IMPACT OF ADULT STUDENT TIME PERSPECTIVE ON LEARNING PERFORMANCE IN ONLINE GAME BASED LEARNING

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To Berenguer

"The only reason for time is so that everything doesn't happen at once."

- Albert Einstein

Keywords

Time Perspective, Time on task, Game-based Learning, Learning Performance, Adult Education, Finance, Serious Games

Abstract

The use of game-based learning (GBL) methodologies is increasing in online higher education in general, and in business education in particular, despite the small amount of research that exists on the effectiveness of these methodologies. The little research that has been conducted has focused on evaluating game design, teacher adoption and technical factors such as connectivity, web-based solutions or multiplayer interaction platforms. An important benefit is that GBL could allow learners in general, and adult students in particular to take an active role in their learning process; however, students do not always engage in online higher education because of their preference, but because they have no other option. Although game researchers and developers are proposing the use of digital games for educational purposes, there is a lack of research on the pedagogical effectiveness of serious videogames and their adequacy for different learner profiles. In particular, we focus on temporal aspects such as *time on task* and student Time Perspective (TP), two variables that have previously been related to learning, only in final assessment models. With the confluence of an increasing use of online higher education, the push to use GBL in business undergraduate courses, and the lack of a large corpus of research on the effectiveness and adaptability of these methodologies, a clear need arises to do further research on the use of the GBL methodology, specifically in online adult business education. Based on existing literature revised during this PhD study, no other known study has conducted an analysis focusing on one single group of students participating in a GBL task implemented in an online course, and relating it to their temporal perspective; making this study unique.

The first purpose of this research was to study the implementation of a GBL task in a continuous assessment online accounting course, in terms of learning performance and student engagement. The data sources were provided by Universitat Oberta de Catalunya (UOC) and by student interviews. A sample of 67 students was statistically analyzed to answer the quantitative research questions and hypotheses focused on the relationship between learning performance, student TP, and time spent in a GBL task, and also during a whole semester. A group of 5 students was interviewed to conduct the qualitative part of the study. The data provided by

Universitat Oberta de Catalunya (UOC) Bachelor in Business Administration (BBA) was analyzed using Mann-Whitney and Kruskal-Wallis tests and the student interviews were analyzed using thematic analysis. Results revealed a significant difference between the GBL task performance and course performance. The second aim was to analyze these results in the light of student TP. Cluster analysis showed three different groups, labeled as *High fatalist and future* (students with high scoring in both future and present fatalist scales of the Spanish ZTPI), *balanced* (students with high scores in future and present hedonism, but low in present fatalism), and *an-hedonist* (learners with low scoring in all ZTPI factors, especially for present hedonism). Kruskal-Wallis test revealed no significant relation of student TP and performance in the GBL task, but showed a tendency for balanced students to have a higher performance in the student course performance. Age and gender relation to TP is also discussed. The thematic analysis of the relationship between student TP, time management and performance both in the GBL task and course, indicated that students don't have prior experience on online or GBL methodologies, but they have a preference for games in general, and GBL in particular. As a result of the originality of this study, which has focused on the quantitative and qualitative analysis of the implementation of a GBL task in an online setting taking into account students' TP, the findings provide new information for the implementation of GBL tasks in online accounting courses.

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List of Abbreviations

ALT: Allocated Learning Time
BBA: Bachelor in Business Administration
BTP: Balanced Time Perspective
CFA: Confirmatory Factor Analysis
DGBL: Digital Game-based learning
FTP: Future Time Perspective
GBL: Game-based learning
ICT: Information and Communication technologies
PAC: Prova d'Avaluació Contínua (Continuous Assessment Task)
PEF: Prior Experience in Finance
PF: Present fatalism
PH: Present hedonism
PKF: Prior Knowledge in Finance
PN: Past negative
PP: Past positive
SG: Serious game
TP: Time Perspective
UOC: Universitat Oberta de Catalunya

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: _____

Date: _____

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Chapter 1: Introduction

The first chapter of this thesis outlines the background (section 1.1) and context (section 1.2) of the research, and its purpose (section 1.3). Section 1.4 describes he significance and scope of this research and outlines the social and research contributions. Finally, section 1.5 includes an outline of the remaining chapters of the thesis.

1.1 BACKGROUND

Higher education institutions in general, and entrepreneurship and business education in particular, aim to give students skills and competencies that are useful for the demands of 21st century society. However, existing curricula are still so much focused on future rewards and teacher-centered approaches that they do not help students training their skills in real contexts. In this sense, online education contexts are particularly lacking in terms of collaboration and competition skills (Kreijns, Kirschner & Jochem, 2003; Şendağ & Ferhan Odabaşı, 2009), and learners in these modalities report a sense of isolation (Robai & Jordan, 2004) and demand more active, student-centered methodologies; this, according to some authors might be overcome using instant rewards and motivation. Concerned with these shortcomings a growing body of research has focused during the last decades on the use of Game-based learning (GBL) in higher educational contexts, and its relation to training skills through game characteristics, specifically in business education (Fitó-Bertran, Hernández-Lara & Serradell-López, 2013). However, there is still a lack of research on the pedagogical and psychological measurements of its educational efficiency and adequacy for different individual and group characteristics, such as student Time Perspective (TP) which has in fact been significantly related to student engagement and grades in onsite education settings (Hortsmanshof & Zimitat, 2007; Peetsma, Schuitema, & Van Der Veen, 2012). Both learners and practitioners are not fully aware of the learning advantages of implementing GBL methodologies in the curriculum.

Particularly in online adult business education, GBL methodologies could help adult learners in the practice of different competencies and skills, such as

competition, collaboration or time management (Bateman & Boom, 2006: Bluemink, Hämäläinen, Manninen, & Järvelä, 2010; Pivec & Dziabenko, 2004). Thus, implementing GBL tasks as a part of a wider learning model is expected to help students when training these competencies and skills. Nevertheless, and according to diverse authors (Chen & Huang, 2013; Nietfeld, Shores & Hoffmann, 2014), learners approach the use of these activities such as Serious Games (SGs) differently, depending on their individual differences such as background, TP and motivation, and this can lead to different amounts of time spent learning and, in consequence, to a wide range of learning performances.

1.2 CONTEXT

This study focuses on online higher education (adult students). A GBL task is specifically designed, implemented and studied among a sample of BBA students in Universitat Oberta de Catalunya (UOC) to understand the pedagogical and psychological implications in terms of learning and time. In particular, we focus on the relation between learning performance; time spent playing, and student TP. This guides the study on how the use of SG tasks can impact learning performance, and in comparing the results with a *non-game-based* methodology, taking into account the moderating variable of *student temporal perspective*. An overview of the educational context, the GBL methodology and the time factor are introduced in this section:

First, the educational context studied, the BBA course in UOC, is an online undergraduate course that uses a continuous assessment model (UOC, 2015) based on contents and competencies that students have to learn and assess through different tasks during the semester. In particular, article 3 in the assessment regulations of UOC says:

> *"Article 3. Continuous assessment*
>
> *Continuous Assessment (AC) is conducted continuously throughout the semester and is different from what is done in a single final assessment test (PAF) at the end of the semester.*
>
> *Continuous assessment is the cornerstone of the UOC's educational model and applies to all subjects on the training programs offered by the UOC. Following AC is the assessment model recommended by the UOC and the one that best meets its educational model.*

The aim of Continuous Assessment is to help with the study and progression of the learning process through a specific work pace suited to the aims, skills and contents of the subject, while at the same time monitoring progress and ensuring achievement.

AC consists of taking and passing a series of Continuous Assessment Tests (PACs) set out in the teaching plan/learning plan in line with the number and calendar specified there. Each subject's AC will match the aims, skills, contents and teaching load of the subject. The Continuous Assessment Tests (PACs) may be:

- *Basic – the ones proposed as minimums for the correct monitoring of continuous assessment,*
- *Extension or in-depth – the ones proposed as voluntary or recommended especially for some students and that allow a more in-depth look at certain specific topics or areas of the subject."*

This educational context can be considered as teacher-centered, as it is focused on delivering contents and training skills and competencies, even though it is a model that does not allow students to take an active role in their learning process apart from deciding when to read the contents.

Second, during the past decades the implementation of GBL tasks is spreading among BBA courses (Fitó et al., 2013), where games and simulations help train skills safely in subjects such as marketing, finance or accounting. However, the UOC model does not particularly bet on the use of SGs as part of the official curricula.

Third, and concerning TP, this model fits into the educational model defined as future-oriented (Leonardi, 2007; Jones & Brown, 2005); therefore, learning methodologies in general, and the UOC context in particular at present demand from students a high delay of gratification. This naturally allows future-oriented students to show better learning performances than their present and past-oriented counterparts. That is, the higher the future orientation of a student is, the higher the academic performance shown by this individual (Adelabu, 2007; Zimbardo & Boyd, 1999). In particular, in online settings such as UOC, students are forced to think about future rewards, both for the evaluation of the learning process (based on term

or final exams) and also for their professional outcomes, both in the close or distant future.

We could admit that online higher education does not take advantage of active learning methodologies such as SG, and nor takes student TP into account, fitting a future-oriented model that does not help present or past-oriented students.

However, during the past decades the panorama has been changing in the framework drawn by the reformulation of teaching methodologies, which should be based on learning, not only in teaching. In this model, evaluation acquires a new dimension by placing the student at the center of the learning process and using a skills-based teaching approach, which involves a rethinking of the nature and design of all structural elements that comprise it.

On one hand, there is a growth of continuous assessment evaluation models in formal online education, due to both the growth of the online and ICT-based higher education contexts, and the evaluation of student skills more than contents, which deserve a formative and continuous assessment model (Gikandi, Morrow & Davis, 2011). This model allows more team activities and discussion among students as a solution to lifelong learning for individuals that have to keep being competitive in the 21st century society and jobs. According to Hernández (2012), continuous assessment encourages students to learn on an on-going basis. In fact, these learner profiles need to combine the time spent with their family, learning and work. On the other hand, there are also young students who access university for the first time, and also choose online universities such as the UOC in Catalonia, with the idea of having more *plasticity* in the time they devote to learning.

Furthermore, beyond mere content acquisition, at present competencies and skills are crucial both for the success of individuals and of companies (Baron & Markman, 2000). GBL methodologies will gain widespread usage within the next 3 years, as they are becoming a pervasive part of everyday life, and our notions of what constitutes a game are changing as fast as the games themselves, as highlighted in the Horizon Report released by the New Media Consortium and EDUCAUSE (2015) especially in adult education and training (Usart, Romero & Almirall, 2011). SGs for learning have been considered significant tools for education and are being studied with initiatives such as GaLA (2010); nevertheless, due to the multidisciplinary nature of the field, research related to the learning efficiency of GBL is still in its

beginnings. There is a specific need to pay attention to psychological and pedagogical aspects of SGs (Connolly et al., 2012; Hess & Gunter, 2013). As a computer-based methodology (Gee, 2009), one of the aspects that has been highlighted as an important factor in GBL is time. In these environments, time has been related to learning (Barberà, Gros & Kirschner, 2012) both as a psychological variable, such students' TP (Romero, 2011); and also as an objective measure of time in a learning task, defined as time on task (Romero, 2010). In relation to cognitive and learning aspects, TP is probably the aspect of psychological time that has historically been most related to learning processes and outcomes in formal education (Fourez, 2004; Schmidt & Werner, 2007).

TP is defined by Zimbardo and Boyd (1999) as the manner how individuals partition the flow of time into five different factors; *past positive, past negative, present hedonism, present fatalism* and *future;* it is related with learning performance (Zimbardo & Boyd, 1999), and students' investment in learning (Peetsma & Van der Veen, 2011). Since education has historically been defined as a process oriented to the future (Leonardi, 2007; Schmidt & Werner, 2007), researchers have focused on the future factor of TP (FTP) as having an impact on the learning performance and time invested in learning (Peetsma & Van der Veen). Nevertheless, most of the existing studies on FTP in general, and of TP in particular, have been focused on teacher-centered and onsite learning environments; that is, TP has been approached in teacher-centered methodologies rather than in student-centered, or in GBL tasks.

We hypothesize that this is relevant to study TP in GBL because through Game-based learning (GBL) tasks, students are no longer forced to have a "delay of gratification" focus, but are often given immediate feedback from the learning activity, which have been historically related to present-oriented TP profiles (Wassaraman, 2002). GBL could also help fostering social interaction and collaboration (Gee, 2003: Hummel et al., 2011)) and help institutions in the skill training demands of student-centered models. We will use both temporal perspective and orientation, and further explain the historical differences in of both names in chapter 2.

A problem arises from this new context: the so-called temporal flexibility in online education may be twofold. It is a promise for students of better time management, but, depending on the learners temporal profile, it could play against

them: reading a lot of materials alone at home could be hampering learning results and motivation of present-oriented students, who, in consequence, do not know how to manage their time to effectively learn, and may lose their motivation. We believe that teacher-centered methodologies are no longer a solution to the needs of the 21st century society. In this direction, it is not clear if online learning contexts are future-oriented any more, with continuous assessment and the implementation of GBL tasks. However, there is limited research addressing the issue of students' TP in online education; as we have highlighted, student-centered activities such as GBL, which are inspired in practical cases and cooperation among students, are proving their learning effectiveness, according to O'Neill et al. (in All et al., 2014), and defined, for digital GBL, in terms of

1) Intensity and length of engagement with a game
2) Commercial success of a game
3) Acquisition of knowledge and skills as a result of the implementation of a game as an instructional medium.

In our research we will focus on the first and third aspect, specifically, we will qualitatively measure student's engagement with our digital GBL: MetaVals, and quantitatively measure the acquisition of knowledge. One of the educational methodologies that could better meet the needs of this learning by doing paradigm is GBL. Implementing Serious Games (SG) in the higher education curriculum could be a better solution for training competencies, motivation and different students' TP.

Nevertheless, implementing GBL in online educational contexts is also contributing to the changing context explained above. For business education in general, and in BBA studies in particular, the use of educational games, also known as Serious Games (SG) for learning, or Game-based learning (GLB) is more widespread, and has been used for decades (Azriel, Erthal & Starr, 2005) especially in subjects such as finance and marketing. Second, concerning time, thanks to GBL tasks, there is no longer a straightforward relation between students' future orientation and learning performance: in SG tasks, as we will further discuss, students focused in the present can also find incentives, as these learning tools give immediate rewards and have a higher component of inter-personal tasks/communication (Usart & Romero, 2014a).

1.3 RESEARCH PURPOSES

Given to what was stated previously, this study focuses on the role of undergraduate student TP in relation to learning performance and time on task in a GBL activity. The aim of this study is to further the knowledge of the learning efficiency of these online, student-centered methodologies, and therefore help in the personalization and implementation of these learning scenarios in the curriculum.

The main purpose of this study is to compare student learning performance between a SG task and the non-game-based performance in an online accounting subject of the BBA grade, relating it to time spent on the activity and student TP. The study explores the amount of time (time on task from now on) that students in the online BBA accounting course need to complete the phases of a GBL task, as well as student performance both in the task and in their whole accounting course (semester). The study also identifies student temporal perspective related both to GBL and semester performances (Zimbardo & Boyd, 1999). The study measures if there is a relationship between student performance and their temporal perspective of the course and the GBL task. Furthermore, and seeking to understand the student's point of view on the use of SG, this thesis also studies, from a qualitative standpoint, student's perception on what aspects of GBL and online learning helped and/or hindered their learning in relation to their temporal perspective. With the findings we should be able to understand if future-oriented individuals are still the profiles showing a better learning performance, and if they are motivated to use GBL.

Research problem: there is a lack of research corpus of empirical research regarding the study of TP impact in relation to adult students' learning performance in online, formal learning contexts in general, and in GBL tasks in particular. Moreover, individual differences for students, such as Time Perspective that have historically been related to learning performance and time spent learning, have scarcely been studied in online or GBL contexts (Romero & Usart, 2013b). When aiming to successfully implement SGs in online learning, and adapting them to learners' profiles, this variables and relationships need to be further studied.

The objective or this thesis is twofold; firstly, we aim to study the implementation of a GBL task in an online course, comparing its performance with a *non-GBL* task and to the whole course performance, and also measuring *time on task* (defined as the time spent in the GBL activity) on the GBL, in relation to

performance. Secondly, we will focus on student TP and study its predictor role on learning performance, both for the course, and for the GBL task. We will also relate time on task to the student's TP profile. Other cofounding variables are age, gender and students' background (defined as prior knowledge, prior experience and ICT level). All these variables will be studied to understand the underlying relationships among variables (see figure 1), and will be conducted in the context of two accounting courses with the same syllabus and professor, in the BBA program for adult Spanish students in an online university: the Universitat Oberta de Catalunya (UOC).

Research Questions and Hypotheses

The following research questions arise from the above-mentioned statements: The first two research questions will focus on the first goal: comparing learning performances among courses, the continuous assessment task and the GBL task.

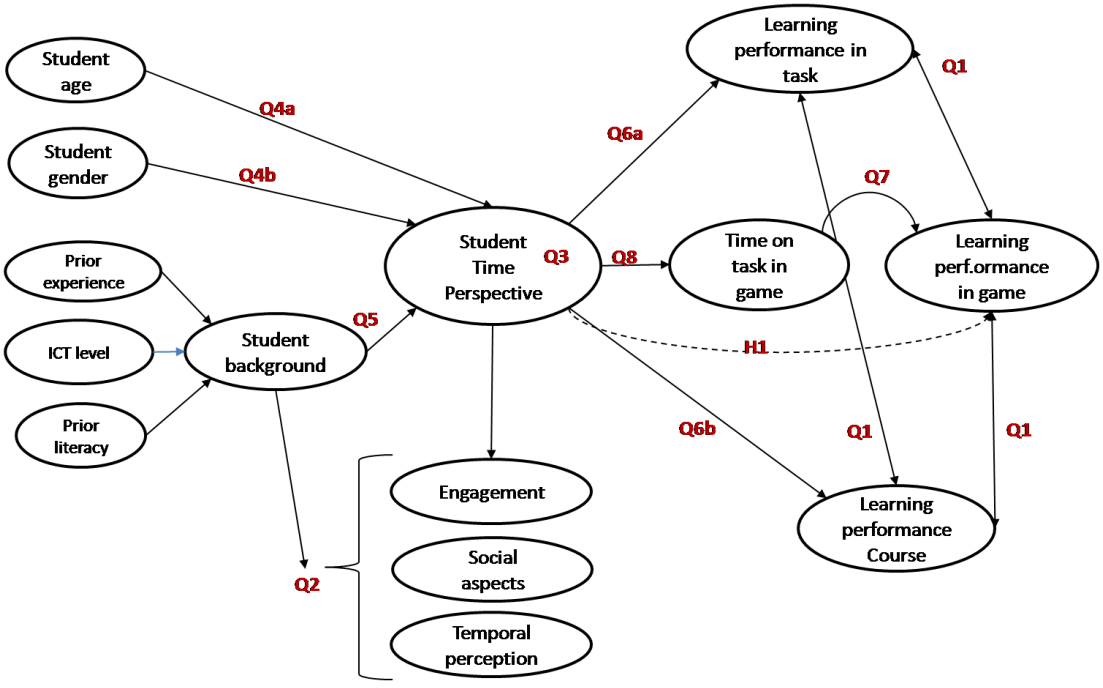

Figure 1.Variables of the study in relation to our research questions and hypotheses

1. 1a. Do students perform higher in a digital GBL activity than in a continuous evaluation activity? 1b. Are these one-task learning performances significantly related to the whole course learning performance? 1c. Do students' prior knowledge on assets and liabilities and background variables predicting learning performance?

2. What is the students' perception of games for learning in general, and for the digital GBL MetaVals task in particular, in terms of learning, engagement, social aspects and temporal perception?

After focusing on game and course performances, we will study learners TP profile, relate it to sample variables, and compare it to previous results in other Spanish samples. We therefore propose the following research questions:

3. Which is the temporal profile of online, UOC students in BBA accounting courses, and to which extent is it related to culture and economical context?

4. What is the relationship between student age (and gender) and TP?

5. What is the relation between background and prior knowledge on assets and liabilities, and between each of these variables and student TP?

In order to study the relation between learning performance and student TP profiles, the following research question and hypothesis arise:

6. What is the relation between students' TP and learning performance in the online course, during all the semester and in the first activity?

Hypothesis 1: There is no statistically significant difference in the GBL task performance among the different TP clusters (*high fatalist and future, balanced,* and *anhedonist*). That is, all the students involved in the GBL activity perform similarly, even being in different TP groups.

Finally, focusing on the MetaVals activity, we measure the relation between time on task and performance for each phase of the game.

Two last questions arise:

7. What is the relation between time on task and performance in each phase of the game?

8. What is the relation between student TP and time on task, during the GBL task?

Table 1.1.

Variables of our study

Variables	Kind of variable	Where (Level)	Measure
Learning performance	External	MetaVals PAC* 1 Course	Quantitative Logs in game
Time on task	“	MetaVals: focus on each phase	Quantitative Logs in game
Time Perspective	Intra-psychological	Student	Quantitative, ZTPI
Age	Attribute	Student	Quantitative
Gender	Attribute	Student	Dicotomic
Background	Experience	Student	Quantitative Self-reported
Prior knowledge	Experience	Student	Quantitative Pretest
Motivation	Experience	MetaVals Games in general Course	Qualitative Interview

* PAC = Continuous assessment activity

1.4 SIGNIFICANCE AND SCOPE

An original contribution of this study is to help filling this research blank and understanding the role of adult students TP in online learning contexts with digital GBL tasks, in particular:

Research contributions

We aim to fill in the blank of adult student TP in online and GBL settings, we also aim to introduce a new methodology composed of quantitative and qualitative data concerning the measure of TP. We also aim to set the steps to measure student variables in a GBL task.

In lecture-based, face-to-face learning scenarios, there is evidence on the role of TP in learning performance and students' time on task, nevertheless, we do not know the impact of students' TP in GBL, student-centered scenarios. Moreover, student TP is an under-researched factor in general, and in particular, little research has been conducted in online contexts and GBL tasks.

An original contribution of this study is to help fill in this blank and understand the role of mature-aged students' TP in GBL environments.

Furthermore, there are no previous studies focused on comparing GBL and non-GBL tasks in the same group of online students. In particular, this thesis sought to investigate the impact of student TP on learning performance and time on task.

Our main research purpose is to explore student TP among the students in the course, and to study its relationship with time on task as an asynchronous, individual SG activity and with learning performance, both during the GBL task and for the whole semester.

Social contributions

We aim to contribute with significant data and results to highlight the importance of TP when designing learning tasks and implementing GBL tasks, we also aim to understand the implications and possible relation of learning performance in a GBL task compared to continuous assessment tasks in online settings, where these tools are starting to be widely used and will be important following New Media Consortium and EDUCAUSE (2015). We also believe that the student's voice is important in the motivational aspects of these learning tasks, assumed as motivational but without a clear confirmation. Concerning the measurement of TP with Spanish Zimbardo Time Perspective Inventory (ZTPI) and student interviews, we aim to understand the cultural differences of this construct in our Spanish population of students.

TP may significantly influence student engagement and performance (Horstantoff & Zimitat, 2007; Romero & Usart, 2013b). We do not have evidence

about the learning efficiency of these educational tasks, although they are widely used in online contexts (Fitó et al. 2012).

Lastly, researchers have evidence that the TP construct is not totally developed until adolescence (Peetsma & Van der Veen, 2011). There is instability of TP among younger students due to the influence of socialization, modeling and educational processes that operate during childhood and adolescent development periods (Seginer, 2003).

In our study, we aim to understand online UOC students' TP and its relation to GBL activity from a broad standpoint, and to study if student TP is related to performance and time on task in GBL tasks, and if this could be a methodology that better meets students' needs compared to teacher-centered methods and learning materials in a continuous assessment model in online contexts.

Furthermore, there are no previous studies focused on comparing learning performance in GBL and non-GBL tasks for the same group of online students. In particular, this thesis seeks to investigate the impact of students' TP on learning performance and time on task both for the online course and during the GBL task. We will focus on a GBL activity for a group of undergraduate adult students in an accounting course, part of a BBA program in UOC (an online university), through the implementation of a GBL task. A SG designed by the authors will be used: MetaVals (Romero & Usart, 2013a). Our first purpose is to study the relationship between performance in the course and performance in the GBL task. The second purpose is to explore student TP profile for the sample of BBA students in UOC, and to study its relationship with time on task in an asynchronous, individual SG activity, and also with learning performance both during the GBL task and for the whole semester. Finally, we aim to understand student motivation for online learning and GBL tasks, from their own subjective point of view.

Research Approach

As we will further discuss in Chapter 2, this thesis is based on constructivism, cognitive load theory, and *flow* intrinsic motivation theoretical approaches where research questions and relations among variables will be studied. However, from a psychological perspective, and concerning the *time factor*, some researchers focused

on the perception of time in relation to making sense of the world, and how it could be related to learning. A key function in the correlation process was found to be making sense of the world by partitioning events in temporal frames. Life consists of an infinite number of perceptions all perceived in the present. The remains of the perceptions become memories of the past. The future consists of expectations and beliefs. These three temporal frames, the past, the present and the future make it possible to organize and make sense of the world. The interest among many educational psychologists has therefore shifted from studying the correlation process itself to instead studying how the relationship among these temporal frames affects our learning process. A closer look at how these relationships, understood and how they are used in this study follows in Chapter 2.

-Corresponding to the theoretical framework, we will focus not only in the quantitative results of the test and the SG activity in an online course, but also on the qualitative analysis of semi-structured interviews to students in the sample. The findings from the interviews might strengthen some hypotheses and prove some wrong.

-A *hybrid*-method research strategy will allow us to conduct this study;

-First, a prospective ex post facto design will be implemented, with students playing the MetaVals game, in a pre-test that will help us control the prior knowledge and experience variables. Dependent variables (DV) learning performance and time on task will be measured in the GBL activity. Finally, the independent variable TP is measured in the ZTPI (that will be factorial studied for its adequacy to our sample). Given that it is an intra-psychological construct, it cannot be assigned, and thus we have to conduct the study ex-post facto.

