiz, I., Sierra, J. & Fernández-Manjón, B. (2008). Educational game design for online education. *Computers in Human Behavior, 24*, 2530 2540.

[20] Wassarman, H. S. (2002). The Role of Expectancies and Time Perspectives in Gambling Behaviour. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 62*(8B), 3818.

[21] Díaz-Morales, J. F. (2006). Estructura factorial y fiabilidad del Inventario de Perspectiva Temporal de Zimbardo. *Psicothema, 18*(3), 565-71.

[22] Massons, J., Romero, M., Usart, M., Mas, S., Padrós, A. & Almirall, E. (2011). Uso del aprendizaje basado en juegos en la formación de finanzas para no financieros. Actas de las Jornadas Interuniversitarias de Innovación Docente. Universitat Ramon Llull, DEUSTO, ICADE, 16-17 June, Barcelona.

[23] Padrós, A. Romero, M. & Usart, M. (2011). Developing serious Games: Form Face-to-Face to a Computer-based Modality. *E-learning papers, 25*, 15-07-2011.

[24] Nurmi, J.E. (2005). Thinking about and acting upon the future: Development of future orientation across the lifespan. *In A. Strathman & J. Joireman (Eds.) Understanding behavior in the context of time: Theory, research, and application.* Mahwah, NJ: Lawrence Erlbaum Associates.