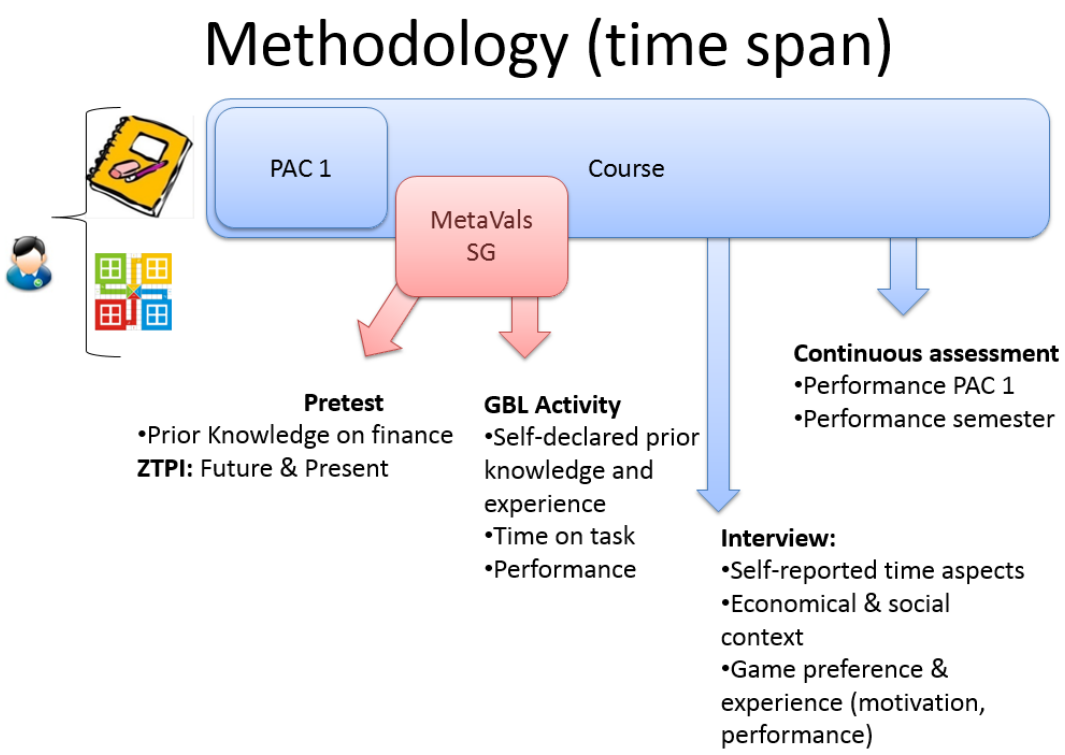

Figure 2.Scheme of the instruments for data retrieval considered in our study

-Second, a semi-structured qualitative interview will be conducted in order to complement and further interpret the quantitative results. It has never been studied before, and we believe it could give a deeper insight to students' TP in relation to games and to social context of each student. As this is an exploratory study in a methodology where TP has not been studied, we have interviewed a representative of each temporal factor.

Assumptions of the Study

The following assumptions were made while exploring the research questions:

1. Study participants responded honestly to interview questions.

2. Study participants were representative of all students and teachers within the UOC finance courses.

1.5 THESIS OUTLINE

This work is presented in five chapters; the first chapter of this research outlines the basic principles under which this project will be conducted.

Chapter 2 focuses on the literature review, it starts by introducing the theoretical approach (2.1), the state of the art for online education, specifically, it will focus on business and management education, studying the existing research in the field of BBA online education (2.2). After this, we will analyze the use of active methodologies in general, and GBL activities in particular (2.3), among online learning institutions, showing examples of research on SGs in BBA programs, and its pros and cons related to learning performance. After this, we will outline the needs that both students and teachers are claiming in this context, regarding the two temporal aspects from a psychological and pedagogical standpoint: time spent learning in relation to age and family issues, and temporal perspectives profiles of students, these also related to age and learning outcomes from existing studies (2.4).

Chapter 3 presents the design of the study, and explores quantitative and qualitative elements within the methodology of this research. Section 3.2 presents the particular educational context (the UOC model), section 3.3 discusses the methodology used in the study, the stages with which the methodology was implemented, and the research design; section 3.4 details the participants in the study; section 3.5 lists all the instruments used in the study, especially focusing on the MetaVals game, and justifies their use; section 3.6 outlines the procedure used and the timeline for completion of each stage of the study; section 3.7 discusses how the data was analyzed; finally, section 3.8 discusses the ethical considerations of the research and its problems and limitations.

Chapter 4 presents the results of the data from this research in a quantitative and tabular form, it presents a discussion of the findings, an analysis of the results and the discussion part. Section 4.1 shows the students' demographic data. This section also presents the descriptive analysis of the pre-test results (analysis of means and standard deviations), the results of time on task for the MetaVals task, and performance for the first assessment activity, the MetaVals task, and for the whole course. Section 4.2 focuses on the description of the Measures (Scales) and Reliability of the instruments used in our study: Background and Spanish ZTPI. In section 4.3, the cluster analysis procedure and results are detailed, giving an explanation of the three student groups found in our sample. Section 4.4 presents the correlations between variables of the study, first focusing on the learning and sample variables, second looking at their relation to student TP, and finally focusing on the

variables of time and performance for the MetaVals phases. Section 4.5 presents the results of the non-parametric tests conducted to study the hypothesis on the relationship between GLB and course performance (4.5.1); and also to measure if student TP is a predictor of background, performance and time on task (4.5.2). In the last part of this section, we show results on age (and gender) variables as predictors of student TP (4.5.3).

In Section 4.6, after analyzing the interviews there is a qualitative discussion about learners' self-report TP and context (4.6.1) and also focused on motivational, temporal and social aspects of games (4.6.2.1), Serious Games (SG) and online learning in general (4.6.2.2). Finally, a closer look is taken at the particular case of the MetaVals task (4.6.2.3). All this qualitative analysis themes will all be related to the 3 student clusters found in section 4.3 to allow a meaningful discussion on research questions 2 and 3.

Chapter 5 focuses on the discussion of the findings for each research question and hypothesis, linked with prior research and particular findings of this study divided into research questions and hypotheses.

Lastly, Chapter 6 presents a conclusion of the findings, with recommendations for practitioners and a proposal for future research directions.

Chapter 2: Literature Review

The implementation of digital GBL tasks in online learning has been growing during the past decades. However, educational designers and educational psychologists aim to understand the learning effectiveness of the tools in this new means of instruction, and furthermore, how different student profiles adapt differently to them depending on age, gender, background and their own temporal perspective.

Thus, the objective of this chapter is to establish the theoretical basis (2.1) that allow us to identify and define both context and student variables, which, in turn, relate to learning performance in online courses at three different levels: learning task, digital GBL task and whole course performance.

We begin summarizing the socio-constructivist paradigm in which we define learning and prior knowledge. In this study, "learning performance" refers to quantitative measures of learner performance in the course, task and GBL; and also to qualitative learner perceptions. Some studies give the name of *Academic Achievement* to the same measured variable, so we will use learning performance during the whole document. The nature of this concept is described in the online learning section (2.2) of this chapter.

Next, we introduce Cognitive Load Theory (CLT) paradigm within which we design instructional multimedia activities such as digital GBL. In section 2.3 we state the theoretical approach of GBL, and focus on digital GBL defined by Sica, Delli Veneri and Miglino (2011) as: "In digital GBL, educators use digital games with serious goals (i.e. educational objectives) as tools that support learning processes in a significant way" (p. 108)

Following this paradigm, we introduce our approach to extrinsic motivation: the flow theory (Csikszentmihalyi, 1997) and we relate it to student motivation in digital GBL. Furthermore, as we will discuss, this concept makes a bridge between learning and the time. Following the scheme as proposed by the socio-constructivist approach, we have the interpersonal level or inter-psychological in which we

measure learning time. To operationalize it we looked at the model of Allocated Learning Time (ALT); adapted to online environments (Romero, 2011).

Lastly, to study and measure time as an intra-psychological variable, we focus on the Time Perspective (TP) approach. Section 2.4 presents the two *time factor* variables involved in this research, related to learning performance in a socio-constructivist paradigm: the student psychological time: TP defined by Keough and Boyd (1997) as "the manner how individuals partition the flow of time into past, present and future" (p. 1008), and the inter-psychological or objective time, an external component of time: time on task (defined as time spent in a learning activity by Fischer et al., 1980).

2.1 THEORETICAL APPROACH

This section introduces the theoretical basis of this research. It is focused on student TP in online learning contexts. It is not limited to one paradigm, but built on a significant structure of different approaches, which we will detail below.

We first focus on the framework, the general context of our study: online higher education, which lies on the (1) Constructivist perspective of instruction, based in the socio-cultural theory of development (Coll, 2001; Riviere, 1998; Vygotsky, 1978; Werstch, 1991). Second, we aim to understand how the implementation of a digital GBL activity in online higher education involves a complementary approach: we need to lay out the (2) Cognitive Load Theory as the intra-psychological paradigm for complex and technology rich learning contexts (Kirschner, 2002; Paas, Renkl & Sweller, 2004; Van Merriënboer & Sweller, 2005), and (3) also implement a student-centered, active learning layer: the particular paradigm of game-based learning (GBL) in general, and digital GBL in particular, which as we will discuss, demands a more active role from learners (Gee, 2003; Prensky, 2005). This model is, in turn, related to the *flow* model (Csikszentmihalyi, 1997; Kiili, 2005): humans can easily lose the track of time when engaged in motivational activities such as games.

Thus, we believe that this intrinsic motivation model directly relates to digital GBL methodology and complements the previous approaches, linking them to the last of our variables: time.

After establishing our educational context, as an online context with the implementation of an active, student-centered learning task, we now present the theoretical approaches for student learning time seen both from an internal or individual standpoint and from instructional or objective time models. For this reason, we need to present and discuss the importance of the (4) time factor in online learning (Barberaet al., 2012; Reimann, 2009). First as a concrete aspect of the allocated learning time (ALT) model (Fisher et al., 1980, Romero, 2010), and also as the student intra-psychological construct of (5) the Time Perspective (Zimbardo & Boyd, 1999) the factors of which, as we will discuss, are directly related to learning performance and the use of instant rewards in GBL (Romero & Usart, 2013b) and to the delay of gratification in classical learning contexts (Leonardi, 2007).

2.1.1 Constructivism in online higher education

The external level of our context is the UOC model. This is based on the theory of constructivism, which holds that learners create their own body of knowledge based on interaction and active mental activity with their environment by applying and modifying their interpretation of reality, knowledge and existing beliefs (Jonassen, Mayes & McAleese, 1993). We need to understand this approach to implement the GBL task correctly and to understand the students' performance and motivation during the whole semester for engaging in online learning. More specifically, from a sociocultural perspective, when the socioconstructivist approach is used, prior to the implementation of the GBL task, knowledge is built at two levels (Vigostky, 1978):

First, there is an external or inter-psychological level: by social interaction with a person who has more expertise in the field of knowledge (instructor/ other learner in the educational context) through the specific content. Second, there is the intra-psychological level: that uses social mediators (psychological tools, mainly language) making more complex connections at the cognitive level. Developing interactions in both levels the learner creates a deeper analysis and interpretation of experiences and perceptions and is encouraged towards a higher-order meaningful learning (Wertsch, 1988). Collaborative construction of knowledge aims at a social negotiation, and commonly results in a common understanding.

Social constructivism is presented as a situated social practice where the learner's interpretations are being negotiated with more expert participants and where different collaborative learning settings such as communities of practice and knowledge-building communities are proposed.

In online learning several strategies based on socio-constructivism can be used: Collaborative games or discussion forums have the potential to improve active learning and pedagogical interaction among learners, and to support collaborative learning. For a theoretical review about the basics of socio-constructivism related to the use of ICT see Coll and Monereo (2008).

The importance in this approach is the scaffolding process that the mediator (mainly the teacher, other students and the technology) provides in the Proximal Zone of Development (Vigotsky, 1978) of the student, which allows him to become involved in a meaningful learning experience, building a progressive educational process, and activating prior knowledge by making it more significant and complex.

From a constructivist perspective, mediation is an important mechanism in teaching and learning process. Mediators are social (Vygotsky, 1978) and cognitive tools (Jonassen, 1991) that help the individuals to interiorize culture and its meanings and contents. The most important mediators in an online learning process are the teacher and the technology although, as it is obvious, both are mediators of a different nature. They afford and they constrain ways of thinking, representing and communicating what is been learnt.

In online learning, technology is a strong mediator that needs to be taken into account in learning design, development and evaluation with the aim to be a fostering partner of the teacher and the student in the online learning and teaching process.

Therefore, learners need to know how to use technology and not be governed by it; we see an interesting similarity here with the use of games. Both technology in general, and digital games, have gained popularity due to the advantages they offer, for instance, they show ordinary cultural practices transcending writing and oral communication integrating them, and even add more applications such as online games, multiplayer games and virtual worlds. All of these resources bring the world closer to students who are learning and making knowledge more meaningful.

The competence-based learning model requires new and valuable learning tools to allow students to develop these skills and become active constructors of knowledge rather than just passive receivers of content. online learning, generally defined as different forms of learning supported by information and communication technologies (ICT), emerges as this new learning environment and constitutes a new paradigm of modern education (Sun, Tsai, Finger, Chen & Yeh, 2008). It has been widely used for some years now (Ma, Vogel & Wagner, 2000), and it allows students to learn in a more autonomous environment and facilitate interaction between instructors and students without time or spatial restrictions (Barker, 2002; Benito, 2009; Sun et al., 2008).

2.1.2 Cognitive Load Theory

In addition to the constructivist approach, and focusing in an intra-psychological level, advances in educational psychology claim that the design of online education should also take into account multimedia learning principles (Burkes, 2007: Kalyuga, 2012). Following Kalyuga, this directly relates to Cognitive Load Theory (CLT), which has significantly contributed to the understanding of students' limitations in terms of cognition in instructional methods using multimedia such as online learning. Furthermore, the implementation of a digital GBL activity in an online context demands the understanding of student's level of cognitive load performed during this *cognitively reach* learning activities. We propose to focus on the CLT, which has become an established theory in the field of learning and instruction during the last decade (for overviews, see Artino, 2008; Kirschner, 2002; Van Merriënboer & Ayres, 2005). Recently, more and more applications of CLT appear in the emerging field of online learning, in particular, when GBL is implemented. According to Kiili (2005), the expected optimal tempo (related to the flow effect) in a digital GBL task could disappear due to an overloading of the learner's working memory as a consequence of too many multimedia elements. The solution to this problem could come by designing and adapting SGs to show optimal audiovisual information. This could help players reach a balanced and optimal rhythm of *gameplay* in digital GBLs and affect learning performance and intrinsic motivation, as we will discuss in the next sections.

Before discussing CLT in relation to motivation in the particular case of the implementation of a GBL task, we believe that differences and similarities between this approach and the constructivist model should be outlined:

Mayer, Moreno, Boire and Vagge (1999) studied the theory-based design principles for promoting constructivist learning in multimedia environments. These authors investigated a computer-supported multimedia learning environment where students were given learning contents via audio and video. Learning was evaluated with multiple measures including understanding of concepts explained in the audio, generation of solutions to new problems, and naming elements in the narration of the video. All these measures aimed to find if constructivist learning had occurred (that is, if meaningful mental representations had been actively constructed, taking learners' prior knowledge into account. Theory predicted that cognitive load should be hampering constructivist learning; more information would saturate student working memory. Nevertheless, if multimedia information is presented in *small bites* enough not to saturate the student´s cognitive load, implementing these tasks will help learners have a more significant learning: this process is due to a correct representation of both visual and verbal, or analog and digital representations (Paivio, 1986).

Furthermore, according to Schnotz and Würschner's (2007) analysis, CLT might have some basic conceptual issues, and they propose to relate it to the concept of Vigotsky of zone of proximal development. This concept allows different and contradicting possibilities to explain some empirical results. In some studies, the reduction of cognitive load can impair learning rather than enhance it. According to our analysis, the reduction of cognitive load is not always helpful for learning. It cannot only be enhanced by reducing the extraneous load, but also by adapting the intrinsic load to the student´s level of expertise. This adaptation can require either a decrease in the intrinsic load due to an excessively high learning task difficulty or an increase of the intrinsic load due to an excessively low task difficulty. They claim that task performance and learning are related concepts even though they are fundamentally different processes. We took the results of this research into account and studied learning performance as the measurement for learning tasks, however we complement this quantitative measure with the qualitative feeling of learning from the students interviewed.

According to the CLT, human expertise comes from knowledge stored in cognitive schemas, not from an ability to engage in reasoning with many new elements yet to be organized in long-term memory. It is through the—often conscious and mindful—construction of increasing numbers of ever more complex schemas, and through the automation of some of those schemas, that expertise develops.

1. The intrinsic cognitive load is determined by the interaction between the nature of the materials being learned and the level of expertise of the learner.

2. The extraneous cognitive load is associated with processes that are not directly necessary for learning and which can be altered by instructional interventions. Using weak problem solving methods may cause the extraneous cognitive load.

3. The Germane cognitive load is associated with processes that are directly relevant to learning, such as schema construction and automation. For instance, the variability of problem situations encourage learners to construct cognitive schemas, because it increases the probability that similar features could be identified, and that relevant features can be distinguished from irrelevant ones. High variability requires the thoughtful engagement of the learners and increases in the cognitive load because they invest more effort in genuine learning.

Cognitive load theorists argue that intrinsic, extraneous and germane cognitive load are additive (Paas, Renkl & Sweller, 2003). During instruction, the extent to which an extraneous cognitive load presents students with a problem mainly depends on the intrinsic load. If the intrinsic load is high, the extraneous cognitive load must be lowered; if the intrinsic load is low, a high extraneous cognitive load due to inadequate instructional design may not be harmful, because the total cognitive load is within working memory limits. Furthermore, if the sum of the intrinsic and extraneous cognitive loads allows for an additional processing capacity, it is important to invite students to invest the germane cognitive load in learning processes, especially with regard to schema construction and automation. Thus, the main instructional principle of CLT is to decrease the extraneous cognitive load and to increase the germane cognitive load within the limits of totally available processing capacity (i.e., prevent cognitive overload).

Over the last five years, more and more CLT related studies have investigated the effects of instructional manipulations on intrinsic and germane cognitive load, and related those effects to the level of expertise of the learners (Van Merriënboer & Sweller, 2005). As a consequence, there has been a greater focus on adapting instructional procedures to meet the needs of the individual learner.

The author of this contribution (Sweller, 1988; 1999) identifies motivation as an important dimension that determines learning success as well as causing the high dropout rate among online learners, especially if e-learning applications are used in online education settings. It is, thus, important for CLT researchers to investigate the motivational effects of instructional methods. A motivational perspective is presented on the relationship between mental effort and performance, pointing to the fact that lower task involvement demands a lower investment of mental effort, combined with a lower performance, and higher task involvement is indicated by an increase in invested mental effort combined with an increase in performance. In the next section we discuss this in relation to flow and intrinsic motivation (Csikszentmihalyi, 1997).

Focusing on online educational contexts, some authors state that theoretically they are based on flexibility, inclusiveness, collaboration, authenticity, relevance and extended institutional boundaries (Stansfield & Connolly, 2009; Yuksel, 2010). In these contexts, both the roles of the teachers and students have changed significantly as educational goals have broadened to include lifelong learning, interaction, acquisition of meta-cognitive knowledge and skills. In particular, there is a curriculum negotiated among actors (Uschi, 2005).

This is a demanding framework that could lead to the social constructivist approach. However, it is important to highlight that this social constructivism is complemented and enriched by the CLT in our study, as some authors explain: We have argued that to free up learning time, we need to combine social constructivist activities with cognitive constructivist ones, incorporating learning tasks that can be somehow personalized or adapted to both course and learner's needs, such as GBL.

As will be discussed in the next section, excessive time pressure in GBL could be counterproductive and prevent learners from achieving the educational objectives. According to Harteveld, Guimarães, Mayer and Bidarra (2007, p.131) "too much information, time pressure or other factors inside a game environment could lead to a

cognitive overload or lead a person to filter out critical information". Time pressure is identified as a factor when explaining poor performance by decision-making groups both in individual and collaborative contexts (Karau & Kelly, 1992; Kerstholt, 1994; Linehan, Lawson, Doughty & Kirman, 2009; Linehan et al., 2012). The balance between the level of difficulty and time pressure leads to the state described by Csikszentmihalyi (1997) -and explained in section 2.1.3- as the flow state.

2.1.3 Active and experiential game-based learning methodologies

We define Serious Games (SG) as "An active, pedagogical technique that uses playful in-class activities designed to actively engage students with key concepts, the faculty and each other", or "Games that have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement." (Abt, 1970, in Laamarti, Eid & Saddik, 2014, p. 1).

Active learning methods engage students directly in thinking and problem solving activities (Bonwell & Eison, 1991). There is less emphasis on passive transmission of information, and more on engaging students in manipulating, applying, analyzing, and evaluating ideas. Active learning in lecture-based courses can include such methods as partner and small-group discussions, demonstrations, debates, concept questions, and feedback from students about what they are learning (Weltman & Whiteside, 2010). Active learning is considered experiential when students take on roles that simulate professional engineering practice, for example, design-build projects, simulations and games (de Weck, Kim & Hassan, 2005). According to Eriksen (2004), the use of ICT in education might help in implementing active learning methodologies.

SGs fall into this category of active learning, but have not been directly discussed as an active learning tool in the literature. SGs require that teachers "place the responsibility of organizing what is to be learned in the hands of the learners themselves", and challenges students to "engage in higher-order thinking tasks such as analysis, synthesis, and evaluation" (Dodge, 2003) instead of passively absorbing material. In other words, active learning in the classroom is implemented through "instructional activities where students do things and think about what they are doing" (Bonwell & Eison, 1991). Furthermore, this active GBL approach can be related to constructivism. In particular, Parcover and McCuen (1995), in their

discussion of a constructivist learning method for teaching engineering design- argue that learning "is not simply a matter of transferring information from lecturer to listener… conceptual development and comprehension requires the opportunity to question, explain, and test beliefs" (p. 238).

In recent years, games have been used in the traditional classroom to enhance active learning processes and active problem solving (Romero et al. 2012). Kim, Park and Baek (2009) define Game-based learning (GBL) as a learning strategy "focused on achieving the specific objectives of a given educational content through game playing" (p. 801). Serious Games (SG) also called computer-based games or digital games are a form of electronic games intended for educational purposes that support student-centered learning. In digital GBL, educators "use digital games with serious goals (i.e. educational objectives) as tools that support learning processes in a significant way" (Sica, Delli Veneri, & Miglino, 2011, p. 108). Serious games are designed in such a way as to achieve a balance between fun and educational value (Zyda, 2005).

In the specific case of business and management students, serious games constitute a relevant e-learning method (Ben-Zvi, 2007; Siddiqui, Khan & Akhtar, 2008; Wolfe & Sauaia, 2005). We will use the Fitó et al.'s denomination to refer to these educational games, and call them business games.

Concerning GBL in general, Prensky (2005) admits that a *sine qua non* of successful learning is motivation: a motivated learner cannot be stopped. It therefore makes a great deal of sense to try to merge the content of learning and the motivation of games, and this is indeed what is happening. The first comprehensive description of this growing phenomenon, *Digital Game-based learning* (digital GBL; Prensky, 2001), discusses how learners have changed, how games teach and why they work. In particular, young people's intrinsic motivation towards games contrasts with their often noted lack of interest in curricular contents (Prensky, 2003). The challenging world of games can shape students' cognitive abilities and expectations about learning, making educational content and practices seem tedious and meaningless (Facer, 2003; Prensky, 2003), and creating a dissonance between formal education and the digital, informal learning environments that students experience outside school (Downes, 1999; Mumtaz, 2001; Oblinger, 2004). However, the motivation of

games could be combined with curricular contents into digital GBL. Online contexts implementing GBL can therefore benefit of this intrinsic motivation variable.

In addition, as stated by Kiili (2005) and according to Csikszentmihalyi (1997), intrinsic motivation could lead to the flow state, where 'the sense of time is altered; hours pass by in minutes, and minutes can stretch out to seem like hours' (p.49). The author identifies game playing as one of the activities that helps individuals 'achieve an ordered state of mind that is highly enjoyable' (p. 72).

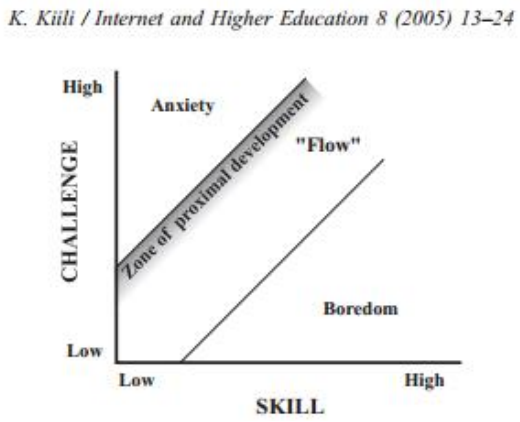

Figure 3.Three channel of flow (From Kiili, 2005).

2.1.4 The role of students time in online learning: Time Perspective

Implicit in theoretical models of schooling (e.g., Bloom, 1976; Carroll, 1963; Harnischfeger & Wiley, 1976; Rosenshine & Berliner, 1978) is the notion that time is an important determinant of degree of learning. The formulation of these models, particularly Carroll's (1963) has provided researchers with an alternate concept of fixed-time learning and has disseminated a number of studies designed to explain the relation between time and learning. Specifically, three time variables were identified, that may contribute significantly to the variability of achievements across individual students, teachers, and education institutions in general. Carroll measured students' involvement: learning was optimal when students' time in learning was the same as the time needed by each student. Allocated time differs from the real time used for learning (also called time on task): students may not be doing academic matters during all the time they are in the classroom: they socialize, doodle, etc. Therefore, these authors define the engagement rate as the percentage of the class actively used in working, or being engaged, in a learning task. This is the variable, which most

studies relate to learning achievement (Fischer et al. 1980). Using GBL in online educational contexts, time has been studied from both an objective standpoint and also from a subjective perspective, or intra-psychological variable related to students' performance, engagement and motivation (see Usart & Romero, 2013c for a complete review):

"*External regulation of time includes the temporal constraints introduced by external agents such as the teacher defining the time on task for playing a game, or the digital game time-out that introduces an external constraint to the learner. The self-regulation of time involves learner choices and the pursuit of learning goals by allocating quality time for developing an effective learning time. Co-regulation of time in GBL can be observed in small groups of two or more when a teammate contributes to the time regulation of another learner. Based on the general definition of socially-shared regulation given by Hadwin and Oshige (2011) we can define the socially-shared regulation of time in GBL as a collective regulation in which the regulatory processes and products are shared among the group. From a more intra-psychological perspective, student time can be considered from a psychological approach, such as a student's orientation to multitasking or polychronism (Hall & Hall, 1987); or temporal perspectives (Zimbardo & Boyd, 1999) that represent the way individuals and cultures divide their experience into three different temporal categories: past, present, and future*."

2.1.5 Time as student intra-psychological variable: Time Perspective

Since Lewin´s (1942) initial study on *future TP*, this construct has been related to numerous outcomes, in different fields of study such as behavior (Strathman & Joireman, 2005), wellbeing (Fortunato & Furey, 2011; Drake, Duncan, Sutherland, Abernethy & Henry,., 2008) and learning in particular (Barber, Munz, Bagsby & Grawitch, 2009; de Volder & Lens, 1982). TP has long been studied in the field of educational psychology as being one of the factors that could help understanding students' learning performance and motivation to study, their investment in learning and flow (Husman & Shell, 2008) in onsite learning contexts, and will be further discussed.

Social psychologists Zimbardo and Boyd (1999) define Time Perspective (TP) as how humans and cultures partition time in three: past, present and future.

Following these authors, TP in general, and the future factor in particular can be related to academic achievement, delay of gratification and goal setting. These significant relations are observed because we are functioning in a predominantly future-oriented educational system (Leonardi, 2007). However, as stated by Thiébaut (1998), "the work on time perspective and both cognitive and school performance demands a clear definition of the variables studied and the relations found in order to continue with the research" (p. 104). Therefore, and concerning the different paradigms that converge in our study, far from using an orthodox methodology, we aim to explore the role of student TP based on a complete overview of this variable in an online educational context with a GBL task.

Once the theoretical approach has been presented, we will now discuss each element of our study in order to give reader the overview of the state of the art.

2.2 ONLINE LEARNING

Online learning, also regarded as web-based, e-learning, distributed learning, and distance learning, is learning that occurs across different geographic, organizational, and other boundaries (Keller, 2005; Ruiz, Mintzer, & Leipzig, 2006; Westbrook, 2006). This can take place using multiple methods (video conferences, telephone, CDs). However, in recent times it is increasingly conducted via the Internet (Adams, Devaney & Sawyer, 2009; Beldarrain, 2006; Hall, 2007). Online learning environments are increasingly being used as an alternative option for traditional learning in education (Adams et al., 2009; de Freitas et al., 2010; Hall, 2009).

Although online learning is growing rapidly, assessing the effectiveness of the design and pedagogical techniques used in these environments should be studied (Harden, 2008; Ke & Hoadley, 2009; Lee, 2005). Even if it seems that there is a lack of research on the effectiveness of these environments, many researchers have evaluated factors that are taken into consideration during the adoption of these types of learning environments. Specifically student and teacher motivation, keeping up with technology, flexibility, increased access to different courses, convenience, and interactive multimedia are a few of the noted benefits to adopting online environments (Allen & Seaman, 2010; Falloon, 2010; Huett et al., 2008; Lee, 2005; Leijen, 2008; Ruiz et al., 2006). There are drawbacks as well to using this type of

environment: students can feel isolated, frustrated, anxious, and confused resulting in a decrease in content interest and motivation (Adams et al., 2009; Westbrook, 2006).

2.2.1 Higher Education in the present: online vs. onsite model

We briefly review the changes in higher education during the last decades and the specific changes on traditional onsite institutions, on those universities having moved to a blended-learning modality, and the online universities. Higher education (HE) in Europe is adapting to the Bologna process, a series of institutional meetings and agreements among European countries aimed to ensure comparability in the standards and quality of HE qualifications (Floud, 2006). Bologna is designed around a more controlled temporal structure of the course through the ECTS, introducing a stricter regulation of the learning times where students have to fit in, requiring higher self-regulation from students regarding their autonomous learning time, and implementing virtual asynchronous learning activities that completely change the pace of traditional HE into a more flexible but demanding temporal model (Fillion, Limayem, Laferrière & Robert, 2007) for onsite, blended and online modalities. According to Floud, up to 10-15% of the students will fail to achieve their degree, probably due to their lack of time for learning (Evans, 2009) and the lack of temporal competences to regulate their learning times in the Bologna model; Olani (2009), when studying the factors influencing the drop-out rates among HE students, points to self-efficacy beliefs as being persistence and performance predictors. Self-efficacy and academic persistence are positively related to temporal factors, in particular to student Time Perspective (Epel, Bandura & Zimbardo, 1999).

Although onsite universities are the predominant HE modality in Spain, they allow less temporal flexibility than online models (Ruiz et al., 2006). Changes in student demography, such as an increasing number of part-time students (school dropouts take part-time jobs while attending university) who have less time for attending classes and studying, demand an online learning model, reducing the classroom attendance in favor of virtual and asynchronous activities (Volery & Lord, 2000).

In some countries, online universities were created as an extension to the traditional onsite university model; however, fully online universities, such as the Universitat Oberta de Catalunya (UOC) are emerging (Alsen, 2012; Currie, 2014). Online education based on web technology faces several challenges – including

increased dropout rates (Taniguchi & Kaufman, 2005) that are related with temporal flexibility and self-regulation (Fillion et al., 2007).

Online dropout rates are 20% higher than in onsite institutions (Diaz, 2002; Clay, Rowland & Packard, 2009). In the US, dropout rates range between 29.5% (for public associate degree students in US) and 56.1% for private online bachelor courses (Evans, 2009). Following Mortagy and Boghikian-Whitby (2010), online student dropout rates are related to finding the course more demanding and sometimes overwhelming when compared to onsite courses. Other studies in online education suggest low levels of academic locus of control and low metacognitive self-regulation skills (Lee, Choi & Kim, 2012) lead to high dropout rates. There is a time factor, which is also related to most of the research on dropout factors (Cocea & Weibelzahl, 2011; Lee, Choi & Kim, 2012). However, while some studies point to a lack of time (Taniguchi & Kaufman, 2005) and time incompatibilities with professional and family pressures (Jacobs & King, 2002; Evans, 2009) there is a lack of in-depth analysis of the student time factors involved in online learning. A challenging aspect is the asynchronous modality of the activities and learners' time management skills in online learning tasks.

Finally, and also related to dropout rates, current online higher education is mostly based on or adapted from the classical onsite model of content delivery (Prince, 2004; Tran et al. 2014). This could lack sufficient student-centered activities -defined as "ways of thinking about teaching and learning that emphasize student responsibility and activity in learning rather than content or teacher actions" (Cannon & Newble, 2000; pp. 16–17). Moreover, without the constant presence of other students or feedback from professors, online learning could be limited in terms of opportunities for interaction and collaboration (Mackey & Freyberg, 2010; Welsh, Wanberg, Brown & Simmering, 2003). Focusing only on knowledge acquisition, and not effective in training people in more abstract concepts and hands-on skills, online higher education might be useless. Thus, the use of student-centered methodologies might help students engage in the learning process during the whole semester and lead them to a deeper approach to learning (Baeten, Kyndt, Struyven & Dochy, 2010). As we will further discuss in section 3, GBL could be the methodology that helps students and teachers in this change of focus.

2.2.2 Students profile in online higher education

Following different authors, we can differentiate two student profiles in online universities: adult learners (older than 25) with family responsibilities and full-time jobs (Green, 1996; Concannon, Flynn & Campbell, 2005); and young students who are increasingly engaging in online universities as a first option, probably due to the time flexibility these models promise (Dabbagh, 2005). Nevertheless, this promised flexibility usually requires more self-regulation (Lee, Choi & Kim, 2012) and more time invested in study (Peetsma, 2000), which relates directly to time management skills and individual temporal perspectives.

Self-reported ICT skills

Currently, universities offer their students an online learning environment. However, it is unclear whether students have the necessary ICT skills –defined as the proficient use of computers, internet and software in general (Verhoeven, Heerwegh & De Wit, 2012)- to benefit from this digital learning environment in a useful way, and improve themselves in order to make meaningful use of the digital learning environment for their studies (Verhoeven, 2011). Therefore, in our study we decide not to focus on a deep research of students' ICT skill level, however, we have to take this variable into account because we are studying learning performance in an online university, and as we will explain in the next lines, background in general, and ICT in particular, could be related to students' performance. So we propose it as one of the prior variables that could compose the student *background* construct.

ICT have been omnipresent in our society since the last decades of the 20th century, and we tend to take for granted that freshmen arriving at the university are familiar with the most important techniques needed to handle a computer, especially in online institutions. However, from Verhoeven´s findings (2011), in a sample of 714 Belgian freshmen we see that even though some students rate themselves as having high ICT skills, a considerable number are not very proficient in computer use or ICT (Kennedy et al. 2008). Kaminski Switzer and Gloeckner (2009) showed that this is a problem also in more experienced students, who admitted that they had a very superficial knowledge about ICT.

Wan, Wang and Haggerty (2008) found two significant variables using a survey on a sample of 383 Chinese students participating in online courses: prior

self-reported experience with ICT and ICT skills affected learning effectiveness and satisfaction.

Student age and Background

Other variables that have previously been related to learning performance in higher education are student age and background. We now present and discuss the results of prior studies. We include prior knowledge and define it as the knowledge a student has before starting a course on the same subject or content. Prior experience and ICT skills are also hypothesized as components of the Background variable. Given the results of previous studies with models that tried to understand its importance as a predictor for learning performance, we only found one study that related prior knowledge or experience to TP (only through the relation of age to TP).Toth, Daniels and Solinger (2011) studied the learners prior knowledge and age in relation to Judgment Of Learning (JOL); In their review prior knowledge has some beneficial effects on episodic memory for both younger and older adults; specifically, older adults perform significantly better in an experience with dated material while younger adults showed the opposite pattern. This could be because prior knowledge provides a semantic context where to form elaborate or distinctive episodic memories.

As we discuss below, ICT skills are important for online learning in general and digital GBL in particular, not only for performance (Bulu & Pedersen, 2012) but also for time on task (Romero & Usart, 2013c). Course performance (learning) is a very complex construct that can be influenced by different variables such as course attendance, motivation, prior knowledge, etc. This is one of the reasons why we focus hereinafter on the performance of a particular activity (learning performance) where variables are more under control, both because of the limited time of the activity, and also because of the time and performance logs recorded during all the GBL task. Prior knowledge in general, and domain-specific prior knowledge in particular, has been studied during the past decades as predicting variables of students' achievement (Dochy & Alexander, 1995; Thompson & Zamboanga, 2004).

Hailikari, Nevgi and Komulainen (2008) studied the performance of 139 mathematics university students in relation to prior knowledge and previous study

with a model. The authors measured prior knowledge as the number of years studying in HE and in mathematics, and success is measured as previous GPAs. The results showed that domain-specific prior knowledge was the strongest predictor of student achievement, together with previous study success.

O'Reilly and McNamara (2007) conducted a study among 1651 High School students (*M*=16.25 years). They measured the relation among prior knowledge (measured with a content pretest on science), reading skill and strategies with performance in a final test where students had to use strategies such as skills and scientific reasoning. Regression analysis results show that in science prior science knowledge and reading skills were significant predictors for achievement.

A process analysis of GBL in a school setting allows us to better understand the role of games in education and behavioral differences between students with different levels of prior knowledge and learning performance in GBL. Hou (2013) analyzed school use of Talking Island, a SG, specifically, a MMORPG. Student's English score at the end of the preceding semester was treated as his or her prior knowledge score. The average score completed by a player, which was automatically recorded by the game, was treated as his or her learning performance score. The author divided the sample into high and low-prior knowledge students, and found that high-prior-knowledge students have more social interactions, and that problem-solving tasks could also include feedback or guidance mechanisms that encourage learner reflection (i.e., Kiili, 2007) provided support to more advanced levels of cognition.

Bulu and Pedersen (2012) studied how learners with different prior knowledge (measured as their scores on a multiple-choice pretest) and metacognitive skills benefited from continuous and faded domain-general and domain-specific scaffolds. Results showed that students with lower prior knowledge took advantage of both domain-general and domain-specific conditions. Results of the study suggested that scaffolds did not substantially benefit the students with higher prior knowledge and higher metacognitive skills. This can be related to the metacognitive tool implemented in our game, MetaVals. However, we admit that it deserves another study since metacognition is not the focus of this thesis.

Gredler (1996) ran a quasi-experimental study in chemistry with 262 thirteen and fourteen year old students. The author argued that the students' prior knowledge of

both content and computer operations might have an impact in their understanding of new material in a computer-supported learning environment. Gredler requested a computer-based simulation to improve the students´ results. In this study, prior knowledge was measured using a 13-item test (5 true/false questions and 8 multiple-choice questions) on the content of the simulation (the authors measured Cronbach's a of 0.769). Achievement or learning performance was also measured from a final test: A 27-item (12 multiple-choice questions and 15 fill-in-the blank questions) developed to test the knowledge the knowledge on oxidation–reduction acquired by the students in the course. Cronbach's α, again obtained from the test data, was 0.794, showing acceptable internal consistency for the items. The researcher concludes that, although computer simulations have been widely adopted in science education, variables such as the nature of the content to be learned, students' prior knowledge, and the formats in which multimedia information are presented must be taken into consideration if tasks such as computer simulations are to be used most effectively.

Information is commonly encoded in different multimedia forms such as onscreen text, narration, static pictures, and animation. The visual information that people usually process while looking at a computer screen can be encoded in a variety of ways. As we have reviewed in section 2.1, Cognitive Load Theory suggests that the modality in which information is presented in a learning environment can affect a student's cognitive workload. In particular, Sweller (1994) investigated how the format of verbal instructions in computer simulations and prior knowledge affected 8th graders' cognitive load level and achievement in a multimedia-learning environment. Although PK was not found to significantly affect student performance and cognitive load level, instruction format was found to impact both. Students who used narrative simulations were found to have a greater cognitive load but also to perform better than those using simulations with on-screen text instructions.

2.3 GAME-BASED LEARNING

In this third section, we will first define GBL and delimitate which game will be considered in our study. Secondly, we will place this methodology in the context

of online higher education, highlighting both the positive aspects and challenges of this methodology. Thirdly, we will focus on the particular case of serious videogames designed and implemented in online business education, giving examples of previous research in the field that will allow us to pose the research questions focused on GBL effectiveness through performance, comparing it to non-GBL, online methodologies, and analyzing the student preferences on the use of SGs. Finally, as a particular case of the business GBL in online business and management education, we will present the MetaVals game (Massons et al. 2011). This tool has been designed and tested in different onsite and online contexts, and will be the GBL used in our study.

2.3.1 Game-based learning definition

At present there are many definitions of game-based learning (GBL) given its growing use (Sawyer & Smith, 2008) mainly in digital-based and online learning contexts. However, we use the word GBL or, Digital GBL to describe the use of (video) games as instructional tools in education. However, this definition is incomplete if we do not explain the aim or objective of its use. There are digital GBLs that aim to train knowledge, others that focus on behavioral or attitudinal changes (All, Nuñez-Castellar & Van Looy, 2014). However, the focus of this study is those digital GBL that primarily aim at skill acquisition, for example, in a corporate or military context (Popescu, Romero & Usart, 2013). Several studies have examined the impact of playing games to practice managerial and finance skills (Corsi et al. 2006; Kretschmann, 2012).

According to O'Neill et al. (2005) the effectiveness of digital GBL can be defined in terms of 1) intensity and duration of the engagement with a game 2) The commercial success of a game, and 3) Acquiring knowledge and skills as a result of implementing a game as an instructional medium. According to the nature of the current study, we will focus on the third aspect, and more specifically on the training of knowledge and skills, as we outlined in the UOC model and the BBA accounting course objectives. The student´s engagement with the game must also be taken into account, because, as Koszma (1994) stated, context and learning content are inherently connected, implying that characteristics of the context can influence the learning outcome. We will do this analysis using more qualitative data to measure

the motivational power of our specific digital GBL task, as will be discussed in the following sections.

2.3.2 Game-based learning in online higher education

During the past two decades computer-based technologies have allowed major innovations in higher education providing support to face-to-face teaching and learning processes in traditional universities (Collis & Van der Wende, 2002), allowing the emergence of blended-learning combining face-to-face and distance computer-based activities in different degrees (Garrison &Vaughan, 2008) and allowing the emergence of online education. Learning methodologies supported by computer-based technologies allow new degrees of interactivity and a higher degree of autonomy and initiative than in traditional lecture-based methodologies, where learners are more passive and are guided by the teacher. These traditional, lecture-based learning methodologies where the learner has a passive role (EDUCAUSE, 2015) is now challenged by active learning methodologies, including the GBL approach.

Since the mid-1950s, the use of games and simulations in learning has grown considerably, in particular for business education, and several studies such as Faria (1998) show that business game usage has grown continuously. Also Faria and Wellington (2004) discuss about the reasons for adopting SGs, the criteria used to select them, the purposes for which they are used, how they are used, etc. In this research, we will focus on student performance and their experience with a GBL task, and leave to further research the debate on why and how institutions and practitioners decide to implement these active methodologies in the curriculum. According to the study made by Faria and Wellington among 14 497 participants, the three main reasons why simulation games were first adopted are that business games and simulations: (a) provide decision-making experience; (b) allow for theory application and (c) allow students to see the integration of functional business areas. These advantages are not found in other learning methodologies such as lecture-based or case studies, where students only have a static view of a company in a precise moment - something that does not evolve in time - and therefore, is less realistic and challenging.

GBL, as an active learning methodology emphasizes the idea of an active, experienced student, and a situation where knowledge is not transmitted to the student but constructed through activity or social interaction. Active learning methodologies such as digital GBL (Prensky, 2003) put the student in the center of the learning process (Leemkuil, de Jong, de Hoog & Christoph, 2003). Prensky highlights the idea that learning by doing is a key element of GBL, because the learner is playing a role in a situation that integrates a certain level of realism of interaction. This process challenges and engages the player. GBL could also permit the learners to engage in a collaborative activity. Following Kim and Baylor (2006) collaboration makes learning more realistic, stimulates motivation and, finally, can bring students to a flow state that could help balance fun and learning. In active learning methodologies developed in CLE, with a certain degree of flexibility, the learner is required to be more self-regulated and autonomous (Azevedo, 2008; Romano et al., 2005) than in traditional lecture-based methodologies. The GBL environments could provide an answer to the current future-focused educational environments, where students have a restricted choice about what they learn, and there is a clear need to search for different types of motivation (Kauffman & Husman, 2004), in particular, and related to the prior findings by Kiili (2005) in the field of GBL, we focus on student intrinsic motivation (see section 2.1.3 for more details).

GBL, as we have previously explained, is one of the active learning methodologies that have benefitted from the evolution of the ICT. According to Azriel et al. (2005), and opposed to classical teacher-centered methodologies that tend to emphasize the transmission of knowledge from an acknowledged expert to individuals in isolation (lecture format), learning that takes place outside the academic environment such as some games are often social, collaborative, and peer based (Ruben, 1999). Gray et al. (1998) found that the use of games improved student test scores on a driving test. Doyle (2001) showed that using games as a review activity could help learning because games encourage student participation. Using games to review course materials may capture the attention of otherwise inattentive students and intrinsically motivate them to participate actively in the learning process.

Digital GBL has allowed educators to reconsider the dynamics of onsite interactions and helped in facilitating the use of GBL tasks in asynchronous and online learning context. The use of games with learning purposes has also benefitted from the use of educational technologies, allowing to redesign onsite GBL activities into computer-based Serious Games (Padrós, Romero & Usart, 2011). Acording to Zyda (2005), GBL activities are designed to help achieving a balance between fun and educational value. The pedagogical use of computer-based games could enhance problem solving competences, decision making, knowledge transfer and meta-analytic skills (Kirriemuir & McFarlane, 2004). Particularly the GBL that involves collaborative actions might allow to place learning in an authentic and realist context allowing students to practice in safe environments, providing realism and motivation to players through good pedagogical design (Leemkuil et al., 2003). From the students' point of view, and according to Foreman (2003) the active discovery required in this learning process enhances skills such as analysis, interpretation, problem solving, memory and physical activity. However these scenarios may show a lack of effectiveness when no instructional or support measures are added to guide the process. In this respect, de Freitas, Rebolledo-Mendez, Liarokapis, Magoulas and Poulovassilis (2010) uphold that a negative learning transfer might occur in GBL with some game players when the players' expectation for high fidelity environments might be related to negative learning processes. Nonetheless, in looking for instruments and educational alternatives, one may consider Serious Games (SG) given that they seem to have more answers to provide context in problem-based learning, inquiry learning, constructionist and connectionism since SG "have more than just story, art and software...they involve pedagogy, activities that educate or instruct, and thereby transmit knowledge or skill" (Zyda, 2005, p.27). Games have the power to change attitudes (Holland, Jenkins & Squire, 2003) even though not all subjects in a curriculum can lend themselves to teaching with SG.

Hence the power of games to intrinsically motivate players to engage in the activity has been considered an important aspect of games that can benefit learning (Garris, Ahlers & Driskell, 2002; Kiili, 2007). Intrinsic motivation when performing an activity is associated with higher levels of enjoyment, interest, performance and higher quality of learning (Ryan & Deci, 2000). This type of motivation, however, is often assumed in the context of gaming, but is not always a reality. Especially in the

context of digital GBL where players can be extrinsically motivated to participate, referring to engaging in the activity as a result of external coercion. In order to minimize this extrinsic motivation variable, in our study we have allowed students to engage only at will, without counting the GBL task as part of the course performance, and using it only as a learning exercise to test accounting skills on their own. However, we are aware that some kind of extrinsic motivation, such as identified regulation (doing an activity because the action or the outcome is accepted as personally important) or integrated regulation (when a student engages in digital GBL because he/she wants to be a good student). These different types of extrinsic motivation are also associated with different outcomes and experiences. Higher levels of autonomy in extrinsic motivation result in higher levels of engagement and performance, and in a higher quality of learning and lower levels of dropouts (All et al. 2014). We designed qualitative interviews where students can talk about their motivation to engage on the digital GBL task to study the extent in which the possible levels of identified and integrated regulation affect performance.

Learning could be enhanced when students become actively involved in the learning process by stimulating critical thinking. In some studies developed in face-to-face situations, active learning methodologies have outperformed traditional learning methodologies (Butler, Phillmann and Smart, 2001; Yoder and Hochevar, 2005). In digital contexts, Liu and Chu (2010) observed that the group of students participating in GBL had a better performance and motivation than students in the traditional methodologies. Papastergiou (2009) focused on secondary education and aimed to compare the learning performance and motivation between two learning methodologies: an instructional activity, and a GBL activity where the contents and learning goals were equal. The results of the scores of the two similar activities showed that the GBL approach lead to higher learner performance and motivation than the instructional approach. Burguillo (2010) studied the use of games in higher education programming courses; the results on the use of games led the author to affirm that using games for education could help increase student performance.

In summary, GBL in online settings in general, can be considered an active methodology that allows students to interact and engage in the learning process. It is more challenging and close to reality than case study methodologies. Furthermore,

there are different studies relating the use of SG with a higher student intrinsic motivation. From student's point of view, GBL is preferred to other methodologies in the online settings, and we also believe they help practice acquired knowledge and improve skills and competencies. However, what happens with online business education?

2.3.3 Game-based learning in online business education

In today's globalized society, both universities and business schools need to incorporate learning tools to help learners in achieving what Fitó et al. (2013) called "high-performance capabilities". In the particular context of business and management education, simulations and games have been adopted during the last decades as an active learning methodology that allows learners' to participate in an engaging and authentic situation, avoiding the risk real life could cause in the fields of finance or security management (Kirriemuir & McFarlane, 2004). In recent years in business schools and universities Serious Games (SG) have become one of the trends of learning innovation moving the traditional lecture methodology and the classroom developed study cases forward. In this sense, reference schools such as Harvard Business School have meant to make a progress, from the evolution of paper based case studies into simulations and interactive case studies where the learners' could play a realistic situation, to learning by doing (Srikant, Garvin & Cullen, 2010). In the context of business education, SGs are focused on achieving the specific objectives of a given educational content through game play. Students' attempts to solve problems are maintained throughout the learning session. SGs can be used by teachers as instructional tools to capture an experience system behavior that will provide experiential insights through learning by doing methodologies. For instance, GBL allows training management competences by failing without the consequences in the real world (Prensky, 2001). Game design is based on the deep human inclination to play games as a source of highly motivated learning (Gee, 2003), where the learner can achieve the state of flow considered by Csikszentmihalyi (1991) to be the complete engagement or absorption in an activity. In the state of flow "the sense of duration of time is altered; hours pass by in minutes, and minutes can stretch out to seem like hours" (p. 49). Csikszentmihalyi identifies the playing activity as one of the activities that helps players' "achieve an ordered state of mind that is highly enjoyable" (p. 72). Moreover, the action of gaming is

visibly becoming a new form of interactive (mobile, multiplatform) content, worthy of exploration for learning purposes. While motivation in the use of the games fosters student's effort without resentment, relaxation enables learners to understand things more easily. Since an additional goal for business and management students is to learn under pressure with the new methods that would enable the combination of theory and practice to construct new concepts that are learned from the content of the course in the classroom, SGs are used to construct educational situations that enhance the learning motivation in students, especially in production management, logistics management, and other decision sciences courses that adopt game-assisted teaching tools to simulate real enterprise situations that allow students to prepare for their professional careers (Tao, 2009). Notwithstanding all of the above, there is a lack of sound empirical evidence on the effectiveness of GBL due to the different outcome measurements used to assess effectiveness, the varying methods of data collection, and results that are inconclusive or difficult to interpret. More research and conclusive results are needed to confirm the usefulness of business games (Feinstein & Cannon, 2002), and follow up and research on the effectiveness of digital GBL in general (All et al., 2014), and of business games in particular (Faria, 2001). Three areas of study can be distinguished:

- Analysis of game effectiveness determinants, measured through game performance as a proxy of the students' learning process (Worley & Tesdell, 2009). Typically implementing pre-and post-game measurements.
- Analysis of business game effectiveness compared to other teaching methods, such as lectures or case studies (Doyle & Brown, 2000), with course performance and grades used to evaluate the effectiveness of the learning method (Faria & Wellington, 2004).
- Analysis of business games tools assessing the learning process of students, considering the users' satisfaction (Fu, Su & Yu, 2009); evaluating business games in terms of the attitudes of students, their perceptions about its suitability or their participation in the game (Azriel et al., 2005).

At the light of these areas of study, and given the general aim of our study, we decided to focus our study on previous points 2 and 3; that is, we compare a GBL task with the performance of the course, but we also aim to take into consideration the student´s point of view, their preference for GBL in general, and their motivation with the particular GBL task. To have a base to compare our results, we now discuss some prior studies focused on business games, students' perceptions and performance in online settings:

Doyle and Brown (2000) conducted an experience with 30 students in five teams across Europe and US, all playing the Business Strategy Game in a virtual environment. Qualitative results showed that the participants thought the experience to be positive, although technical problems were reported which might have affected the learning process.

Fitó et al. (2013) analyzed the evolution and performance of two groups of students who had played a business simulation on some academic semesters. Results for 146 students around Europe showed that the level of generic and specific competences obtained using business games was quite high and that online students valued specific competences higher than the onsite group. The authors suggest that business games might be considered a useful tool to improve student's achievements and foster a high skill level.

Fu, Su and Yu (2009) relate online GBL as aimed at the achievement of learning objectives through the creation of a flow effect. In their study they aimed to develop a scale to help assess the students enjoyment of online games for learning. Authors proposed 8 different dimensions: Immersion, social interaction, challenge, goal clarity, feedback, concentration, control, and knowledge improvement. Results in 166 students using 4 SGs in an online course, showed that the validity and reliability of the scale was satisfactory.

Finally, Azriel et al. (2005) studied a GBL course on *Strategic management* with a famous commercial game (*Jeopardi*) adapted to learning aims. The student sample was comprised of 37 students who played the game, and 40 students who were in a control, lecture-based model group. Although the GBL option did not emerge as the superior methodology to improve the students' exam scores, it can be

concluded that using Jeopardy was as effective for reviewing class materials as the lecture method. Furthermore, the researchers discovered that GBL could be motivating for students, as they actively participated in the learning process. Students preferred this methodology and reported that the use of games was appropriate and that it facilitated learning.

As discussed in this section, the different types of learning methodologies could be more or less adapted according to the students' characteristics, such as their previous knowledge, their cognitive style, their socio-emotional profile, and their Temporal Perspective (TP). The adequacy between passive or active learning methodologies and the learners' characteristics has not been studied enough, nor influence of the passive or active learning methodologies on the learners' willingness to engage in the learning activities or their performance.

In addition to the previously stated variables that relate to learning performance and effectiveness of GBL, there is the time factor (Gros, Barbera & Kirschner, 2010), which has also been shown to be an important element for engaging and performance in online learning contexts in general, and in GBL tasks in particular, as studied by Romero and Usart (2013c). In the next section, we will focus on external and internal temporal variables that are related to learning performance: time on task and student temporal perspective.

2.4 TEMPORAL FACTORS RELATION TO LEARNING PERFORMANCE IN ONLINE EDUCATION

In this section we discuss the temporal factor as considered in prior research on learning in general, and focusing on GBL and online contexts in particular to set the base of our study. This time factor will be detailed through two different approaches; firstly, it will be studied as the temporal framework or span during a particular activity or learning time, and as we stated in section 2.1, we will use the ALT model[1] as a basis. Secondly, we will study the psychological time of the learner (defined by Block (1990) as the individual perception of time, in terms of succession, duration

[1] ALT model: Alocated Learning Time model (Fisher, C., Berliner, D., Filby, N., Marliave, R., Cahen, L. & Dishaw, M. (1980))

and temporal perspective), in our research, we focus on the last aspect, time perspective (TP), since it has been related directly to learning and has been operationalized as a measurable construct. Both approaches are introduced, defined, and related to learning in online contexts and also in GBL tasks, to provide the theoretical context for a complete implementation of digital GBL tasks in online higher education.

2.4.1 Time on task

In educational activities such as Serious Games (SG), the time factor can be considered as the temporal regulation of academic time that students develop while playing. In particular, external regulation of time includes the temporal constraints introduced by external agents such as the teacher defining the time on task for playing a game, or the digital game time-out that introduces an external constraint to the learner (Romero & Usart, 2013c). This learner time on task allocation and regulation in the context of GBL is an important factor in understanding the learner's level of achievement and temporal pressure during the activity (Usart & Romero, 2012).

To characterize the time on task in a GBL task, we analyze student time according to the Allocated Learning Time (ALT) model. The San Francisco Far West Laboratory for Educational Research and Development team designed this model (Figure 4) for the assessment of beginning teachers (Beginning Teacher Evaluation Study, Fisher et al., 1980) and it was adapted to online learning by Romero (2010). It characterizes four different typologies of time in educational contexts, including scheduled time (e.g., the academic semester in which the course using the game is scheduled); the designed or adapted allocated time for starting and finishing the game (i.e., the game duration); student engaged time or time on task (i.e., the time in which the learner is playing the game), which also includes a period of time when the student is doing other elements of the task – such as organization or learning how to play; and effective learning time (i.e., the specific moments when the student is learning through playing). The model distinguishes these different types of time in the process of teaching and learning and the relationships between them, including both hierarchical and interactional relationships.

In this framework, we can affirm that, although two teachers may allocate the same amount of time to allow students prepare and conduct an online activity, the amount of time actually engaged in learning can vary between groups as well as among individual learners. Thus, many researchers (e.g., Arlin & Roth, 1978; Rosenshine & Berliner, 1978) stress that time spent in a particular learning task is a more useful index of learning time and a stronger predictor of achievement than simply allocated time.

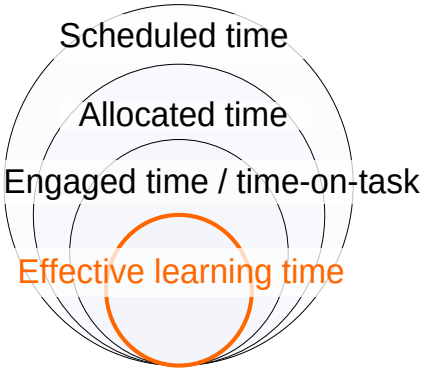

Figure 4.ALT Model

Within the ALT model, students can devote more or less time to the learning activity (time on task) within the bounds of allocated time and within this time period they have a certain amount of effective learning time. We should consider a learner's effective learning time (ELT) as the amount of time a learner devotes to relevant academic tasks and successfully performs those tasks. In GBL, the ELT corresponds to the time the learner is successfully engaged in activities oriented towards learning objectives and competencies development. An effective GBL task should therefore reduce the time allocated to non-educational objectives and increase the time allocated to activities that ensure the learner's achievement of the learning objectives and the development of competencies (Romero & Usart, 2013a).

The effective learning time is hard to observe in autonomous learning situations where the learners are not directly observed by the professors. For this reason, most of the research developed in the relation between the academic times and the learning performances, has been focused on the time on task relation to the learning performances. The reason for using the concept of ALT to interpret the

extant data in research on learning is simple: Instructional time variables that are observable and relatively simple to measure can provide an understanding of instructional processes that reasonably account for the effects that have been found in scores of empirical research studies.

The role of time on task in game-based learning according to the ALT model

As a new standpoint of our work, we can affirm that the ALT model in GBL (Romero & Usart, 2013b) allows us to study the real time spent playing in the different phases of a digital GBL task, and relate it to learning performance. This can be considered as a new approach to measure time on task, because in non-GBL online contexts or onsite studies (e.g. Peetsma, 2000) there were only self-reported measures of the students in their time on task.

GBL activities proposed to students as autonomous activities out of the classroom have an allocated-time including a starting and ending day, but the students can spend different time on task, in different moments of the day. This time on task flexibility also applies to effective learning time. We define student time flexibility as the student ability to regulate his time on task according to his learning time availability, instructional time requirements, and flexibility of the learning task proposed. In this context, GBL does not ensure the quantity and quality of the learner time on task because the instructional time and allocated time flexibility demands the learner to self-regulate his time on task quantity and quality (Romero & Barbera, 2011; Romero & Lambropoulos, 2011).

Most of the games used in educational settings can be played on demand and so can be considered as time independent, offering the highest level of time flexibility for the student (see Romero & Usart, 2013c for a complete review of this concept). In this case, the learner has a certain degree of flexibility when deciding how much time to allocate to playing the game. In other contexts, the instructor introduces a higher level of constraint and schedules the time for playing the game: students cannot choose the time to allocate and has no temporal flexibility in the GBL time on task. A particular case of this constraint is MetaVals game (Padrós et al., 2011; Romero & Usart, 2013a), with time-outs that allow students to start playing

when they want but, once in the game, they have to finish within 5 minutes per screen.

In online learning settings, temporal flexibility is higher; students have to self-regulate their learning time and activities in order to meet a final exam, then time flexibility in online learning is less important than the initial expectations of the online learners (Levinson, 2006). Despite all the advantages of temporal flexibility in online and GBL activities, this high degree of temporal self-regulation could cause the less regulated students to fail to devote enough time on task, so reducing their effective learning times and performance (Romero, 2010).

Pivec, Dziabenko and Schinnerl (2003) observe that "although game activity takes place apart from the real world, it occurs in a fixed space and time period with rules, which govern the game for its duration (...) e.g., When the time runs out, whatever's on the screen will be implemented as the decision" (p. 218). This example could be analysed under the perspective of the ALT model.

Relation between time on task and performance in game-based learning

Studies published on the time factor in academic performance have analyzed the relationship between time on task spent and academic performance, especially in the context of face-to-face education homework assignments. Wagner, Schober and Spiel (2008) show a positive relationship between performance and the quantity of time allocated by postsecondary learners (N = 824). Using the German PISA data set in primary education (N = 24,273), Trautwein (2007) observes that the frequency of homework is even more relevant in academic performance than the amount of time it takes to complete assignments. Other studies on time quantity and academic performance provide variable results, with a slight positive relationship between the quantity of study time and performance (Allen, Lerner, & Hinrichsen, 1972, r = .23; Hinrichsen, 1972, r = .32; Wagstaff & Mahmoudi, 1976, r = .31) and indicate a negative relationship in some cases (Greenwald & Gillmore, 1997, r = -.15). The analysis done by Schuman et al. (1985) concluded that "there is at best only a very small relationship between amount of studying and grades" (p. 945). Observing a group of 120 college students in an online pharmacist program, Wellman and Marcinkiewicz (2004) found that time spent online by learners was only weakly correlated with learning. In game-based learning (GBL), Lewis (2007) observes that

time on task is one of the great general truisms of educational interventions: the longer one spends learning, generally, the more one learns", but he subjects the influence of time on task to the relevance of the learning objectives addressed by the game. We can consider the concept of efficiency, by considering the students' time on task in relation to the learning performance increase. The games could allow an (enormous) increase of the time on task, because of their engagement, and some learning performances, but the question of the learning efficiency is: Does the time on task in the game increase the learning performances in an efficient way? In this respect, Gee (2003) argues that a well-designed SG may engender an increase in the time on task spent by the students, creating an environment that fosters practice, but it does not relate this time on task directly to a better learning performance. The Horizon Report released by the New Media Consortium and EDUCAUSE (2015) foresees that in three years horizon Massively Multiplayer Online (MMO) games designed for learning will make players dedicate enormous amounts of time on task pursuing the collaborative problem solving goals of these games, but it does not predict an increase of the learning performances and efficiency. Moreover, in some cases the study on the time on task and the learning performance is not analysed as a casual relation, as in the SG *DimensionM* (2010). This SG was designed to teach algebra; and the analysis of its use shows and increase in the students' time on task, and a parallel increase in the students' performance and transfer of knowledge.

According to the studies analyzed in this section, we could expect time on task to be related to performance in GBL activities. However, little research in online GBL tasks has been conducted. Although we cannot predict a result for our study on the measure of time spent by students in MetaVals and their scoring in the game, we can expect that, if no technical problems interfere in the task, there should be a significant relationship between student time on task and performance.

2.4.2 Time Perspective

Time Perspective definition

Usart, Romero and Barbera (In press) identified 15 FTP definitions. Four used by the vast majority of the authors, however, all the existing (F)TP definitions cited previously evolve from the Lewin's (1942) TP definition: "the totality of the individual's views of his psychological future and psychological past existing at a

given time" (p. 75). TP has been defined from different perspectives since Lewin's (1942) study. This is a not situation specific construct (Nurmi, 1991), and has been compared and sometimes measured as time perspective; a multidimensional trait with extension and valence that is different for each life domain (Gjesme, 1983). Different authors claimed for a clear definition of this psychological concept and highlighted that TP have historically been defined and therefore measured using different questionnaires to measure this construct (Díaz-Morales, 2006; Fourez, 2009). Nevertheless, since the Zimbardo, Keough and Boyd (1997)) definition of TP as "the manner how individuals partition the flow of time into past, present and future" (p. 1008), it has been considered a multifactorial construct with five main factors: past positivism, past negativism, present hedonism, present fatalism and future. We can affirm that the study of TP has a solid theoretical basis and can be measured through a reliable instrument, the Zimbardo Time Perspective Inventory (ZTPI) for the English-spoken western cultures (Zimbardo & Boyd, 1999) and Spanish ZTPI in our culture (Díaz-Morales, 2006; Usart & Romero, 2014c).

Without dismissing the rest of theories, we will focus on the TP theory by Zimbardo and Boyd (1999). The theoretical foundation of Zimbardo and Boyd's time TP paradigm aims to provide a quantifiable measure of the multiple time frames and dimensions of this construct. We will see that having high FTP does not mean that we are low in present orientation, and this model is unique in considering this possibility, as it is based on a combination of motivational, emotional, cognitive and social processes that contribute to the operation of TP.

Only recently, there has been a higher focus on the *balanced* Time Perspective (BTP), considered by Boniwell and Zimbardo (2004) as a *balanced* perspective scoring high past positive, present hedonistic and future, combined with low past negative and present fatalistic scores. BTP has been analyzed in relation to well-being (Drake et al., 2008; Boniwell, Osin & Ivanchenko, 2010; Gao, 2011) but has not been yet analyzed in relation to the learners' performance in passive and active learning methodologies, neither in onsite, blended or online learning contexts.

Cultural aspects of Time Perspective

Focusing on the Zimbardo and Boyd's TP definition and operationalization, we aim to discuss the cultural aspects related to this construct, because, as mentioned by Jones and Brown (2005; p.307) "Time perspective is a cultural value as well as an organizing principle for relationships, norms, and expectations." These authors state that not only individuals, but also cultures show variations in TP; based on Hall (1983) definition of monochromic and polychromic time (M-time is business, working time, related to punctuality, clock time; while P-time is play, social time, related to leisure, slow pace of life), they explain that some cultures have a M-time pattern and others a P-time pattern, and therefore this defines the cultural character. Furthermore, following Jones and Brown, the closer to the equator a culture is, the more polychromic it is, and therefore, the entire society will be more focused on the present and less oriented to the future. Related to these studies, the authors state that each culture attaches values to the behaviors that understands as more desirable. In particular, Brown and Jones, and also Capdeferro, Romero and Barbera (2014) show that future orientation (M-time) is related to academic achievement (learning performance).

Concerning the ZTPI instrument, it has been translated to many languages and studied in different countries: french (Apostolodis & Fieulaine, 2004), italian (D'Alessio, Guarino, de Pascalis & Zimbardo, 2003), greek (Anagnostopoulos & Griva, 2012), portuguese (Milfont, Andrade, Belo & Pessoa 2008; Ortuño & Gamboa, 2009), and Spanish (Díaz-Morales, 2006; Oyanadel, Buela-Casal & Pérez-Fortis, 2014; Usart & Romero, 2014c). The results from these studies show that both the five TP dimensions can be identified cognitively, and their pattern of relationships with other variables are comparable across cultures, with its factorial structure being stable. However, there are some researchers claiming for further study when implementing the ZTPI in other languages and cultures (Milfont et al,. 2008; Carrelli, Wilberg & Wilberg, 2011).

Focusing on the Spanish version of this instrument, there are some differences in items that have been explained on the basis of cultural singularities: Usart & Romero (2014c) discuss their results in a sample of 250 Spanish higher education students, in relation to prior research, showing that:

- Past negative (PN) factor has some items that could be related to cultural factors, because the results of Usart and Romero's study coincide with Díaz-Morales (2006) findings but do not adjust to Zimbardo and Boyd results. These items are 11. On balance, there is much more good to recall than bad in my past, 51: I keep working at difficult, uninteresting tasks if they will help me get ahead, and also item 12: When listening to my favorite music, I often lose the track of time, a sentence that had been originally rated as present hedonist (PH). Furthermore, the civil war, dictatorship and even economic and social context in Spain could be generating some high PN scorings compared to other cultures (Usart & Romero, 2014c).
- Present Hedonsim (PH) and Present Fatalism (PF), that is, the present orientation, could be less influenced by culture than past and future; and items mainly meet the original Zimbardo and Boyd results.
- Finally, Future TP (FTP) items show three major differences that could be due to cultural aspects: the valence of items 20,28 and 52 shows that there are cultural aspects that have to be faced in future studies.

TP and learning Performance

Albeit authors in the early 60s and 70s used different definitions, most of the actual researchers summon Teahan's work (1958) as one of the first in the field of TP and learning. Recently, Peetsma (2000) study among 600 students between 11 and 20 years old also claims that future TP is an attitude, and depends on four different life domains (schooling and professional career, social relations, personal development and leisure time). According to Peetsma, these domains allow a different focus on the future TP factor, as it can be differentiated for the particular field of learning, and therefore measured as a particular object. The most significant results of Peetsma's studies show the relation of positive FTP on professional career in near and distant future to higher investment in study.

TP has been tackled in multiple contexts and related to diverse learning outcomes. Most of the research corpus focusing on TP and learning has been developed in onsite, teacher-centered contexts. Studies focused on students observed

how being future-oriented can be associated with several optimal study outcomes. Husman and Shell (2008) found that future TP (FTP) was instrumental and directly related to academic achievement. It has been reported that students with high Grade Point Average (GPA) were characterized as being future-oriented (Mello & Worrell, 2006; Ozcetin & Eren, 2011). It has also been observed that college students' thoughts about their future could have an impact on their academic achievement (Gjesme, 1983; Shell & Husman, 2001). As Zimbardo and Boyd (1999) studied, future-oriented adult students shows less late and missed learning activities than learners' oriented to the past or the present. Furthermore, individuals with a high FTP tend to invest more time in studying, consequently showing higher long-term academic achievement (Peetsma & Van der Veer, 2011).

Most authors in the field of TP and learning focused their research on individual learning environments (Leonardi, 2007) where motivation and academic achievement were studied through the use of final exams following a traditional instructivistic lecture-based approach. However, as we have previously discussed, since the 1990's, traditional lecture-based approaches are being partially replace by more active learning methodologies, based on social constructivism and cognitive theories (Dillenbourg, 1999). Nevertheless, the TP study has not analyzed the active learning methodologies and the TP literature review provides only results from traditional instructivistic lecture-based approaches. Previous studies on TP and learning have found that individual differences in TP influenced how promptly and reliably university students completed their learning obligations (Harber, Zimbardo & Boyd, 2003). Students with a long FTP more easily anticipate the implications of their present classroom activities for the more distant future and prepare more academic or professional plans or projects (Phalet, Andriessen &Lens, 2004); future oriented students' motivational beliefs could positively influence learning behavior and consequently academic achievement (Van der Veen & Peetsma, 2009). Present time orientation in high school and university students yields more negative motivational and learning correlates, while future-oriented individuals seem to show stronger personal endorsement for their present study activities (de Bilde, Vansteenkiste &Lens, 2011). In a study on TP and academic achievement conducted on African American students, Brown and Jones (2004) observed that future-oriented

individuals had a higher score on Graded Point Averages (GPAs) and that those students perceived education as more useful for future success in life.

It was not until the last decade that a researcher (Zabel, 1995) devoted his PhD study to TP in a distance education context; more concretely, in an adult correspondence course. Up to our knowledge, it was the first academic study to approach TP in an online distance learning environment. Focused on distance or online learning environments.

Time perspective and performance in GBL and online learning contexts

Research on TP in online learning is sparse. There are few studies on the field of temporal perspective and distance higher education. Zabel (1995) used the first version of the ZTPI to study the TP profile of students on correspondence university courses; a total of 101 adult students were studied (M=31.04 years-old). Results indicate that participants had more of an orientation to the future than the past or present. This could be understood as a higher consciousness among FTP students in the pursuit of the learning experience proposed a second study by Schmidt and Werner (2007) focused on online HE, but did not measure student's TP profiles, it focused on the analysis of the possible designs for future-based online courses.

Despite a general lack of studies on TP and GBL, there are various studies in educational and social psychology focused on TP in social and instant feedback situations. Brown and Jones (2004) showed how present-oriented individuals have a higher engagement in social activities. The authors used a self-reported questionnaire, the Temporal Orientation Scale (TOS) to measure TP. Results on African-American high school students indicate that past and present-oriented students tended to engage in social activities more than academic activities. In the same study, Brown and Jones observed that future-oriented individuals saw education as useful for future success in life. In the same vein, Wassarman's (2002) thesis on TP and gambling behaviour points to present-oriented adults engaging more in gambling activities than past and future-oriented individuals. These results could be explained by various underlying causes. Firstly, as studied by Moreno-Ger, Burgos, Martínez-Ortiz, Sierra and Fernández-Manjón (2008), the mix of fun and learning introduced by the GBL methodology could neutralize the heterogeneous

learning outcomes expected from the results seen in classical learning activities due to the fact that GBL in online contexts capture attention of the student, and could lead to deeper learning because of the involvement of different senses in the learning process. These authors also mention student motivation: GBL has the potential to extrinsically motivate and engage learners. Focusing on motivation, present-oriented students prefer instant-reward activities (Wassarman, 2002), while *future* and *balanced* individuals can foresee investment in learning as a source of future rewards.

Furthermore, Papastergiou (2009) studied how secondary education students performed in a GBL activity compared to an instructional activity; both contents and learning goals were the same, and results for the sample (N=88) scores showed that the GBL activity lead to higher learners' performance than the instructional approach.

Nevertheless, these results point to specific aspects of games, such as social activities and gambling. There is still a lack of research on TP in online contexts with digital GBL tasks. With the aim of approaching this subjective temporal aspect, not previously targeted, Usart and Romero (2012) designed the study described below. This research was a first step in the way to the present thesis and deserves special attention:

A total of 24 adult students in a master's course at ESADE formed the sample of our case study (9 women and 15 men, age M = 31.90, SD = 4.09). A classification game, MetaVals, was implemented in the introductory finance course. The research scenario was set by an online pre-test of financial literacy, together with face-to-face SG activity, (where students played a web-based SG to classify assets and liabilities) and an online post-test. Students were rated, according to the ZTPI, as future or present-oriented. The ANOVA analysis for this study confirmed the central hypothesis: there were no significant differences in game performance among different TP profiles. Nevertheless, due to the lack of previous studies in the field of GBL and TP, more research needs to be done to confirm the tendency of future-oriented students to score higher than *balanced* and present-oriented individuals. Similar results shown among students with different TPs support the theory that a mix of fun and learning introduced by GBL methodology neutralizes the different

learning performances found in classical learning activities. Present-oriented individuals approach a GBL activity as an entertaining and challenging activity. However, future-oriented students may be engaging in GBL activity not for fun – but for the learning and future outcomes of playing in an educational context.

According to these studies, the following empirical and theoretical reasons affirm that no significant differences in performance should be observed in a GBL scenario between present and future-oriented participants:

1. Prior results in digital GBL show no significant differences among present, balanced and future-oriented students.
2. GBL offer a mix of fun and learning able to neutralize the differences in performance observed in non-GBL tasks.
3. All students have (different) motivations for engaging and performing in a GBL task (Present-oriented students prefer instant-reward activities, challenging and entertaining; *future* and *balanced* students with high consciousness and foresee future gain or their present learning tasks).

TP and age

Age is an important variable in the study of the TP because along the lifecycle, this variable shows different tendencies. In general, young adults show a higher FTP and adults a more present orientation (Díaz-Morales, 2006). The existing studies in onsite HE show a higher future orientation among young adults (from 17 to 24 years old) than for older students (Mello & Worrell, 2006). This could be due to the fact that older, lifelong learners are more focused on the present applications of what they learn. These profiles do not present a high FTP when compared to younger students, who could need a higher orientation to the future to foresee the further benefits of their actual efforts (Van der Veen & Peetsma, 2011). Finally, Zabel (1995) used the first version of the ZTPI to study the TO profile of correspondence university courses, the antecedent modality of online education; a total of 101 adult students was studied (M=31.04 years-old). Results indicate that participants in the course had more of an orientation to the future than to either past or present.

Table 2-1.

Student age and TP relationship

Age	Adults (> 25) are increasingly returning to institutions of HE to take supplementary courses whilst in full-time employment, or during short career breaks (Concannon et al., 2005).	=> TP Previous studies relate TP and age
	Currently more than 40 percent of the "students" enrolled in two- or four-year colleges and universities in the United States are age 25 or older (Green, 1996),they are more focused on the transition from classroom to job, often eager to apply the day's reading and discussion to *real world* and *real work* issues.	Focused on the future applications of what they learn, FTP could be therefore higher older adult in onsite students.
	Increasing numbers of mature (aged 21 years on admission) and male students are commencing undergraduate healthcare programs (Kell, 2006)	

Díaz-Morales (2006) study showed that the future increases with age. However, Romero and Usart (2014) findings in higher education profiles have, on average, a higher future orientation than population in general. Results published by Mello and Worrell (2006) among an onsite, secondary education sample showed that young adult students had a significantly higher future orientation than older adults. Furthermore, the fact that medium age individuals show a higher orientation to the future and planning than older students could also be related to the fact that time perception is directed towards possibilities in later life (Lang & Carstensen, 2002).

Finally, Present Fatalism (PF) shows no significant differences with age in general, although older students have a higher PF than the other two groups (Romero & Usart, 2014), especially for the online and blended-learning students.

TP and Gender:

The findings of Zimbardo and Boyd (1999) in an undergraduate sample show women scoring significantly higher than men in the future factor. On the other hand,

the findings of Díaz-Morales (2006) among a Spanish non-student population also show that there is a tendency in women towards a higher future orientation, although not significant. The study conducted by Oyanadel et al. (2013) using the Spanish version of the ZTPI in a south-American sample found the same tendency. The women in the sample also showed a more positive vision of the past when compared to men. This agrees with the theoretical explanation shared by Dörr (1996): although women may live difficult events in their lives, they are also the members of the family who maintain rituals and familiar events. Women could be more affective, while men seek for sensation and hedonist activities.

Student TP as a predictor of time on task

One of our aims is to understand learners TP in our sample and relate it to their feeling of time on task during the game, and to do it through the qualitative interviews. This methodology sought to help us understanding how students perceive time in a GBL activity, as to measure if different TP orientations show different time perceptions during this learning task. We now discuss the theoretical basis and previous research in this field.

Romero and Usart (2013b) studied the role of student TP as predictor of time on task in MetaVals among a group of 24 adult MBA students. Results showed no significant differences depending on the TP of the students. Our results, although not significant, show a tendency that should be studied in a greater sample, in order to understand why present focused students spend more time in this GBL activity, when compared to their *balanced* and *future* counterparts. Although in previous studies time on task was related to the learners' performance and as the result of the students' self-regulation process, in the analysis of the use of MetaVals in the context of finance postgraduate education, the present oriented students showed a higher amount of time on task. That result could be understood under the analysis of enjoyment and immediate reward provided by the GBL experience (Bateman & Boon, 2006).

Time Perspective Measurement in educational contexts

One of our aims is to understand learners TP in our sample and to relate it to their feeling of time on task during the game through the qualitative interviews. This methodology seeks to help us understand how students perceive time in a GBL activity, and to measure if different TP orientations show different time perceptions during this learning task. We will now discuss the theoretical basis and previous research in this field.

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Time Perspective Measurement in educational contexts

In this section we briefly explain the existing instruments used to measure TP, both from a quantitative and a qualitative standpoint. We will discuss why we choose to use the Spanish ZTPI in our study, and how it has been validated in different samples (Díaz-Morales, 2006; Usart & Romero, 2014c). We also discuss our decision to introduce an exploratory, qualitative study on TP among some of the students in our sample. Lastly, we will explain Cluster analysis as the method to interpret the student TP profiles, and the extent it has been used previously in different research areas.

Quantitative Methods

In the study by Usart, Romero and Barbera (In press), a total amount of 13 different methodologies for measuring (F)TP were described in the references to the sample. According to the definitions having the highest number of quotes, the three instruments of the sample that were used by a higher number of authors were the following:

Table 2-2.
Instruments for measuring FTP in learning research

Instrument	Author/s	References using the instrument
Future Time Perspective Scale (FTPS): 25-item/ 27-item self-reported, 5-point Likert scale instrument	Shell & Husman (2001), based on Shell (1985) instrument, extended by Husman & Shell (2008)	8
Future Time Perspective Questionnaire: 48-item, self-reported 5-point Likert scale instrument	Peetsma 1992	5
Zimbardo Time Perspective Inventory, in particular the Future subscale(ZTPI): 12-item self reported, 5-point Likert scale instrument	Zimbardo & Boyd, 1999	9

After 1999, only Fourez (2009) built a methodology that did not take into account one of the previously quoted instruments.

We focus on the ZTPI given that it is the only instrument designed to measure the past, present and future TP in adults. Its operationalization, past, present, and future temporal frames are subdivided into five subscales or factors: present hedonism, present fatalism, past positivism, past negativism, and future Time Perspective. Nevertheless, researchers in the field of TP and higher education have specifically focused on two of these factors (Malka & Covington, 2005; Horstmanshof & Zimitat, 2007): present hedonism (PH) and future TP. PH is defined as seeking immediate pleasure, with little regard to risk or concern for consequences. Present hedonist orientation has been positively related in education, and to

procrastination, another temporal variable, which is studied in relation to academic outcomes among HE students' samples (e.g. Clariana, 2013). Furthermore, future oriented individuals are characterized by a delay of gratification, as results of the desire to achieve specific long-term goals. Relations to TP in general and to FTP in particular have also revealed a positive correlation between time invested studying and their orientation to the future (Peetsma, 2000; Peetsma & Van der Veen, 2011); The findings from these studies indicate a significant relation among students' FTP and learning performance, with the mediating effect of time invested in learning. That is, adolescent students with a higher FTP presented spent more time studying at home, and show a higher learning performance (measured in a final exam) than those who were less future-oriented.

Qualitative methods:

According to our research, only five researchers did not use self-report measurement instruments for TP; Teahan (1958) designed a methodology with a first exercise for students: he presented open sentences and asked students to self-rate them into past, present or future; secondly, he asked participants to write a story from the presentation of 3 Thematic Apperception Test (TAT) cards. Thirdly, a story completion technique was used; students wrote a story starting with a partially completed statement. Nuttin (1964) did not measure FTP directly; he measured the different effects of feedback (reward) on open and closed learning with his inventory of Motivational Goals, an instrument with 150 positive and 50 negative sentences that students had to rate. House (1973) complemented the use of a self-report questionnaire with the measures from performance expectancy. Before going into the learning task of solving anagrams, he measured the subjects' expected number of correctly solved anagrams at each of the testing times. Nurmi and Pulliainen (1991) interviewed students on goals, hopes and plans for the future. Finally, Edwards and Poston-Anderson (1996) were the only authors in the final sample that conducted a semi-structured interview to measure participants' FTP within the context of grounded theory qualitative analysis.

Recently, and not only focusing on the future factor of TP, some authors have used the focus groups methodology to understand adolescents and children TP from the qualitative standpoint (Mello et al., 2009; McKay et al., 2011). These authors set up

focus groups with 19 students during the last week of a summer academic program for talented adolescents in the US. A trained researcher was the moderator and a research assistant distributed material sand managed equipment such as recordings. Participants were told that the purpose was to find out how people their age think about time, and they were informed that the focus group would last one hour :

> *"The moderator led a discussion eliciting definitions of the past, then the present, and finally the future. Participants were provided with apiece of paper divided into three sections with the words past, present, and future written at the top of each section and were asked to write how they defined these words. The moderator then posed the following three questions: "How do you define the past? How do you define the present? How do you define the future?" Questions were posed sequentially such that a question was posed then a conversation ensued before the next question was discussed. Data included the short-answer responses and transcripts of the focus groups. Short-answer responses to defining the past, the present, and the future were entered into a document and organized by the temporal dimension."* (p. 543)

Results from the analysis of the focus group suggest several patterns in the conceptualization that adolescents' had about the past, present, and future, which included absolute and fluid definitions, relations among temporal dimensions, and affective qualities.

Finally Mello, Finan and Worrell (2013) presented the Adolescent Time Inventory (ATI) with the aim to build a valid and reliable instrument to confront the measurement of TP in adolescent and children samples. The final part of this test is an open-question inventory with the following questions:

- *"How do you define the past?*
- *How do you define the present?*
- *How do you define the future?*

However, this instrument is only being applied to adolescents and child samples. We believe that open questions on past, present and future among adult students could

also help to extract the cultural and individual difference context for the sample, complementing the use of a quantitative, standard inventory. As we will further explain in chapters 3 and 4, in our study we decide to implement a qualitative interview based on open questions on TP and GBL among students with the aim to triangulate information from quantitative data, particularly due to the fact that more information is needed to understand prior results on GBL performances among TP profiles.

2.5 SUMMARY AND IMPLICATIONS

Seeking to have a solid context from where to start to understand how to implement digital GBL tasks in online contexts, we first draw a map of the theoretical approaches upon which we base our study: constructivism, cognitive load theory, flow, ALT model and TP as a multidimensional, psychological, students' individual difference.

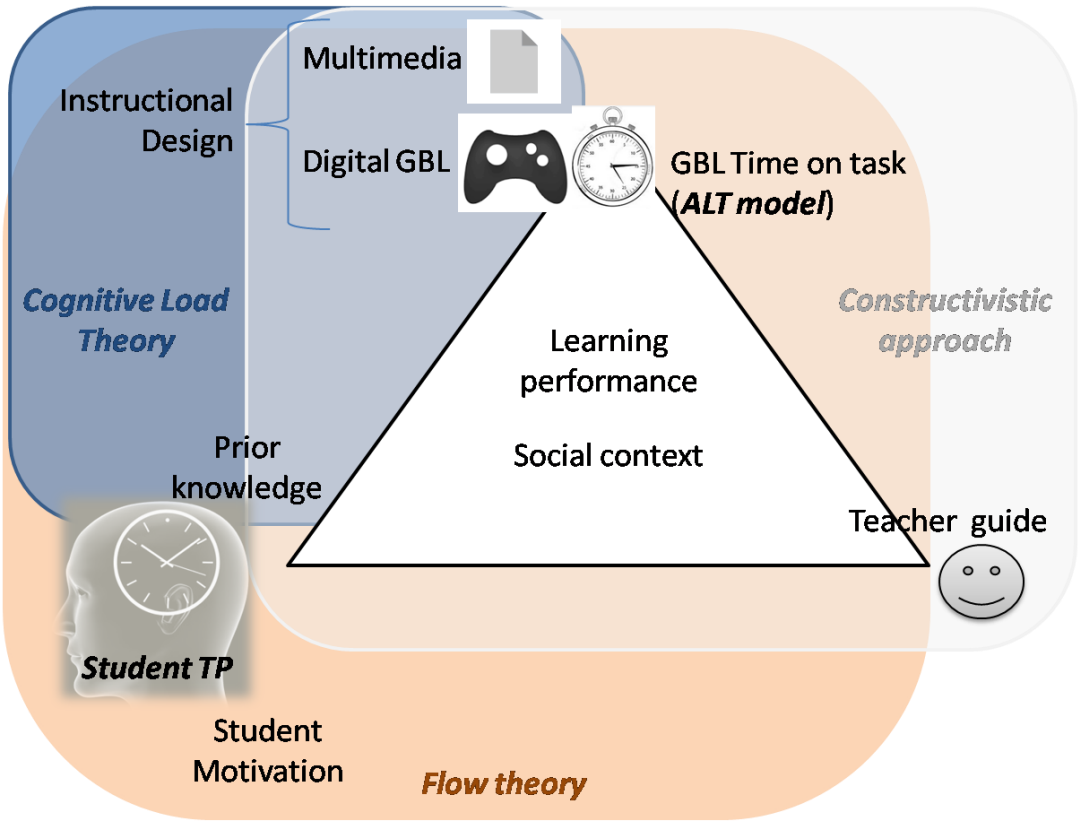

Figure 5.Diagram of the theoretical approaches.

We then proceeded to study the online learning contexts in higher education. We specifically focused on the Spanish context. Online university population is growing, and the last years, not only adult students but also freshmen with ages starting at 17 are choosing this online institution as their first option. These different student profiles have different learning styles but all need to have a work-life balance Romero (2011), that is, they should be able to manage study time in order to implement this activity in their life.

Analyzing these online, higher education contexts, we have seen the need for more practical methodologies other than case-based learning to meet the present and future needs of students' in 21st century skills such as time management, competition and collaboration.

After this section, we focused on GBL in general, and on digital GBL in particular, a methodology with a widespread use during the past decades, mostly in the management and business education areas. We have seen how, notwithstanding its great potential for helping students train in diverse competences and skills in reality-based environments, they lack pedagogical and psychological studies to make them efficient and allow their mass implementation as "active learning tasks" in online settings. Among other factors, we have seen game characteristics that might help finance and accounting students so they can practice their skills and contents, both demanded in higher education. This section will be focused on the next chapter, where we make a detailed explanation about the MetaVals digital GBL task used in our thesis.

We have also focused on two aspects of time related to learning: time on task and student TP. We have explained the ALT model as a framework to study the relationship between the time on task and performance in GBL, and have described through the existing literature why this issue should be further analyzed to help game designers conceive games that increase effective learning time (ELT) and reduce time allocated to activities that are not contributing towards the learning objectives. To analyze the qualitative aspect of learner's time, we focus on the intra-

psychological times in the following sections – with particular emphasis on the learner's Time Perspective.

Referring to the TP theory, we focus on this construct since theory relates learning performance to students' temporal orientation. That is, TP is an important psychological construct that has historically been related to learning. We have reviewed how previous studies relate future TP with higher performance in onsite settings, but our original idea was to study what happens in online and GBL contexts. Furthermore, we have seen that TP actually relates to learning performance in relation to time spent learning or time on task, and to the age of students. It is important to remark that the background of the students will also play a role that must be taken into account in learning performance.

This is the picture that describes our study and the framework where we will test a hybrid methodology that aims to take the voice of students into account without forgetting the important role of real time and scoring logs from a digital GBL activity and an entire accounting course.

Chapter 3: Methodological Framework

After introducing the theoretical framework in the previous chapter, this chapter aims to focus on the methodological framework. The chapter includes a detailed description of the educational context, research design, population and sample, instruments, data collection, quantitative and qualitative procedures and data analysis. Section 3.1 is an introduction to the rest of the chapter. Section 3.2. describes the educational setting that we choose to conduct the research: the UOC BBA case. Section 3.3 discusses the methodology used in the study, the stages by which the methodology was implemented, and the research design; section 3.4 details the participants in the study. Section 3.5 lists all the instruments used in the study, focusing on the Spanish ZTPI and the MetaVals game, and justifies their use. Section 3.6 outlines the procedure used and the timeline for completion of each stage of the study. Section 3.7 discusses how the data was analyzed. Finally, section 3.8 discusses the ethical considerations of the research and its problems and limitations.

3.1 INTRODUCTION

The objective of this thesis is twofold; the first purpose is to study the implementation of a GBL task in an online course, comparing its performance with a non-GBL task and to the whole course performance, and also measuring time on task on the GBL, in relation to performance. This first goal will be reached by performing a quantitative analysis of student performance in all the activities, and by performing correlation analysis and non-parametric analysis.

As well, time on task will be related to student TP profile. Other cofounding variables are age, gender and students' background (defined as prior knowledge, prior experience and ICT level). All these variables will be studied in order to understand the underlying relationships among variables. This will be conducted in the context of two accounting courses with the same syllabus and professor, in the BBA program for adult Spanish students in an online university: the Universitat Oberta de Catalunya (UOC). The methodology chosen to reach this first goal is based on two steps. The first one focused on conducting an exploratory factor analysis, and the study of the internal reliability of each TP factor studied with the

Cronbach alpha indicator, both for present and future frames, based on previous studies in different cultures with the ZTPI (Díaz-Morales, 2006; Usart & Romero, 2014c). After that, we provide a cluster analysis guided by the reviewed prior research conducted by different authors in the field of TP (Anagnostopoulos & Griva, 2012; Boniwell & Zimbardo, 2004; Boniwell et al., 2010), that is, we first analyzed the more reliable number of clusters through a hierarchical cluster analysis, and after that we conducted a k-means cluster analysis with the 3 clusters found.

Finally, we aim to investigate the role of student TP as a predictor of time on task and learning performance in a GBL task and in an asynchronous online learning course. We also take into account students' prior knowledge, ICT skills and experience (all three components of the background variable), as seen in chapter 2, these variables can be directly related to learning performance. Based on correlation analysis and non-parametric analysis following (Oyanadel et al., 2014), some of the TP factors were identified to be related to student age, background and performance.

3.2 THE EDUCATIONAL SETTING

This study took place in the Universitat Oberta de Catalunya (UOC) in the first semester of the 2013-14 academic year. The decision to focus on the UOC was primarily based on the fact that it was created as the first distance university of a new generation, which subsequently was known as online university (Tiffin & Rajasingham, 2003), having a clear mission to bring knowledge to all kind of students, and making thus feasible a more equitable distribution of knowledge in line with the UNESCO declarations, and the declaration of human rights (Duart, Salomón & Lara, 2012). In the Spanish context, the UOC has positioned itself as an innovative and pioneering university in the use of new technologies applied to learning, this may also concern GBL methodologies. Following Sangrá (2002), the real innovation of the UOC is that it was "designed to be an exemplar of a new generation of distance education providers capable of creating cooperative interaction not only between students and professors, students and learning materials, but also among students themselves."(p. 1).

Furthermore, we implemented the GBL task on two courses, the first one on basic accounting and the second one on financial accounting; all of them had the

same professor and 4 different online tutors[2]. However, the choice of these classes was made with the professor, after studying the contents and syllabus of each course (see Appendix E). Both courses focus on the understanding of assets and liabilities. To assure sample similarity for the different groups, we implemented the prior knowledge test and asked students to self-rate their prior knowledge and experience on assets and liabilities, as we will further discuss in chapter 4, section 4.1. There were a total of 4 groups with students from the BBA. A detailed description of the research design for this study is provided in the next section.

3.2.1 The UOC Case

Distance education in Spain was limited to adult radio and correspondence courses on basic contents from 1940s to 1970s (CEAC, 1996). Later the first distance university, the Universidad Nacional de Educación a Distancia (UNED), was set up in 1972 as a life-long learning model aiming to reach those students spread in the rural areas of Spain (García-Aretio, 1996). This first model of Spanish distance education was based on asynchronous methods, i.e., postal mail and TV programs. Finally, in 1995, the Catalan Online University (UOC) was created as the first fully online university in Spain (Sangrà, 2002). According to the author, one of most important decisions in the development of the UOC is the decision to start from scratch considering the requirements and opportunities of the distance education model. The faculty at UOC was hired considering the online learning competencies required for authoring and tutoring in online education. In other countries, the online universities had been created as an extension to the traditional face-to-face university (Sangrà, 2001); they then had to meet the challenge of transforming the traditional face-to-face model into online learning ones, according to Garrison and Kanuka (2004).

The UOC model pursued collaboration among all the actors involved in learning; although it was first focused on Catalan students, it rapidly spread to Spain and South American countries. In the wake of this new model, other universities, such as UNIR, the first European online university offering a grade in elementary education, are growing this innovation sector in Spain. In addition to these, in

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In the UOC model the counselor, personally welcomes, accompanies and guides students during their studies. The counsellor also helps students adapt to the University, creating a community and promoting and making the most of the UOC's resources.

secondary education, the Institut Obert de Catalunya (IOC), whose target population are adult students with a primary school degree, numbered over 23,000 students during the academic course (Generalitat de Catalunya, 2010).

Currently in Spain there is a growing number of students and an extension of the present profile of the online learner, that is, adults combining professional activity and learning. This new context is therefore not only focused on adult, life-long learning students, but also on younger students replacing onsite by distance education, and profiles that combine face-to-face learning activities with the performance of distance (including online) education programs. Students enrolled in undergraduate programs and aged under 30 are more than ⅓ of the students in the UOC, the largest Spanish online university with 52,000 students (UOC, 2015). The UOC offers 17 bachelor's degrees, one BBA in Catalan and one in Spanish. It also offers 35 master degrees, 3 doctoral programs, and 42 postgraduate programs. Currently there are 52,513 students and 58,094 graduates, with 324 faculty and research staff and 3,022 collaborating teaching staff, most of them "online counselors".

We therefore consider that the technologies used in learning institutions should be adapted to this new student population profile, in order to promote assurance of learning and overcome the lack of online learning quality certificates.

3.2.2 Learning business in online contexts: BBA in UOC

Bachelor in Business Administration (BBA) is an undergraduate program that is usually offered as part of the business and management education in most of the universities and business schools worldwide. In particular, online BBA programs represent nowadays a plausible alternative for those students who cannot or do not want to enroll in onsite BBA courses.

Grandzol, and Grandzol (2006) recently reviewed online business education, and demand pedagogical quality for these courses. In their study, focused on the US, they investigated a broad spectrum of institutional characteristics that relate to online courses and programs at accredited business schools. These included such factors as the number of students, faculty qualifications, tuition rates, and length of programs, among others. A sample of 163 business school deans indicated growth statistics consistent with the overall online program results presented earlier; 53% offered online business programs, 67% indicated retention/ expansion of online programs,

and 80 % represented public institutions, with new entrants to this market increasing. Although no explicit mention of GBL was made, the authors cite Swan's (2003) synthesis of undergraduate and online education set of organizing principles for online developers and instructors, which include setting clear goals and expectations for learners, Multiple representations of course content, frequent opportunities for active learning, frequent and constructive feedback and flexibility and choice in satisfying course objectives. As we will discuss in the next section, the implementation of GBL might cover most of these pedagogic principles.

Wresch, Arbaugh and Rebstock (2005) also reviewed international online management education courses. They measured the participation rates of students both from Europe and the US. Researchers observed the participation patterns and time of students' interaction in a case-study task. The results show online courses decline as the course progresses, because active participation through the duration of an online course requires extensive effort. The authors also related it to an increase in the class size, which could hamper student participation (Robai, 2002).

Contextualized in this international online learning context, UOC offers a BBA program as a part of the undergraduate education solutions to the demand of the actual context in Europe in general, and in Catalonia in particular. There is a need to maintain the culture, competitiveness, creativity and entrepreneurial spirit of its citizens (Duart, Salomón & Lara, 2012).

3.3 RESEARCH DESIGN

To develop this research, data were collected within a hybrid methodology proposed by Strijbos and Fischer (2007) who affirm that the appreciation and understanding of a methodology different from that central to our background leads to developing a merge of quantitative and qualitative research perspectives (Suthers, 2005) that may enrich the final result much more than the limited vision of pure qualitative or pure quantitative approaches. Creswell and Plano Clark (2007) state that the researcher "collects and analyzes quantitative and qualitative data on the same phenomenon" (p.64). The rationale for this approach is "…to obtain what is different through complementary data" used to "compare and contrast quantitative statistical results with qualitative findings" (p.62). In our study, quantitative data was first recovered using a quasi-experimental research design by implementing a pre-

test for identifying the features and variables involved, the logs from the GBL task, the scorings of the continuous assessment activities and the course grade; and the qualitative data was recovered from the recordings of the 5 interviews with students, according to the methodologies that are presently being used in the field of TP and learning (Mello & Worrell, 2014).

Several statistics techniques were used: Exploratory factor analysis, internal reliability analysis, Hierarchical and k-means Cluster analysis, Spearman Rho correlation analysis, and non-parametric correlation analysis to analyze and answer the research questions and hypotheses. To report the results we used numerical and graphical procedures, and tables and charts were used to present findings.

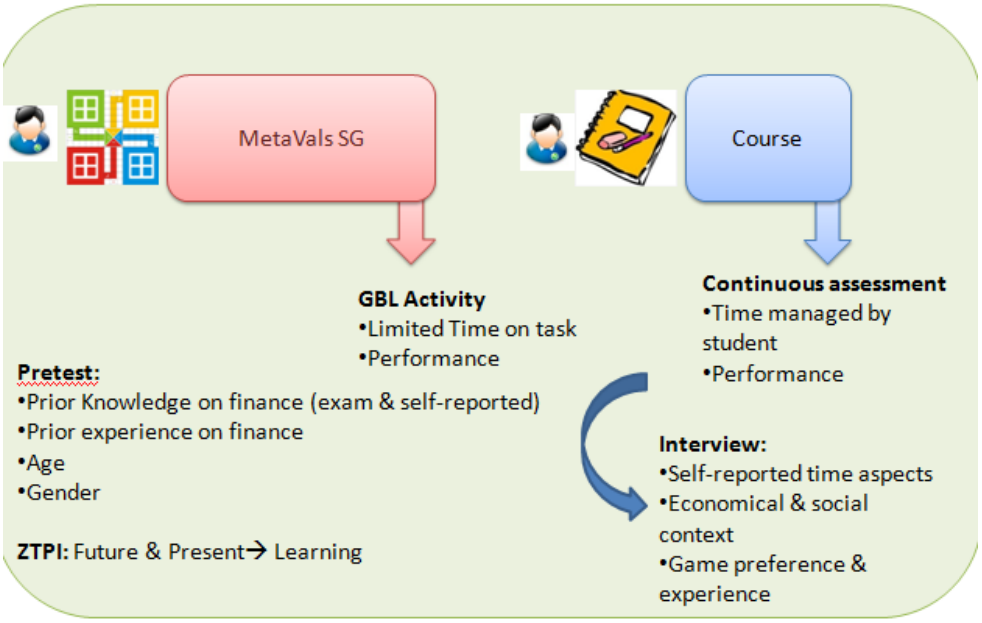

Figure 6. Research Design

3.4 SAMPLE

The selection of the sample was made on the basis of the exploratory nature of this case study, as a first step for studying how to implement GBL tasks in the UOC model, taking into account the students' TP. According to this objective, the sample was retrieved from the BBA students in UOC. Our sample was chosen for different goals. First, given our interest in the UOC model as the first and largest online university in Spain. Second, because of the need to understand how-to implement GBL tasks in online, business and higher education contexts. Since implementing the GBL task cannot be compulsory for students in the UOC model, after previous

research experiences with MetaVals (Romeo & Usart, 2013a; Usart & Romero, 2014b) had been studied, the pre-experimental design endorsed by Fife-Schaw (2012) was the logical option.

A total of 67 participants from a population of 232 students (from the 4 classes taking part in the study) participated in the GBL task and completed all the pre-test, questionnaire, ZTPI and course activities. All were online students at the Universitat Oberta de Catalunya (UOC). The sample population for the context was chosen according to the profile of online BBA students. The sample was taken from the third and fifth semesters taking into consideration the importance of having passed the "first year experience" in a new HE program discussed in the "Student retention in open and distance learning" symposium reported by Gibbs (2003).

The qualitative sample for this study was retrieved from all students who were willing to participat0e in the interviews. Students were notified by the researchers via email, and only 7 students answered the call. Out of all of the invited students, five participants finally completed the interview due to temporal and family constraints, 2 students could not proceed to the Skype meeting.

This study took place at the completely online learning university: the UOC. The UOC was created as the first completely online university of Spain in 1995 (Sangrà, 2002). The model started from scratch taking into account the requirements and opportunities created by the distance education model. The UOC temporal model is mostly asynchronous as it aims for a high level of flexibility for lifelong learning adult students, and pursues online collaboration among all the actors involved in learning. The target population is both mature students (older than 25) and younger students (from 17 years old) who have participated in online education recently.

The professor of the two basic accounting subjects was the person in charge of contacting learners and online counselors to enroll in MetaVals experience (see Appendix A: Request for learners).

The setting was selected due to the following reasons:

1) The representativeness of the university for online students in Spain.

2) The university continuous assessment methodology that allow us to implement a voluntary GBL task.

3) The researcher's accessibility to online learners and faculty members.

4) The researcher's familiarity with the structure and technologies of the institution's undergraduate online education programs.

The characteristics of the setting are the following:

The UOC is the only completely online university in Spain, founded in 1999 and located in Catalonia, Spain, as extensively discussed in the previous section (3.2).

The participants of the sample were selected using the following criteria: they had to be enrolled in subjects teaching assets and liabilities, with a first activity (PAC 1[3]) devoted to this part of the syllabus. These subjects had to be able to implement the MetaVals assets and liabilities version, and the students in the final sample chosen had to be willing to take part in the research.

- A sample of 232 learners from the university's population who were enrolled in the BBA degree was considered to be our population. Finally 68 students were involved in the entire quantitative process, and 5 learners also participated in the semi-structured interview.

3.5 INSTRUMENTS

Four different strategies for collecting information from participants were implemented: first, a pre-test for learners to find out the initial values of variables related to the demographics, student TP, prior knowledge, experience and performance of learners; second, the scoring and time logs from the MetaVals game, third, the performance for each continuous assessment activity (PAC) retrieved during the whole semester for all subjects studied; and fourth, data from the semi-structured interviews conducted via Skype, a remote video communication system, with 5 of the students in the sample.

The process followed in each of the strategies is described below.

A) Pre-Questionnaires:

[3] PAC: Learningactivity that students in UOC perform during the semester in order to complete the continuous assessment process.

a) The Pre-test on finance was designed together with an expert accounting and finance professor from ESADE (see Massons et al. 2011 for further explanation). This instrument with 3 multiple-choice questions and a final top scoring of 5 points allowed researchers to have an objective scoring of the prior level of adult students on assets and liabilities (it can be accessed in the Appendix B). It was implemented to measure student prior knowledge on assets and liabilities on the contents of the first continuous assessment "PAC1" and the MetaVals task.

b) Demographic and background data were self-reported from students in the pre-test (see appendix C).

Variables for demographic data: The questions used to collect demographic data from participants, variables of age, gender, prior experience and knowledge on basic finance, and ICT competence were self-reported by students. The scale was organized in the following way. The learner variables Likert-type scale contained scales ranging from 1 to 10,, where 1 meaning "no skills at all" and 10 meaning "totally skilled". That is, before participants start playing MetaVals, they are asked to fill in self-declared statements on their background in the specific domains of accounting and ICT.

Table 3-1.
Description of pre-test Items

Section	Number of questions	Total Number of Survey Items or Categories
Evaluation on assets and liabilities	3	1
Demographic	6	1
Background (self-reported)	3	2
Total	12	4

The Spanish ZTPI (see appendix C) contains 56 items (Díaz-Morales, 2006), grouped into five theoretically independent factors corresponding to five time orientations. The original instrument contains 10 sentences describing past negative behavior, 10 measuring past positive behavior, 8 that operationalize the present fatalist orientation, 15 for present hedonism and, finally, 13 statements on future Time Perspective. Each statement must be rated using a 5-point Likert scale (1 = strongly disagree, and 5 = totally agree). The Spanish version used in our study was validated in 756 Spanish adults between 19 and 67 years of age, with the first 5 factors explaining a 33.82% of the variance, and factors presenting the following Cronbach Alpha results: α=0.80 for past negative, α=0.64 for past positive, α=0.70 for present hedonism, α=0.79 for present fatalism and α=0.74 for future. However, this instrument presented some different item scorings compared to the original ZTPI from the EEUU (Zimbardo & Boyd, 1999). With the aim of understanding these differences in a sample of Spanish higher education students, Usart and Romero (2014c) conducted a complete factor analysis with 316 students. CFA results show 45 items for 5 subscales that can be used in Spanish student samples. Due to the non significant relation between the past subscales of TP with learning variables, as previously explained in Chapter 2, we decided to focus only on the three present and future factors (PH, PF and FTP) to conduct a reliable EFA analysis with a sample of 67 students (Hair, Black, Babin & Anderson, 2010); this strategy has also been used in previous research by Nowack, Milfont and Van der Meer (2013), with reliable results in a small sample (N=41).

c) The final factor distribution and internal reliability for each subscale, focusing on the future and present temporal frames were as follow:

Table 3-2

Analysis of Spanish ZTPI present and future subscales

Factor	Items; *M* (*SD*), Cronbach α (Usart & Romero, 2014c)			Díaz-Morales (2006)
PH	7	.25 (.55)	α=.77	3.21(0.48) items: 10 (α=.79
FTP	9	3.77 (.41)	α=.64	3.83(0.41) items: 13 α=.74
PF	11	2.73(.62)	α=.79	2.80(0.46) items: 11 α=.64

Because one of the aims of our study is to analyze the factorial structure of the Spanish ZTPI in our sample and compare it to prior studies; the factor loadings and internal validity of the Spanish ZTPI were also studied and will be explained in the next chapters, concerning sample differences such as culture, economic context, age and academic background.

It is important to note that, in order to facilitate participation and data collection in the study, all the pre-test items were available only through the MetaVals URL. Students had to access metavals.eu; there they saw their name and could choose to personalize their avatar and self-report their prior experience and knowledge on finance and ICT. After that, MetaVals allowed them to fill in the pre-test survey, and only after that, they could start playing the GBL activity. Researchers implemented the pre-test using a *LimeSurvey* with all the complete instructions for filling in the pre-test and the ZTPI and connected this page to MetaVals before the study.

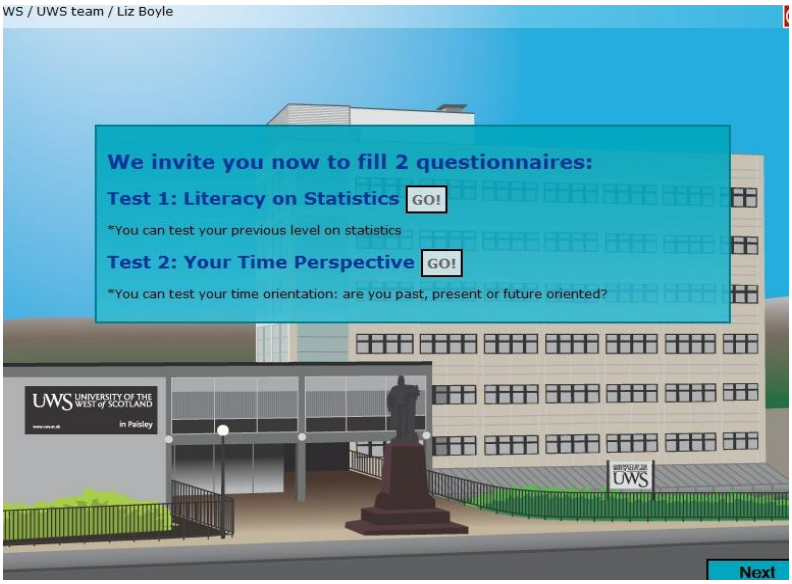

Figure 7. Screen for pre-test access in MetaVals game

B) MetaVals task:

In the context of the theoretical analysis of GBL in business education for online contexts, we now focus on the MetaVals game, a digital GBL that allows teachers to train different contents in online and onsite contexts, through a web-based, easy to use application aimed to train learners' skills and content in an active and motivational way which, due to its simple interface and design could help learners decrease their cognitive load, and, according to Kiili (2005), could help players reach an optimal rhythm (or tempo) of game play in digital GBLs and affect learning performance and intrinsic motivation.

MetaVals is a digital GBL tool that was created from a previously existing onsite classroom activity, used to practice basic finance concepts (Massons et al. 2011). Despite the pedagogical interest of the initial onsite activity, the classroom time limited the number of students who could actively participate in this learning task, and therefore it was difficult to incentivize discussion among peers in this context. A digital environment appeared as a solution that could allow students engaging in an unlimited number of interactions and help them to share and discuss their knowledge in dyads. This GBL activity was designed based on a first, paper-based version (Usart, Romero & Almirall, 2011) that leaded to an ICT-based version tested in different learning environments (see Usart & Romero, 2014a for a complete review). The present release of MetaVals is web-based, and can be considered as a

classification game, with a first individual phase where students have to classify 6 items into different categories, and two collaborative phases with 6 different items: the correction phase, where students can look at their peer's answers and correct them if necessary, and finally the discussion phase, where dyads have to reach consensus on the total answers of the 12 items presented in the previous phases. The collaboration element was implemented in these two latter phases, where students must cooperate with their peer to win the game against the rest of the class. To facilitate online interaction, MetaVals has a virtual dyad version that allows players to play and interact in an asynchronous context. Furthermore, in order to foster the engaging competition element (Romero et al., 2012); researchers decided to implement both a timer in each phase, and a classification dashboard in the final screen, where students could access their scores and compare them to the rest of the players. The sharing of prior knowledge and experience is also faced in MetaVals with the use of a pre-test on the content, and a first screen where players can self-declare their prior knowledge and experience (see figure 8).

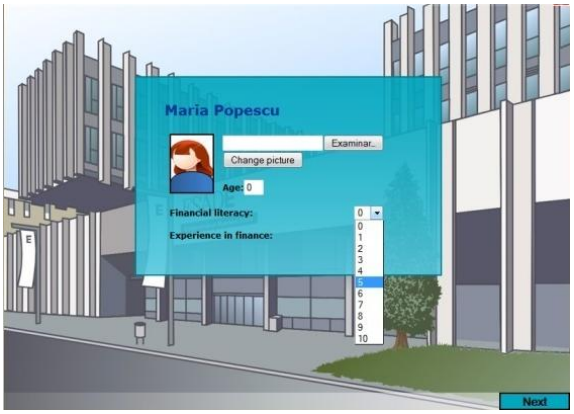

Figure 8.Screenshot of the MetaVals initial screen. *Timer* screen, *classification* screen

Another important aspect of MetaVals is the personalization of the game interface: it allows teachers and researchers to choose the language and wording of the game, the items to show, and the time-outs for each phase. These changes aim to adapt the tool to each particular learning context, and make it more realistic and focused on the objectives and real needs of skill development of the course. Students can choose their own avatar; this helps players feel identified with their character during the game and share significant information with their peers during the game, all resulting in higher engagement through intrinsic motivation, as seen in the previous section.

In the present study, we will measure online course results and GBL task scorings for an accounting course of students to compare both learning performances.

The present release of MetaVals is web-based, and can be considered as a classification or sorting computer-based SG, with a first individual phase where students have to classify 6 items into different categories, and two collaborative phases; the correction phase where players correct 6 different items previously answered by a virtual peer, and the collaborative phase, where dyads have to reach consensus on the final classification of the 12 total items. MetaVals performance (GBL performance) is the sum of performance in each phase (GBL P1, P2, P3 in Figure 9), that is, the sum of Individual performance, Correction performance and Collaboration performance. Time spent in MetaVals is also recorded in the database and cannot be higher than 5 minutes per phase (GBL time on task is therefore 15 minutes maximum).

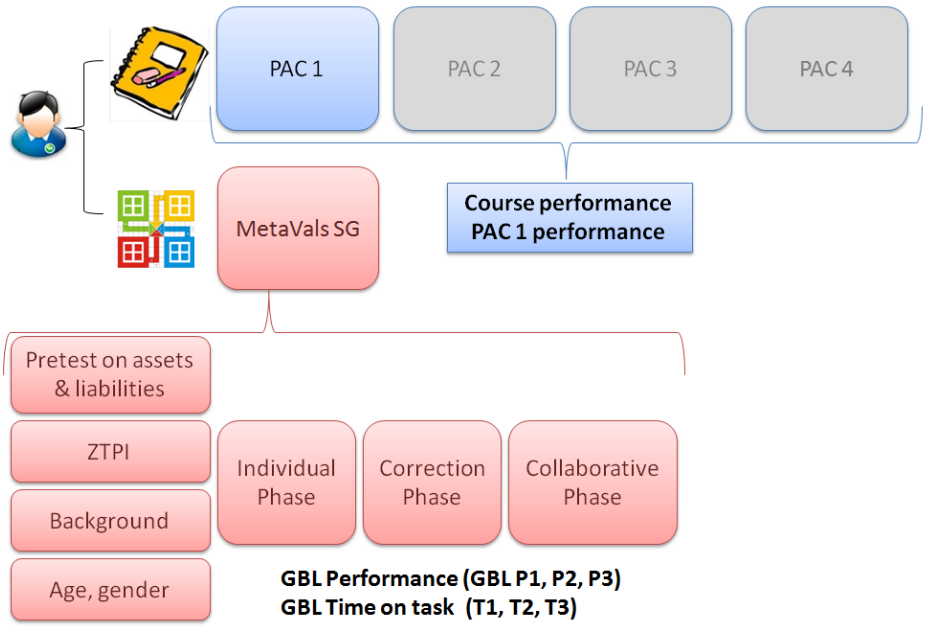

Figure 9 The MetaVals phases in the context of the course.

In order to facilitate the implementation of MetaVals in diverse learning contexts, we designed a virtual dyad version that allows players to play and interact in an asynchronous scenario like the UOC context. Furthermore, in order to foster the engaging competition element of games (Romero et al. 2012), researchers implemented a classification dashboard in the final screen, where students could see their scores and compare them to the rest of the dyads. Researchers designed the GBL task and its database, and therefore have access to all the players' logs. In particular, scorings and times for each phase were retrieved in order to study GBL performance and GBL time on task.

C) Course Performance:

Variables concerning course performance involve both the scoring of the first continuous assessment activity (PAC1) and the whole course grade. In the two subjects studied: "Introducció a les finances" and "Comptabilitat financera" student grades are posed by the online counselors some weeks after they send their tasks and revised by the professor. It is important to highlight that, albeit researchers had access to all the continuous assessment grades, we choose to focus on the first task because its contents are similar to those in the GBL task. The scoring of the semester is therefore the final grade in the subject, and we studied it as the GPA variable that is usually related to FTP students.

D) Interviews:

The qualitative analysis for this study came from interviews with a sample of five students. Participants answered to the informed assent and consent to participate in the interview before this started, and were recorded. Students were interviewed via Skype and were asked a variety of questions related to games, learning and temporal issues (see Appendix D). Interview length ranged from 32 to 92 minutes long. All student interviews were recorded using a digital voice recorder and were transcribed within a week to ensure the voice of each student.

The purpose of mixing quantitative and qualitative methods in this study was to gain an in-depth understanding of the students' motivation and prior experience on these GBL online learning contexts and also on the cultural aspects that may affect and shape TP (Beiser, 1987; Zimbardo & Boyd, 1999).

One objective of this study is to measure student Time Perspective (TP); and to do it from a more reliable standpoint, we triangulate results from the self-reported questionnaire with qualitative analysis of interviews (Edwards & Poston-Anderson, 1996). The research questions that guide these interviews and the specific questions that arise in Chapter 1 (questions 2 and 5) are:

• Which is the temporal profile of online, UOC students in BBA accounting courses, and to which extent is it related to age, culture, and economic context?

• What is the students' perception of the GBL methodology in general, and the MetaVals task in particular, in online contexts, in terms of learning, motivation and time perception?

The interview questions were developed with the study's purpose, goals, research questions, and the data provided from the Spanish ZTPI in mind. Also, established methods of question development from the qualitative methodology literature will be used to ensure validity and to aid the converging process (Bryman, 2008).

Table 3-3.3

Overview of the variables in our study and its level of control

	Variables	Control
Pre-test	Prior knowledge and experience (PKF, PEF) Objective knowledge on assets and liabilities ; ICT skills, demographics and TP (PH, PF, FTP)	High, quantitative
MetaVals	Game performance GP = (IP + CP + CLP / 3) Game time on task GP = ITot + CTot + CLTot	High, quasi-experimental
Course	Course performance First assessment activity (PAC 1) performance is also measured and discussed in the next Chapter.	Low, post-hoc
Interviews	Student preference for games, GBL MetaVals perception and TP self-reported.	Low, qualitative

3.6 PROCEDURE AND TIMELINE

The data collection was conducted from September 2013 to June 2014 in a sample of 67 learners. The researcher contacted online learners and course online counselors through the professor of accounting in the BBA online program. Learners were invited to participate in the study through the online counselors ‘message in the virtual classroom (see appendix A) and had two weeks to access MetaVals, taken from the end of the first continuous assessment activity and the start of the second activity. The average response time from the access of the pre-test to the end of the MetaVals game was about 30 minutes, and students spent less than 5 minutes per phase of the game, as we will discuss in the next chapter.

a) First, the professor was contacted and a phone meeting was conducted to schedule the different messages and mails with information for students and online counselors.

b) Second, the message to the online counselors was posted by the professor in the virtual classroom for online tutors, explaining the activity and giving them the message to send to the classroom the day after the first continuous assessment activity of the course finished.

c) The data collection (pre-test and MetaVals task) was conducted during two weeks, and a reminder email was sent to students at the end of the first week to maximize the number of students participating in the study. All the messages for students included the contact details of the research to answer any question or addressing any concerns that participants had about the study. At the end of the survey we sent the students the results of the ZTPI and asked them for an interview using Skype, five learners agreed and interviews were conducted during December 2013.

d) Finally, at the end of the semester (January 2014), the professor was contacted again to retrieve the data on student performance for all the continuous assessment activities (PAC) and the final grade of the course (AC^4 performance)

3.7 DATA ANALYSIS

With the abovementioned variables and using SPSS version 19.0, the following statistical analyses were performed:

a) A descriptive analysis of the sample was done: percentage of men and women, age ranges, prior knowledge and experience on finance, ICT skills, etc. (see Table 4.1and Table 4.2 in the next chapter).

b) A reliability analysis was conducted (see Tables 4.3, 4.6-4.8 in the next chapter) to see the internal consistency of the instruments. An exploratory factor analysis (principal components method) was conducted for the *background* construct (involving prior experience, knowledge and ICT), and also for the TP construct,

[4] AC: Academic Course or Continuous Evaluation performance

which was focused on the 3 theoretical factors of future, present hedonism and present fatalism. A Varimax rotation was used to relate the calculated factors to theoretical entities, on the premises that the factors are believed to be uncorrelated (orthogonal), according to the procedures of Zimbardo and Boyd (1999) and Díaz-Morales (2006). Internal reliability for each factor was studied using Cronbach Alpha, one of the more robust and widely used standards for measuring internal consistency (Carretero-Dios & Pérez, 2007).

c) With the aim to study participant TP profiles, and taking into account the exploratory nature of our study; we based ourselves on previous research (Osin et al., 2009), which indicated that the more intra-individual approach of cluster analysis might be more appropriate than the often used inter-individual operationalization of ZTPI-scores based on percentile cut-off point criteria (e.g., Drake et al., 2008). Moreover, due to the limited number of participants in our sample, the model used in previous studies focused on *balanced* TP (Drake et al., 2008)) was not a good choice. Therefore we choose to follow the procedure detailed in Boniwell et al. (2010). This methodology has been used in learning research by Ozcetin and Eren (2010) and, more recently, by Zhang, Howell and Stolarski (2012) to find TP profiles focusing on FTP. We performed a two-step cluster analysis based on the procedure conducted by these authors. First we conducted a Hierarchical cluster analysis using the Ward method and Squared Euclidean metric to analyze the optimal number of clusters; and then we used a k-means clustering with the resulting fixed number of group to determine the size and center of each cluster.

d) As a first step to study the possible relations among variables posed in the research questions and hypothesis, a Spearman Rho correlation analysis was carried out. The Likert-type scale used to measure variables in this study can be considered as ordinal scales, they have a rank order although the distances between answer alternatives cannot be equal, thus the proper statistics to perform is a non-parametric test such as Spearman Rho correlation (Field, 2013; Jamieson 2004).

e) Due to the limited size and the non-normal distribution of data in the clusters, non-parametric tests were conducted to verify the existence of significant differences between TP factors and the different related variables, as was done in previous TP studies that focused on the Spanish ZTPI such as Oyanadel et al. (2014). According to these authors, and according to the non-normal distribution of our data,

we ran a Kruskal-Wallis for variables divided into two groups such as age and gender; and a Mann-Whitney test for variables grouped in three groups such as TP factors in relation to performance and time on task. The probability of $p<0.05$ was used as a level of significance in all analysis of the exact results of the tests.

f) Lastly, the thematic analysis was used to study the qualitative data from the interviews. Glesne (2006) describes this as "…a process that involves coding and then segregating the data by codes into data clumps for further analysis and description" (p. 147). Pursuant to the guidelines by Marshall and Rossman (2006), the researcher organized the data, immersed in the data, and developed categories and themes, coded the data, interpreted data, and searched for alternative understandings (p. 156). Student interviews were analyzed using Marshall and Rossman's (2006) guidelines for qualitative thematic analysis. After all the audio recordings had been transcribed, the transcriptions were organized, first into two main themes (based on the questions of the interview): 1) Time and Culture 2) Games and learning, and each theme was further analyzed until 5 and 4 sub-themes emerged: a1.)Self-reflection on TP, b1) Past decisions to engage in online learning c1) Present behavior, feelings and motivation for learning online d1) Future context and usefulness of online learning e1) Work-life Balance issues and a2) Performance and learning b2) Motivation and engagement c2) Temporal perception d2) Social aspects.

The interviews that were recorded (Skype interviews) were transcribed word-for-word by the researcher. After that, there was a process of reading and re-reading the interview transcripts and listening to the original audio files to clarify transcriptions. During this process, the researcher compared student responses to become familiar with the data, and linked the emerging categories to prior research in the field. Each transcript was further analyzed according to thematic coding around categories corresponding to the research questions. The data analysis process started with the coding process, that is, with the identification of recurring words and ideas, which were then marked as possible themes. This late step helped in naming the complete system of categories.

Resulting from the immersion process, different patterns and themes emerged that were similar and contrasting across the interviews. Data was then coded

consistently throughout all transcripts using an Excel file with key words and highlighting.

The emerging themes were interpreted in such a way as to address specific research questions of this study. a1) *Self-reflection on TP* b1) *past decisions to engage in online learning* c1) *Present behavior, feelings and motivation for learning online* d1) *Future context and usefulness of online learning* and e1) *Work-life Balance* issue related to time was interpreted to address research question 3: "Which is the temporal profile of online, UOC students in BBA accounting courses? And to which extent is it related to background, culture, and economic context?" and a2) Performance and learning b2) Motivation and engagement c2) Temporal perception and d2) Social aspects to study research question 2: "What is the students' perception of the GBL methodology in general, and the MetaVals task in particular, in online contexts, in terms of learning, motivation and time perception". In addition, critical analysis was used to interpret alternative meanings from the emerging themes. These were used to provide other plausible explanations and assertions for future research.

The information obtained from the participants was considered significant to answer the objectives proposed in this part of the thesis, to complete the quantitative data analysis and to give students' subjective feelings a voice in the research process. This, which has scarcely been done previously, might be a key aspect to help us understand the relation between the factors of the ZTPI, the culture and the social context of the students, as we will discuss later. It is important to note that current studies on TP such as those conducted by Mello and Worrell (2006), are also categorizing the answers to TP questions in interviews with students, and although these authors are working with the TAT instrument (an adaptation of the ZTPI for adolescent students), the educational background and theoretical framework are similar to the ones explained in this thesis.

3.8 ETHICAL CONSIDERATIONS

According to the Guidelines for Ethical Practices in Research from the Open University of Catalonia (UOC), this study was done observing the ethical considerations detailed below:

a) All participants were informed of the study and its purpose. They were guaranteed confidentiality in recruitment, and aconsent letter with a complete explanation for learners (see Appendix B) and instructors (see Appendix A) was sent with the first and second questionnaire.

b) All records, identification codes and data will be held indefinitely and in confidentiality.

c) An alphanumeric identifier was assigned to participants to guarantee the confidentiality and anonymity of the subjects.

d) The research design did not involve any experimental treatment of the participants, either physically or mentally.

Chapter 4: Results

The first purpose of this study was to explore online student learning experiences and outcomes, comparing performance in a digital GBL task and performance in one activity and during the entire semester of the online accounting course in the BBA grade in UOC. The second aim was to study the learners' TP profile (comparing it first to Spanish population results) and to measure if these TP profiles were significantly related to sample (age, gender) and learning variables (background, performance, time on task).

Qualitative and quantitative data sources were collected as based on the triangulation convergence model; that is, a type of design that, through convergence or corroboration, seeks to enhance validity or credibility of results (Creswell & Plano-Clark, 2007). Quantitative data was provided by the results of the pre-test and ZTPI instruments, and by logs of the MetaVals game and course performance provided by the professor at the end of the semester. Qualitative data was collected through interviews with 5 students.

Results are presented in the following order: Section 4.1 shows the demographic data of the students. This section also presents the descriptive analysis of the pre-test results (analysis of means and standard deviations) and results of time on task for the MetaVals task, the performance for the first assessment activity of the MetaVals task, and the results for the entire course. Section 4.2 focuses on the description of the Measures (Scales) and the reliability of the instruments used in our study: background and Spanish ZTPI. In section 4.3, there is a detail of the cluster analysis procedure and of its results, explaining the three student groups found in our sample. Section 4.4 presents the correlations between the variables of the study, first focusing on the learning and sample variables, then looking at their relation to student TP, and finally focusing on the variables of time and performance of the MetaVals phases. Section 4.5 presents the results of the non-parametric tests conducted to study the hypotheses on the relationship between GLB and course performance (4.5.1); and also to measure if student TP is a predictor of background, performance and time on task (4.5.2). In the last part of this section, we show results on the age (and gender) variables as predictors of student TP (4.5.3).

Finally, in Section 4.6, and after analyzing the interviews, we present a qualitative discussion about the learners' self-report TP and context (4.6.1) and also focus on motivational, temporal and social aspects of games (4.6.2.1), Serious games and online

learning in general (4.6.2.2), and finally, we take a closer look at the particular case of the MetaVals (the digital GBL task in 4.6.2.3). All this qualitative analysis themes will be related to the 3 student clusters found in section 4.3, to allow a meaningful discussion on research questions 2 and 3.

All the results are reported with three significant digits, and, according to chapter 3, alpha is set to the standard level: $\alpha = .05$.

4.1 DEMOGRAPHICS

The characteristics of the students in our sample have to be identified in order to know which of them are significant for this study.

Since students provided demographic data in the pre-test and the UOC provided the requested performance course data, the differences between gender and age of those enrolled in the GBL task and who were completing the online course (n = 67) were analyzed. Results are presented in the following order: Analysis of the study sample profile, variables of age, gender, the subject they are enrolled in, prior knowledge and experience in finance and ICT skills, and characteristics of their performance and time on task in the course and in the GBL task.

We will make an analysis of these results aiming to identify the likely significant relationships concerning the research questions and hypothesis.

For the qualitative study, data was taken from the interviews conducted by the researcher via Skype, with five students who voluntarily accepted to participate in this part of the study. All of them had completed all the tests, the MetaVals task, and the course continuous evaluation activities.

4.1.1 Learners Demographic Profile

According to the variables related to TP and learning, the learners' demographic profile is described in terms of gender, age, prior knowledge on finance and ICT skills as outlined in chapter Table 4.1 shows demographic distributions for gender, age, prior knowledge on assets and liabilities, and ICT skills for learners. There were more female (52.25%) participants than male (47.75%); this is consistent with t data of learners in the courses at UOC and to other studies conducted in online contexts. The average age of participants is M=34.66 (SD=8.23).

Age ranges were set according to studies by Diaz-Moreno (2006) and Oyanadel et al. (2014) on Spanish ZTPI population studies. The age ranges were 18-29, 30-49, and 50-70. As can be seen in table 1, the vast majority of the students in our study fall into the second category, and only 4.5% of the participants are older than 50, as it is expected for HE students (see discussion chapter).

Table 4-1

Student demographic profile

Demographic	Participants	%
Gender:		
Female	35	52.25
Male	32	47.75
Age:		
18-29	23	34.33
30-49	41	61.19
50-70	3	4.48
Pre-test on finance		
Low performers (0,1)	7	10.45
Average performers (2,4)	57	85.07
High performers (5)	3	4.48
ICT skills		
Not skilled (0-3)	6	8.95

Skilled (4-8)	55	82.10
Expert (9-10)	6	8.95

Students participating in the study were classified as high, average and low pre-test performers after analyzing the histogram of scorings:

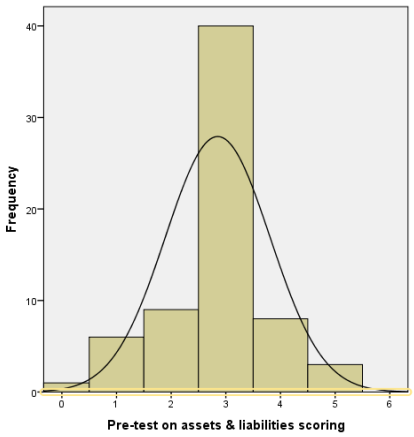

Figure 10. Histogram of pre-test scorings

From the results it can be seen that low scorings range (0, 1); average performers between (2, 4) and high performers (5). Results show that the majority of students can be considered as average in prior knowledge on assets and liabilities, and therefore, we can expect that this variable is not confounding our performance results. In Section 4.2 we will discuss the self-reported scorings of student prior knowledge and learning performance, and in section 4.4 we will show the results of correlations among self-reported and pre-test scorings.

Finally, ICT skills was also studied in order to divide students into *non-skilled*, *skilled*, and *experts*. Similar to pre-test results, ICT skills values are average for students in our sample, and less than 17% of the participants are below or higher than the average scoring. That is, we can consider that our sample is ICT Skilled.

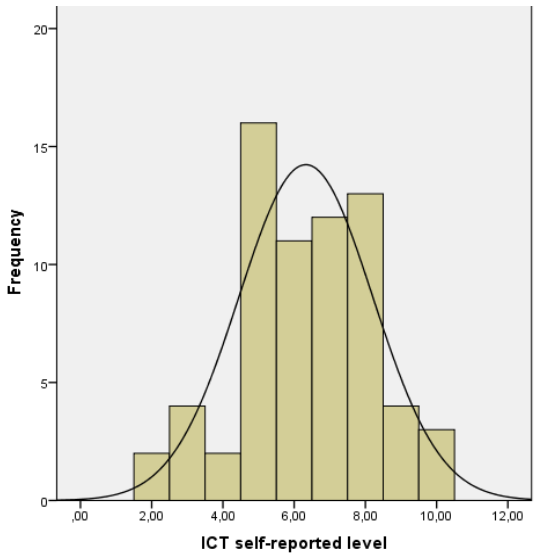

Figure 11. Histogram of ICT skill self-reported results in our sample

4.2 CONSTRUCT VALIDITY AND INTERNAL RELIABILITY OF THE INSTRUMENTS

In this section we analyze the components of the constructs background and TP according to the instruments used. The first instrument, as it represents one unique dimension (background), will be studied with Principal Component Analysis (PCA) and Cronbach Alpha in order to measure both construct and internal reliability. For the second construct, TP, an Exploratory Factor Analysis (EFA) with a Varimax rotation will allow us to study the items that compose each factor.

4.2.1 Background

As discussed in Chapter 3, in order to assess student (self-reported) background on finance, an ad-hoc Likert scale was built. Students rated their prior knowledge, their experience in the field (finance or accounting) and ICT skills level. The scale covered levels from 0 (*not experienced / skilled*) to 10 (*expert / proficient*). Principal components analysis (PCA) showed an acceptable one-factor structure (KMO=0.617; significant Bartlett's test, p=0.000) with factor loadings as follows: PKF=.923 PEF=.919 and ICT=.335 and a 60.33% of total variance explained.

Table 4-2

Statistics for each item of the background construct

	M	SD	N	Range

PKF	3.88	2.73	67	0-10
PEF	3.10	2.77	67	0-10
ICT	6.33	1.88	67	0-10

PKF: Prior Knowledge in finance; PEF: prior experience in finance.

The reliability analysis of the factor showed good internal consistency when discarding the ICT skills item. Cronbach Alpha without this item rises to $\alpha = 0.86$. Since this item does not have a significant correlation with the other two items (see table 4.3), and also weighted low in the correlation matrix, we decided to leave the background construct with two items: Prior experience (PEF) and prior knowledge in finance (PKF). In the next sections we will study the correlation of this construct with pre-test results and with student TP.

Table 4-3

Scale-element statistics for each item of the Background factor

Item	*M*	*SD*	r_{ij}	Multiple square correlation	α(if element neglected)
PKF	9.43	3.56	.67	.57	.23
PEF	10.21	3.54	.66	.57	.25
ICT	6.99	5.16	.16	.03	.86

4.2.2 Spanish ZTPI

The factorial structure of the Spanish ZTPI in our sample was analyzed taking into account only the present and future scales, although the participants took the complete test. This decision, as explained in Chapters 2 and 3, is due to the fact that only these temporal frames have shown a relation to academic performance and gambling attitudes; and also because the size of our sample and the exploratory nature of the study do not allow us to perform a complete analysis of the 56-item original structure. However, please remember that the complete analysis of this instrument among a sample of higher education Spanish students is accessible in Romero and Usart (2014).

Since the 3 factor structure for present hedonism (PH), present fatalism (PF) and future (FTP) frames has been studied in diverse Spanish samples, and also by the authors of this thesis, we performed an exploratory factor analysis with the items that had been confirmed as part of each of these 3 scales in prior research; according to the CFA results of Usart & Romero (2014c), a total of 29 items were analyzed. The principal components analysis (PCA)

showed an acceptable three-factor structure (KMO=0.600) and a significant Bartlett's test, p=0.000). It also shows a consistent three-factor structure accounting for 41% of the variance.

According to Brown (2009), we first conducted a *direct oblimin* rotation to confirm that correlations were not driven by the data by looking at the factor correlation matrix for correlations (see table 4.4). These correlations did not exceed .32 in any case.

Table 4-4

Correlation Matrix for the Three Factors in an EFA with Direct Oblimin Rotation for the Spanish ZTPI data

Factor	1	2	3
1	1.000	-.131	-.169
2	-.131	1.000	-.027
3	-.169	-.027	1.000

These values gave enough variance to warrant orthogonal rotation, therefore a Varimax rotation was conducted, giving factor loadings for the rotated matrix accessible in table 4.5. Following Hair et al. (2010), and due to the size of the sample, items with factor loadings lower than .600 should be out of our analysis. However, given that this study relies on prior research, we decided to keep the items with weights higher than .400 until we perform the analysis of the internal consistency for each scale.

Table 4-5

Rotated components matrix for the 3-factor Spanish ZTPI

	Component		
Item	FTP	PF	PH
40	**.777**	-.002	-.021
21	**.771**	-.195	-.064
30	**.667**	-.251	.141
45	**.666**	-.110	.060
13	**.636**	-.008	-.039

18	**.626**	.183	-.083
56	**-.504**	.282	.152
9	**-.550**	-.397	.183
43	**.415**	-.068	.148
10	**.410**	-.079	.247
38	-.068	**.743**	.042
37	-.241	**.645**	.098
3	.103	**.627**	-.088
23	-.138	**.601**	.158
39	-.175	**.581**	.084
44	-.184	**.565**	.464
53	-.130	**.513**	.077
19	.247	**.487**	.154
8	-.147	**.486**	.099
24	-.382	**.443**	.101
15	.055	**.338**	-.003
14	.103	.166	.161
31	.059	.070	**.837**
26	.170	.064	**.751**
42	-.060	.188	**.696**
48	.019	.016	**.627**
46	-.126	.409	**.535**

35	.351	-.216	**.481**
32	-.163	.163	**.447**

After discarding items 14 and 15 due to their low weight in all the factors (< .400), the study of internal reliability for each factor was again conducted via a Cronbach Alpha analysis; with the following results for PF, FTP and PH.

Focusing on the PF factor, we conducted the same analysis that was reported in table 4.6, and results show a good internal reliability for this factor (α= .80; *n*=10 items). Discarding any of the items would result in a decrease of the consistency, however, we must remember that α increases with the number of items (Hair et al. 2010); furthermore, after a low EFA weight of item 8, we admit that discarding this item, which originally did not belong to this scale(as we will further discuss in the next chapter) results in a minor loss of α, and therefore we choose to eliminate it and have a final PF structure of 9 items.

Table 4-6

*Averages (*M*), standard deviations (*SD*), correlations and alpha values for eliminated items in PF factor*

Item	*M*	*SD*	r_{ij}	α
3	2.72	1.69	.47	.76
8	**2.69**	**1.72**	**.35**	**.77**
19	**2.63**	**1.75**	**.31**	**.77**
23	2.72	1.72	.52	.75
24	2.74	1.74	.41	.76
37	2.69	1.66	.58	.75
38	2.76	1.66	.62	.74
39	2.77	1.69	.51	.75
44	2.67	1.68	.56	.75

53	2.75	1.73	.39	.77

Concerning the FTP factor, it can be observed in table 4.7 that, when discarding item 9, α increases dramatically from an unacceptable level (α = 0.43) to an acceptable value (α>.600); therefore, we decide to eliminate it and leave the future sub-scale with n=9 items.

Table 4-7

*Averages (*M*), standard deviations (*SD*), correlations and alpha values for eliminated items in FTP factor*

Item	*M*	*SD*	r_{ij}	α
9	3.39	1.19	-.38	**.64**
10	3.19	1.00	.34	.35
13	3.22	1.01	.22	.39
18	3.17	1.01	.36	.35
21	3.19	0.96	.59	.28
30	3.19	0.98	.61	.29
40	3.20	0.98	.49	.31
43	3.23	0.95	.23	.38
45	3.23	0.95	.42	.31
56	3.37	1.18	-.40	.58

r_{ij}= correlation total-item; α = Cronbach Alpha if the item is neglected.

Finally, focusing on the PH factor, the internal reliability analysis (see table 4.8) reported good results for this factor (α=.77; *n*=7 items). Discarding any of the items would result in a decrease of the consistency, and we decided to keep a PH factor structure of 7 items.

Table 4-8

*Averages (*M*), standard deviations (*SD*), correlations and alpha values for eliminated items in PH factor*

Item	*M*	*SD*	*rij*	α
26	2.73	1.27	.62	.71
31	2.79	1.24	.69	.69
32	2.82	1.32	.32	.77
35	2.65	1.39	.32	.77
42	2.84	1.24	.62	.70
46	2.81	1.30	.47	.74
48	2.79	1.33	.39	.75

The present and future scale items distribution is detailed in the next table and compared to the previous research after performing the exploratory factor analysis (EFA) and a study of the internal reliability for each factor.

Table 4-9

Final factorial structure for the 3-factors Spanish ZTPI in the UOC sample

Factor	Items (If different in Díaz-Morales, 2004; Zimbardo & Boyd; 1999; Usart & Romero, 2014c)			
PF (9 items)	03. Fate determines much in my life.			
	19. Ideally, I would live each day as fully as possible, one day at a time	PH	PH	PH
	23. I make decisions on the spur of the moment.	PF	PH	PF
	24. I take each day as it is rather than try to plan it out.	PF	PH	PF
	37. You can't really plan for the future because things change so much.			
	38. My life path is controlled by forces I cannot influence.			
	39. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.			
	44. I often follow my heart more than my head.	PF	PH	PF
	53. Often luck pays off better than hard work.			
FTP (9 items)	10. When I want to achieve something, I set goals and consider specific means for reaching those goals.			
	13. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play			
	18. It upsets me to be late for appointments.			
	21. I meet my obligations to friends and authorities on time.			
	30. Before making a decision, I weigh the costs against the benefits			

	40. I complete projects on time by making steady progress.			
	43. I make lists of things to do.			PF(-)
	45. I am able to resist temptations when I know there is work to be done.			
	56. There will always be time to catch up on my work.			
PH (7 items)	26. It is important to put excitement in my life.			
	31. Taking risks keeps my life from becoming boring.			
	32. It is more important for me to enjoy life's journey than focus only on the destination.			
	35. It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.	FT	FTP	FTP
	42. I take risks to put excitement in my life.			
	46. I find myself getting temptations when I know that there is work to be done.			
	48. I prefer friends who are spontaneous rather than predictable.			

Differences with prior studies are highlighted and will be discussed in Chapter 5, according to the students' sample profile, economical and social context.

To better understand these results, in Chapter 5, section 5.3, we compare them to previous studies with Spanish ZTPI from Romero and Usart (2014), and Díaz-Morales (2006); the first one with the aim to compare our results with higher education students in other contexts, and the second one to compare it to the Spanish population in general before the economic crisis (see Chapter 5, section 5.3 for a complete discussion).

4.3 CLUSTER ANALYSIS

The Hierarchical Cluster Analysis (HCA) Ward's method and Squared Euclidean metric was applied to standardized scores on three ZTPI sub-scales to identify the groups of individuals with similar TP patterns within our sample. We adopted the Boniwell et al. (2010) strategy when choosing the number of clusters: they increased the number of clusters as long as differences between clusters remained statistically significant and their magnitude could be interpreted; however, in our case, the FTP factor was always similar and not-significant ($F(2,67)=2.76$; $p=0.07$; $\eta^2=0.079$) among all the clusters, so we also based our decision on the visual method (see figure 12) that proposes a number of clusters equal to the number of cases (N=67) minus the number of cases with a similar distance (N=64). That is, the findings of the HCA revealed three cluster patterns for the TP variable (see table 4.10), which will be further discussed in Chapter 5, section 5.3.

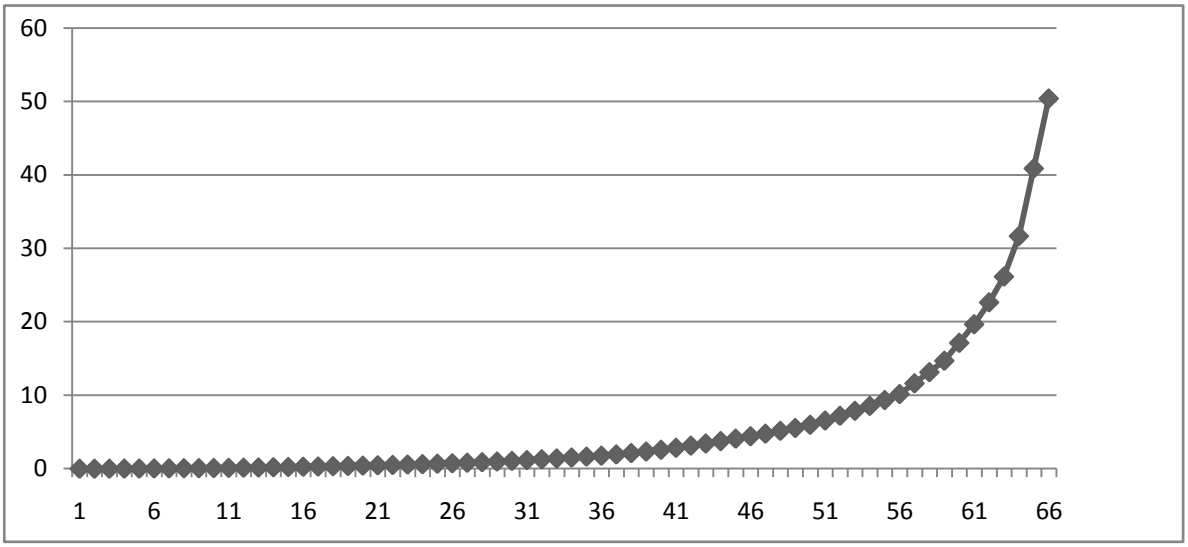

Figure 12. Sedimentation graphic for HCA in our sample (N=67)

The differences between the three clusters were tested using one-way ANOVA and were significant for PH and PF in all the clusters (see Table 4.10).

Table 4-10

Cluster centers regarding the PH, PF and FTP factors

	Cluster mean				
Scale	1	2	3	*F* (2,64)	η^2
PF	3.10	2.10	2.59	50.33**	0.611
FTP	3.86	3.81	3.58	2.76	0.079
PH	3.42	3.62	2.62	32.45**	0.503

Note: $^{**}p<0.001$; η^2 = sample size effect.

The first cluster (*n*=33; 49%) was characterized by high PF scores and high to moderate present hedonism; the FTP scores were in the average level as we have previously noted, and will further discuss in the next chapter. The name of this cluster could be *High fatalist and future*.

The second cluster (*n*=16; 24%) presented the lowest PF scoring, and the higher present hedonism, while FTP was also in the average. This cluster was labeled as *balanced*, and will be discussed in the next chapter.

The third cluster (n=18; 27%) was characterized by low scorings in all the temporal frames, however, this group scored significantly lower in PH. This group was labeled as *anti-hedonist* and, together with the names of the other clusters, will be discussed in Chapter 5, section 5.3.

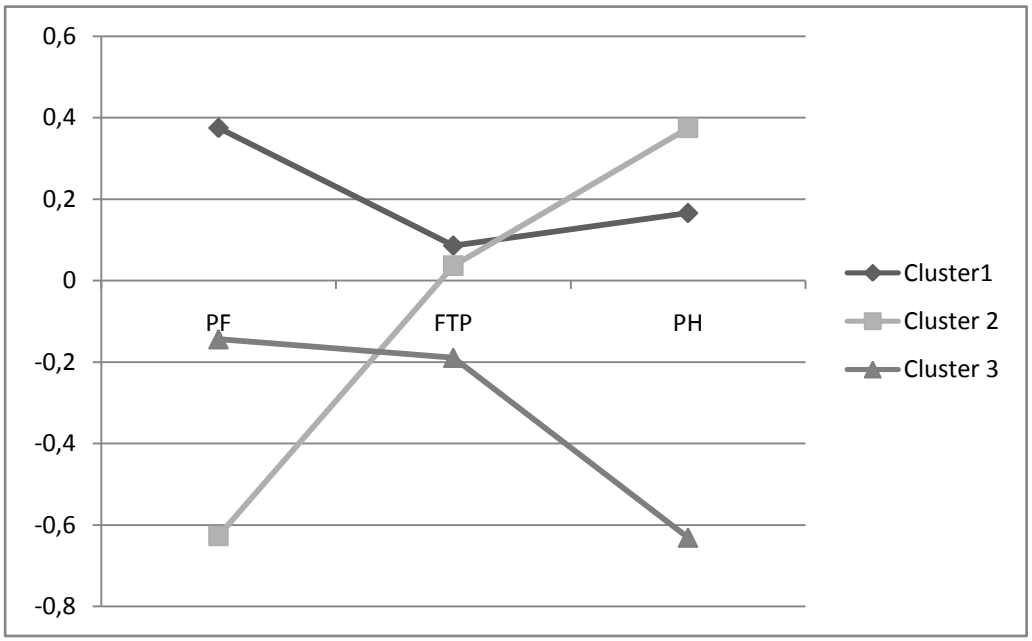

Figure 13. TP clusters after K-means cluster analysis in our sample (n=67)

4.4 CORRELATION ANALYSIS

To study the research questions posed in Chapter 1, we first have to study the correlations between our variables of study. We present the results of Spearman Rho divided into three tables; the first (table 4.11) relates the variables of study in general terms, without the TP factors. The second table focuses on the relation between TP factors and the other variables of study (table 4.12). Finally, table 4.13 focuses on the three MetaVals phases, specifically, how times relate to performances (individual, correction and collaboration), and

to student TP. We present the significant results to further discus the relationship between time on task, performance, and student TP in the GBL task.

Pre-test (on assets and liabilities) scoring was significantly correlated with background (r = .27, p <.05) and negatively correlated with age (r = -.28, p <.05). GBL time on task; that is, the time students spend in the MetaVals task is significantly related to performance in the task (r = .69, p < .01), and finally, PAC 1 performance is significantly correlated to performance in the entire course (r = .67, p < .01).

Table 4-11

Spearman Rho correlations between the learning variables (n=67)

Scale	*M*	*SD*	Range	1	2	3	4	5	6	7	8
1. Age	34.66	8.24	21-59	1							
2. Background	3.49	2.58	0-10	-.01	1						
3. Pre-test score	2.85	.96	0-5	-.28*	.27*	1					
4. ICT skill	6.33	1.88	0-10	-.01	.13	.07	1				
5. GBL Performance	4.26	2.86	0-5	.01	.20	.01	.09	1			
6. GBL Time on task	85.09	62.36	0-214	.07	.07	-.10	.09	.69**	1		
7. Course Performance	4.66	1.79	0-5	.02	.20	-.09	.15	.25	.17	1	
8. PAC1 Performance	4.51	1.67	0-5	.04	.19	.10	.05	.20	-.08	.67**	1

Note. *p< .05; **p< .01; N= 67

Focusing on the student TP factors, background is negatively and significantly correlated to present fatalism (r = .395, p <.001); that is, students with a higher score on PF show a lower background (prior knowledge and experience) on finance. On the same direction, pre-test on assets and liabilities also correlates negatively and significantly with present fatalism (r = .-.253, p < .05). Finally, course performance is significantly correlated to future orientation (r = .247, p < .05). Thus we measure a statistically significant relationship

between future orientation and learning performance in our sample. Furthermore, performances in the GBL task and in the PAC 1 are not significantly correlated to any of the TP factors, as we will further discuss in the next chapter.

Table 4-12

Spearman Rho correlations between the ZTPI and variables of study (N=67)

Scale	Present-Fatalistic	Future	Present-Hedonistic
Age	-.095	-.085	-.120
Background	-.395**	.039	.153
Pre-test score	-253*	-.136	.025
ICT skills	-.088	-.140	-.157
GBL Performance	-.015	.011	.061
GBL Tot	.035	.082	.058
Course Performance	-.008	.247*	.024
PAC 1 Performance	-.058	.028	-.105

Note. $*p < .05$; $**p < .001$; $N = 67$

Finally, we studied the data on the specific MetaVals activity. In table 4.13 we can observe that all the times and performances are positively and significantly correlated to each other; that is, students spending more time in the GBL task also perform higher, and students who perform low spend, in average, less time in the game phases. Concerning student TP, there is no significant relationship between performance and any of the students' present or past orientations (as predicted in hypothesis 1). As well, time on task for any of the phases is not correlated to student TP. These results will be further discussed in Chapter 5.

Table 4-13

Correlations between the MetaVals task variables and ZTPI in our sample

Scale	*M*	*SD*	1	2	3	4	5	6
T1	36.00	27.27	1					

T2	26.39	24.19	.702**	1				
T3	21.97	20.68	.636**	.752**	1			
Perf1	3.35	2.28	.659**	.667**	.538**	1		
Perf2	3.42	2.51	.653**	.642**	.708**	.673**	1	
Perf3	3.46	2.45	.641**	.702**	.701**	.785**	.737**	1
PF	2.73	.529	-.043	.022	.096	-.040	.018	.046
FTP	3.77	.416	.007	.006	.228	-.033	.044	.062
PH	3.25	.557	.092	-.025	.096	.011	.048	.067

*Note. *p< .05; **p< .001;N = 67*

4.5 NON-PARAMETRIC TESTS

4.5.1 Relationship between GBL performance and course performance

A one-sample Kolmogorov-Smirnov test failed to accept the null hypothesis that the data followed the normal distribution (D = .337, .258, .216 respectively for performance in the course, the PAC1 and the GBL task, N = 67 for each, and p = .000 for each). Therefore, non-parametric tests will be conducted.

First, focusing on GBL and course performance, we state the null hypothesis: performance in the course is equal to performance in the GBL task. After conducting a Wilcoxon t the level of α=0.05 of significance, there is enough evidence to conclude that the performances are different (p=0.002; we reject the null hypothesis; Z=-3.736; N=67)., that is, we accept that performance in the course is different than performance in the GBL task.

Concerning the PAC 1 performance, and guided by the correlation results, we studied whether it had a significant relation with course performance if the null hypothesis states that performance in the first continuous assessment activity (PAC 1) is equal to performance in the course. The Wilcoxon test shows that there is enough evidence to conclude that the performances are different (p=0.092; We accepted the null hypothesis; Z=-1.683; N=67). That is, we can affirm that, at a level of significance of α=0.05, student performance in the first

activity will predict the student´s performance in the course. However, this result will be further discussed in next chapter.

4.5.2 Student TP as a predictor of Pre-test scoring, Background, Performance and Time on task in the GBL, and performance in the course.

Pre-test on assets and liabilities and TP clusters:

In order to analyze the possible differences among clusters for the pre-test on assets and liabilities, a Kruskal-Wallis test with the three TP groups is conducted in SPSS. The first cluster with *high fatalist* students (*n* = 32), the second with *balanced* students (*n*= 16), and a third group with an *anhedonist* profile (*n* = 18). Results fail to show significant differences among clusters (χ^2 (2, n= 65) = 2.488,*p* = .288); however, balanced students show a higher average scoring than other two groups.

There is a significant difference ($\chi 2(2)=5.306$, *p*=.040) between the means of the balanced group and the other two clusters for the background variable. That is, students with a balanced TP show a higher academic and professional background on finance.

Focusing on the relationship between performance and TP clusters, Kruskal-Wallis test results fail to show significant differences among clusters for the GBL task (χ^2 (2, n= 65) = 0.581,*p*= .788); this also happens for Course Performance(χ^2 (2, n= 65) = 1.688,*p*= .430) and for the PAC 1 performance(χ^2 (2, *n*= 65) = 0.038,*p*= .981) . Finally, we focus on the relationship between time on task and TP clusters: results of the Kruskal-Wallis test fail to show significant differences among clusters for this variable (χ^2 (2, *n*= 65) = 0.318,*p*= .853). This means that students with different temporal profiles spend similar times in the GBL activity. However, present-fatalistic group spends in average more time than balanced and anhedonist students.

Table 4-14

Kruskall-Wallis results for the variables of study among the three clusters identified in our sample (N=67)

Variable	Cluster	*N*	Average Rank	Sig.	χ^2
Background	High Fatalist	33	30.05		
	Balanced	**16**	**43.47**	.040	5.306

	Anhedonist	18	32.83		
PRE	High Fatalist	33	31.56		
	Balanced	**16**	**39.78**	.288	2.488
	Anhedonist	18	33.33		
GBL Performance	High Fatalist	33	35.03		
	Balanced	16	35.19	.748	0.581
	Anhedonist	18	31.06		
Course Performance	High Fatalist	33	32.64		
	Balanced	**16**	**39.34**	.430	1.688
	Anhedonist	18	31.75		
PAC1 Performance	High Fatalist	33	33.61		
	Balanced	16	34.06	.981	0.038
	Anhedonist	18	34.67		
GBL Time on task	**High Fatalist**	**32**	**34.84**		
	Balanced	16	32.53	.853	0.318
	Anhedonist	18	31.97		

4.5.3 Student age and gender in relation to TP

An analysis on the relation between gender and TP factors was conducted using a Mann-Whitney test. The evaluated sample shows no significant differences for the present or future dimensions (see table 4.15)

Table 4-15

TP factors differences between gender in our sample

Gender	*N*	Average Rank	Rank sum	*U*	Sig

Present Fatalism	Men	32	30.81	986	458	.199
	Women	35	36.91	1292		
Future	Men	32	32.56	1042	514	.562
	Women	35	35.31	1236		
Present Hedonism	Men	32	34.94	1118	530	.705
	Women	35	33.14	1160		

Students in the sample were divided following the three age groups explained in section 4.1. In order to analyze the possible age differences, a Kruskal-Wallis test with the three age groups is conducted in SPSS. The first group with participants aged 18 to 29 years(n = 23), the second with students with ages between 30 - 49 years (n= 41), and a third group of participants older than 50 years (n = 3). Results show significant differences for the present hedonistic factor. The 50 and older age group show an orientation to present hedonism (χ^2 (2, n= 65) = 6.397,p = .004) higher than other age groups, and in particular when compared to the 30-49 years group.

Table 4-16

Kruskal-Wallis ranks for the 3 temporal frames and age groups

		N	Average Rank
Present Fatalism	18 - 29	23	33.89
	30-49	41	33.56
	50-70	3	40.83
Future	18 - 29	23	36.59
	30-49	41	33.11
	50-70	3	26.33
Present Hedonism	18 - 29	23	39.57

30-49	41	29.61
50-70	3	51.33*
Total	N=67	

Note. *$p < .05$; $N = 67$

4.6 QUALITATIVE RESULTS

Due to the exploratory character of this part of the study, participants were classified based on each of the TP groups emerging from the cluster analysis: as seen in table 4.17, the sample for this qualitative part was made of three *High fatalist* students (60%), one *balanced* student (20%), and one *anhedonist* student (20%). Students are all older than the average age of the sample, and 3 students (60%) are unemployed. It is interesting to remark that, although students participating in the interviews were volunteers, the final distribution is similar to the one shown for TP profiles in the entire sample.

Table 4-17

Demographic data of students taking part in the qualitative interviews

	Student 1	Student 2	Student 3	Student 4	Student 5
Gender	Male	Male	Female	Female	Male
Age	41	34	45	48	36
Cluster TP	1	1	3	1	2
Job	Unemployed	Salesman	Clerk	Unem.	Unem.
Interview time	40 min	53 min	42 min	93 min	32 min

Before focusing on each part of the interview to build a complete categories system for the qualitative analysis of the study, we present the quantitative results of answers for each question. According to De Wever and colleagues (2006), the *Unit of analysis division* was made focusing on the sentences, as our context is a synchronous interview — interaction is as

short as two sentences, or as long as a paragraph, showing different ideas. This is also in accordance with our research questions and hypothesis. Since we aim to study the student's point of view at different levels, we cannot assume that an answer, even a short one, covers only one category and it has to be split into sentences (Rourke et al. 2011). Students show a higher number of sentences in the last part of the interview, concerning the temporal and socio-economic questions. Also, the student with less sentences is the one in cluster 2 (n=90 sentences; TP: *balanced*) and the student with longer answers belongs to cluster 1 (TP: present oriented), with n=151 sentences.

Table 4-18

Answers to each interview question per student

Student	1	2	3	4	5	Total
Age and semesters studying in UOC	2	8	3	5	2	20
Previous experience with GBL?	3	4	11	2	1	21
Do you like games? Do you play them? Why?	20	18	9	9	15	71
Did you like MetaVals experience? Recommend?	24	9	3	13	6	55
Time spent in the task? And for each phase?	13	4	4	6	6	33
Which phase of the game did you prefer? Why?	6	3	4	1	2	16
Did you like playing alone, would you prefer peers?	4	1	8	1	2	16
Did you played for fun or as a learning activity?	9	1	6	5	2	23
What do you think about your TP?	1	37	26	33	15	112
What do you think about using games for learning? Do you think they help learn?	17	37	13	8	8	83
Questions on the present & future context	4	29	16	38	31	118

Total per student	103	151	103	121	90

We first build the system of the categories emerging from the analysis of all the students' answers in the different questions, and divided it into three main themes: 1) Games and Learning motivational and behavioral aspects 2) MetaVals and course performance 3) Student Time Perspective, 4) Time spent on MetaVals task 5) Cultural and economic context. This final part of the chapter is therefore divided into the categories concerning the research question 2 (4.6.1) and results related to the research question 5 (4.6.2). particularly:

The emerging themes of Student TP and Social aspects related to time were interpreted to address research question 2: "What is the students' perception of games for learning in general, and for the digital GBL MetaVals task in particular, in terms of learning, engagement, social aspects and temporal perception?"

Motivation and engagement for Games, SGs and learning tasks in general and MetaVals in particular, time spent in the MetaVals task, and performance in MetaVals and in the course were themes that were used to answer to the research question 5: "What is the students' perception of the GBL methodology in general, and the MetaVals task in particular, for online contexts, in terms of learning, motivation and time perception".

4.6.1 Time Perspective related to background, social and economic context

To study Research question 3, the students' answers on their own past, present and future were analyzed in the last part of the interview, together with their background, and their economic and social context in Spain, aspects that were also related by the interviewees.

Although our questions focused only on the past and future regarding their "present" as students in an online BBA course, participants tended to talk about their "long-distance" past, bringing memories from their childhood throughout the interview, and in particular when talking of games, as we will discuss in the next section. Different levels of individual-group identity were also related to temporal aspects; we decided to divide it according to the theoretical approach of Jones and Brown (2005) to cultural TP. Third, students gave an emotional, motivational or behavioral valence to their answers. According to Lens and Husman (2001) we classified sentences as *behavioral*, *motivational* or *cognitive* statements. Finally, an important aspect related to the students TP is the work-life balance aspect; as studied in Chapter 2, students can be future-oriented when learning but present-oriented at

home or in their leisure time (Peetsma, 2000); therefore, sentences in our interviews were also classified as being focused on learning, family, leisure or a job. In table 4.19 there are examples of sentences for each category.

After classifying each sentence within these four categories, we divided the answers in the five emerging themes, short sentences focused on the group or culture level of TP; students focused on their own TP. Furthermore, they also talked about the future consequences of their present investment on learning, and also compared it with past behaviors and motivations.

- Self-reflection on TP
- Past decisions to engage in online learning
- Present behaviour, feelings and motivation for learning online
- Future context and usefulness of online learning
- Work-life Balance

To obtain the data to answer research question 2 "What is the temporal profile of the online UOC students in BBA accounting courses, and to what extent is it related to their background, culture, and economic context? "we will now show the results of the answers given by the students answers to each of these themes and a summary table where the themes are linked to each temporal cluster.

Table 4-19 Categories and examples from the interviews for research question 2.

Category	Subcategories	Example
Temporal frame	Distant past	“When I was a child my parents did not have time to play with me” (S.1)
	Past	“Before starting BBA, I had lost steam in my job” (S.2)
	Present	“I don’t have time to play games because I am with exams now” (S.2)
	Future	“Even if I finish the BBA, I will never find a job in this country” (S.3)
Individual-collective level	Individual	“I prefer to focus on the present, future will come” (S.4)
	Group	“My friends told me I don’t think about the future” (S.2)
	Culture	“This country is not focused to future but always thinking short term” (S.5)
Valence	Behavioural	“I took the decision to quit studying and find a job” (S.3)
	Motivational	“Now I have to be satisfied with my present options” (S.3)
	Cognitive and metacognitive	“I like reflecting on the process and results of my exams” (S.2)
Life aspect	Education	“Managing to effectively study 8 hours a day is hard for me” (S.3)
	Family	“I like to spend time with my little son and my wife” (S.5)

Leisure	“Can you see all these boxes? These are table games, I love spending evenings playing” (S.1)
Job	“I hope that, when I finish my BBA, I will have a better position in my company” (S.4)

Self-reflection on TP

We can observe that the student's discourse is mostly devoted to talk about their present, but linked to their past decisions as well as to their expected future, relating it to their present investment on learning. First, when asked about their TP results, some of them did not understand the sense of the ZTPI, and S2 answered "I am very negative, and I saw myself as positive in the results, I don't understand it" (the interviewer explained it was not *positive* but *high* scorings in Present and Future temporal frames). S2 also admitted that "I think about future consequences and sometimes friends say that I leverage risks of present actions, well, that's true with money". S1 did not go into details about his TP; he said "I don't know, it is just a test". S4 talked about the need to think about the future: "Whatever I do I always think it will have consequences for the future, so I try to enjoy myself but I believe it is all linked". Finally, S3 admits she was not surprised with the ZTPI result because "I am absolutely null for time management, I hate time" (she was classified as *anhedonist*).

Future context and usefulness of online learning

Participants explained their feelings and acts for the past, present and future temporal frames based on their own experiences and expectancies around the BBA course; however, in general, they did not relate taking the BBA with concrete future positive changes. When asked "At present, to what extent do you think the future will be better after your BBA?" Present focused students were more positive, S2 responded by stating, "I will improve at work, maybe become a boss", and S4 answered: "Look, I have been working in the same place for 20 years, taking my BBA will be useful because I will do things at a higher level". While low temporal S3 commented, "It doesn't matter if I take my BBA, Spanish context is just so bad I will never find a job".

Present behaviour, feelings and motivation for learning online

When students were asked how their life and prospects had changed since they studied the BBA, all the students talked about their lack of time for other things other than studying, and they shared the feeling of lacking time to spend with their family, E.g. S4 admitted: "*Mmmmm*...rest! Now I never take a rest! I sleep 5 hours", nevertheless, this student said that "However, everything is OK as long as you are

motivated, is a personal sacrifice but you see results, right?": Students also admit that online learning is a temporal and personal motivating challenge; S5, stated: "When my baby sleeps I like to spend the evenings doing PACs".

Past decisions to enroll in online learning

Student responses to why they enrolled in the BBA program were also varied, S1, S2 and S4 (High and present TP) said that they did it for their future jobs, because they did not have higher education degrees. e.g. S4: "I was afraid because I had not studied since I was 15, but I enrolled in an English course and I enjoyed it, and I thought...let's do it!". On the other hand, S3 said: "My husband told me to enroll on the BBA because I had good grades on an informal online course, and I did". Most of the students tend to talk about their own temporal orientation, but also relate it with "what is expected" or compare it with *what people in this country do*. S2 explains his experience with a friend who "got a mortgage when things seemed to be OK, he told me I was not thinking on the future, I was a fool because I was renting, and now they are in a serious problem".

Work-life Balance (WLB)

Finally, life frames shown in the students discourse is mostly related to learning and to the WLB aspects that online students have to face daily. Students interviewed are all aware of the need to study for a future gain, although S3 admits that she is not good managing study time "Look, I start studying at a.m. and finish at p.m., and I admit that I only study 1 actually effective hour" while she engages on leisure activities: "I spend most of the time playing online games just to take a rest from the course" and S2 comments his lack of family life due to his involvement in his studies:

> "Maybe these weeks I shelved the familiar issues a bit more because I have a lot of assignments and exams, however I try to go out for a walk with our child, to do things with my wife, but we cannot do it often because she works weekends and I work weekdays".

Despite S2's present orientation, when focusing on learning and job aspects, he relates his past decisions to present and future consequences. When focusing on his hedonist decisions and looking at it in perspective, he appears motivationally

engaged with the future, but this happens after learning from the past hedonist behavior that has lead to a present lack of time for family due to his need to study:

> "Man, for example, when I decided not to study, well it involved a risk, because now, maybe that I am 34 years old, if I could be placed, I don't know, as a sales boss, then perhaps when I'm 40, 45 I can be placed in a management role can't I?

Table 4-20 Summary of the temporal and social perspective themes found during the student interviews.

Themes	Interviews
Self reflection on TP	HP: Think there is a need to think about the future, and see themselves as negative and don't like to risk with economic decisions.
	BTP: they are aware of having a *balanced* profile, they say they enjoy present and think about the future.
	AH: Not surprised with their scorings in the ZTPI, they relate their TP to bad time management.
Past decisions to engage in online learning	HP: Mostly talk about past for recalling what they could or should not do, but not negatively, they *learn the lessons*.
	BTP: good past memories, always focused on studies and learning.
	AH: Negative at a group level, believe that past acts as a group is now our grief. Individual decisions took by others.
Present behavior and motivation for learning online	HP: Present is good for them although they have to study a lot.
	BTP: Present could be better. Not happy with the present social context, but believe that working hard today at an individual level will lead to results no matter what the context is.
	AH: Negative feelings on present time management, high negativism and external locus of control.
Future context and usefulness of online learning	HP: Future is not a clear picture; they have good feelings for their own future plans.
	BTP: Future is positive, whatever the context of Spain will be, due to

	today personal efforts. AH: Worry about the future with a "no matter what I do, because the social and political context is bad" present fatalist discourse.
WLB issues	HP: See the need to study for future gain in their jobs, although they like to spend time with their family and friends. Don't report present or future related to leisure. BTP: Like to spend time with family although spending a lot of time studying and setting out job opportunities. AH: Bad *study time* management, like to engage in online games for *leisure time*. Not sure of the usefulness of BBA for future job due to the bad economical and political Spanish context.

Note: HP: *High fatalist*, cluster 1; BTP: *Balanced*, cluster 2; AH: *Anhedonist*, cluster 3.

4.6.2 Students experience with Games, Serious Games and MetaVals task

SGs and learning tasks in general and MetaVals in particular, time perceived in the MetaVals task, and performance in MetaVals and course were used to answer to the research question 5: "What is the students' perception of the GBL methodology in general, and the MetaVals task in particular, in online contexts, in terms of learning, motivation and time perception".

4.6.2.1. Games

Concerning this subject, students did not focus on learning or performance in games; they did not clearly link games to learning. However, S2 admits : "When playing videogames, your imaginary world develops more" and S4: "Games are good for kids, they learn by playing, don't they?"

Motivation and engagement

This is the subject that students talk about most during all the interviews: "Do you like games in general? Do you consider yourself a *gamer* (like *Wii*, etc.)? What are the reasons (what do you like / do not like about the game? S2 admits that "I don´t know why I like games, but I do". S1 explains that he likes games "Since I was a kid" and like S2, that "Yes, I consider myself a *gamer*". S3 admits she is "hanged"

on online games, and says: “I suppose that… to evade from reality…I play!”

Temporal perception

Although there is no concrete question on time and games, students report their feelings about time when playing. S2: “Time flies when playing in my PC”. S5, on the other hand, says: “I don’t have time to play videogames now, I had it when I was a child, but now there are more important and serious things to do”. Finally, S3 admits that “I spend a lot of time playing online games”.

Social aspects

One of the reasons why students admit they play video or table games is because they like the social part of it. In particular, S1 explains: “I like meeting friends that come to play table games”; and he reports bad memories from the past: “My parents did not have time to play with me, we ended up playing *Ludo*”. S3 admits that “I don’t like videogames... sincerely...but I like table games. With friends and so...I really like them”. S4 admits that “I like playing online games with other people, when we chat, you realize the majority are middle aged women... like me..*haha*”. Finally, S5 explains that he likes playing alone but “I often think about my future, playing... teaching my son how to play some *Wii* games...”.

Table 4-21

Summary of motivational and performance aspects of games found during the student interviews

Themes	Interviews
Motivation and engagement	HP: Games are fun, allow doing things you cannot do in real life, sensation seeking.
	BTP: Games are fun, but “serious” things are more important.
	LA: Hanged on games, to evade from reality.
Time perception	HP: Experiment flow when playing video and table games.
	BTP: Lack of time for playing: other important things to do.
	LA: Experiment flow when playing online.

Social aspects	HP: (table) games are a good space to meet friends and family.
	BTP: Used to play alone, would like to play with my kids in the future.
	LA: Plays with other people online in MMORPG.

Note: HP: *High fatalist*, cluster 1; BTP: *Balanced*, cluster 2; LA: *Anhedonist*, cluster 3.

4.6.2.2. Serious Games and online learning

Performance and learning

Students' answers to the question "Have you done any other course that includes educational games, if so, can you describe the experience briefly?" were mostly answered by the interviewees with a negative response. Most of the students had no prior experience on SGs, and only S4 shared her little experience with English grammar online games:

> "I remember I played in the EOI. They were grammar games, something like games, but for learning. It was very nice and it was pleasant to learn! And whether you liked it or not, you paid more attention and you say well! I... I scored low... or I made only 2 mistakes, and then you try and see if the next time you can make fewer mistakes! There is little challenge, right? ... yes! I find it is a very easy way to learn, yes."

When asking students their opinion on using SG activities in accounting courses and other subjects of the course, in general, students agree on the idea that it is important to have *active* and *social* tasks. S2 shared the following reflection about learning in UOC and games:

> "Because with a game you let´s say, you can see ... which is the level you're working at, right? When reaching the goals of the course, no, I told you that what I find very interesting from these games is that when you have a semester exam, it is one hour, and you cannot beat around the bush about the answers, and such, and that is why I think tasks like games are good activities, they prepare you for the pressure.
>
> We, in the UOC, have the problem that we don´t not know if we are learning. See ... you don´t have a person to analyze your PAC, but maybe

you've only focused on PACs for preparing the exam, you're not focused on the rest of the contents, ok? Everything is summarized, it is centralized in the PACs... eh I don't criticize the UOC, but as an UOC student you ask yourself if you're learning or not. Because you're doing PACS but...Then when you go to the exam you realize that you are learning, right? But things are not as clear, you're not as conscious as when you have a teacher telling you. That is why I think educational games could help us."

Motivation and engagement

Answers to the two questions above also gave motivational cues; S2 admits that he "loves games" not only for playing but also for learning. However, he ends by saying: "Maybe because of my age, in the courses I have been enrolled in there was no use all for videogames to learn". S3 admits that "Now they are very trendy, everybody loves educational games..." And S5 shares: "I think that games for learning can be very fun, you learn but you also have a good time".

Temporal perception

Students do not report specific answers on temporal perception of serious games in general, but they focus on the aspect of online learning and their BBA. S1 shares: "Time flies since I started..." The rest of comments are focused on the MetaVals task and will be quoted in the next section (4.6.2.3).

Social aspects

Albeit their little experience on SGs, some students relate these tasks to other social learning tasks. In this sense, S1 states that: "Well, not Serious Games but debates and online group discussions, we have had some during the course..." When asked on their preferences, some of the students share their preference for social interaction in SGs. In particular, S1 says:

"Especially if...if you can play a game where you are not alone, it is better, isn't it? Where ... well, if you play alone it is also ok, but also performing activities with groups that have to ...or with a game huh ... with others, there is the component of speaking ..Well, or discussion, reflection, then I think the game, apart from being fun. It has a great pedagogical component".

Also S4 admits that sharing with other students and teachers could be something that helped UOC students, because "sometimes in a virtual class you introduce yourself to the rest the first day, and then nothing... no questions, no guides, no social life online". Finally, S5 reflects on the possibility of playing SGs with other students: "I admit that I had never thought of playing with other students, but it could be very positive, yes...I think it is a good idea!".

Table 4-22

Summary of motivational and performance aspects of Serious Games and Online learning found during the student interviews

Themes	Interviews
Performance and learning	HP: SGs help pay more attention to what you are learning or training, and help preparing for the UOC tests.
	BTP: SGs are helpful, they help learning.
	BA: SGs are interesting like other activities.
Motivation and engagement	HP: SGs are a challenge, engagement and fun.
	BTP: SGs can provide fun while learning.
	LA: SGs are a trend.
Time perception	HP: Time flies in online learning.
	BTP: No answers
	LA: No answers
Social aspects	HP: Social SGs are better because of discussion and sharing with students and also with the teachers.
	BTP: Social SGs are similar to individual games.
	LA: Does not talk about social aspects of SGs.

Note: HP: *High fatalist*, cluster 1; BTP: *Balanced*, cluster 2; LA: *Anhedonist*, cluster 3.

4.6.2.3.MetaVals task experience

Performance and learning

In this section we describe the MetaVals SG experience of the learners based on the data collected during the interview. When asked: Did you like the game experience MetaVals? Would you recommend the game? Students talk about cognitive and metacognitive processes that MetaVals help them to do, compared to other learning tasks. In particular, S1: "I do, more than anything because it gives you ehh…see discussions and group activities are more or less standard, in all the courses, but a game like MetaVals gives you a variability ... I always appreciate it, makes you think a little..." S2 was especially attracted to the *Confidence Level* tool in the game: "I liked it because of the fact of having to choose an answer and put your certainty grade mmm...and then get a result, it can help you to face the final exam, when you doubt in a response, then you would like to know the result". S3 admitted: "It was OK, but I don't see the sense in having to learn or memorize all this stuff...there is software doing it for you!" S4 was clear and said that she had liked it but without further explanations; and S5 shared: "I felt like it was an exam, it was challenging".

Motivation and engagement

Students in general shared that MetaVals was a challenging and motivating activity, they compared it with other PACs. In particular, S1 said: "I saw it as a learning activity, well, maybe if it develops further, then it will be fun"; and S2 admitted that: "It was another activity". On the other hand, S3 experienced MetaVals as a game, "It was engaging and different from the rest of the PACs, it was...ah... difficult, I felt is as a game, but I tried to answer as well as I could!" Finally, S5 felt like MetaVals was a learning activity: "I tried to have fun; however, I knew it was a learning test, so I tried to do my best".

Temporal perception

On the question: How much time do you think you spent on MetaVals? Students perceived the time spent in MetaVals very differently; S1 does not remember, but he admits: "I did not feel time pressure at all" S2 said: "It was... not much...one hour I think...." S3 reports: "It was 15-20 minutes more or less". Also, this student reflects on the asynchronicity of the GBL task: "I prefer it as it is now (asynchronous, with virtual peer), because meeting another student at the same time... wow, it could really

be an issue". S5 was the student who reported time more accurately: "I think it was around 10 minutes, less than 5 minutes per phase, that's sure". Furthermore, when asked in which phase of the task they think they had spent more time, all the students answered that they spent more time in the individual phase.

Social aspects

When students were asked which phase of the game did they prefer and why, thoughts of students on the UOC model emerged again. Interviewed students report their preference with a *realistic* context, and those who admit to prefer a real peer interaction also share that it is difficult in the UOC model. S1 states that:

> "The only thing with real peers is that you have... well... to coincide, and you have to spend more time, obviously. Because interaction is not the same if you comment on the items, or if you only agree... then it would be different. However, I prefer the individual game, it is like the final exam I will have to perform, then, I prefer an individual game to prepare me".

S2 likes the MetaVals game as it was. S3 stated:

> "Man! taking other peer's actual answers... it´s always more interesting because you can compare with... with your colleagues, don't you?, to see if your results are within the average score of the course, or if you move away, right? It will always gives a reference to someone close."

This student, when asked if they would rather play with a real peer, she answered as follows:

> "Yes...yes, it would be a good experience, however, the issue is that it is complicated to meet schedules and tie it all, but I think it would be interesting, yes ... to compare the doubts you may have... you always have a something to discuss that is not clear to you, or you can see a different point of view... That is always good! Yes".

Finally, S4 said: "Well, for me it was OK, but with a real peer it could also be interesting..."

Table 4-23

Summary of the motivational and performance aspects of MetaVals emerging during the student interviews

Themes	Interviews

Performance and learning	HP: Students focus on the "Level of Certainty" in MetaVals, it helps them reflect on the learning process. They think this activity is useful to prepare for the exam. BTP: They see it similar to an exam. LA: They find the content difficult and not useful to learn or memorize.
Motivation and engagement	HP: Students don't see MetaVals as a game at all, but as a learning activity. BTP: Students don't see MetaVals as a game at all, but as a learning activity LA: Students see MetaVals as a game, it is engaging and different from other assignments, they like it to be difficult and the content.
Time perception	HP: Lack of temporal pressure during the game. They prefer the game to be individual and asynchronous. Report 30 minutes -1 hour of game. Report more time in the individual phase. BTP: Report is realistic, 10 minutes of gameplay. Spend more time in the individual phase. LA: Report 15-20 minutes, they prefer it as asynchronous; think that synchronicity could be an issue. Report more time in the individual phase.
Social aspects	HP: They prefer to play alone, and compare it to the exams and other learning tasks in UOC. BTP: They prefer the collaborative phase, and would like to share it with real peers. LA: They perceive a lack of real discussion and collaboration but believe that it would be difficult due to synchronicity.

Note: HP: *High fatalist*, cluster 1; BTP: *Balanced*, cluster 2; LA: *Anhedonist*, cluster 3.

4.7 SUMMARY

This chapter provided demographic data, quantitative and qualitative results for the research questions and the hypothesis that guided our study. The final sample

was composed of 67 students who completed all the tests and tasks. There were 35 female (52.25%) and 32 male (47.75%). The average age of participants was *M*=34.66 (*SD*=8.23); the majority of students in the experience fell into the 30-49 age group. Focusing on learning variables, most of students can be considered as having an average level of prior literacy on assets and liabilities. Finally, less than 17% of the participants were below or higher than the average scoring of ICT skills. That is, we can consider that our sample is ICT Skilled.

The first research question focused on the *relationship between learning performance in an online accounting course, learning performance in a continuous assessment activity, and performance in a GBL task.* Results from Spearman Rho correlation showed that PAC 1 performance was significantly correlated to Course performance(r = .67, p < .01). On the other hand, the GBL task performance was not related to other learning performances (r < .26). Furthermore, a one-sample Kolmogorov-Smirnov test failed to accept the null hypothesis that the data followed the normal distribution (D = .337, .258, .216 respectively for performance in the course, the PAC1 and the GBL task, N = 67 for each, and p = .000 for each). Non-parametric test (Wilcoxon t; α=0.05)therefore showed that Course performance was different than GBL performance (p=0.002; null hypothesis rejected; Z=-3.736; *N*=67). On the other hand, the PAC 1 performance could predict Course performance in our sample (*p*=0.092; *Z*=-1.683; *N*=67). We failed to meet a significant correlation, however, GBL and Course performance correlated (*r*=.20; *p*=.260) with pre-test scores.

The second research question: *What is the students' perception of games for learning in general, and the MetaVals task in particular, in online contexts, in terms of learning, motivation and time perception?* It was studied through the qualitative analysis of the five students' interviews. Results show little experience of students on Serious Games (SG) and online courses prior to engaging in the UOC BBA. Only one of the interviewed students had played SG activities in language courses. However, some of the students had experience and preference for video and table games, albeit they report a lack of time at present due to study and family restrictions. Students can be divided into two categories: *gamers* and *non-gamers*. The *gamer* profiles engaged on MetaVals as a learning task that could prepare them for the exam, and enjoyed it as individuals and allowing metacognitive judgments.

Non-gamers enjoyed the activity as a game, and did not perceive it as a learning task. They would prefer it with real peers but believe it is difficult in the UOC asynchronous model. Finally, time spent in the activity changed depending on the TP profile; balanced were more realistic, while *high fatalists* believed they had spent much more time in MetaVals. In this sense, these profiles also comment that "time flies" when talking about the BBA course.

The third RQ focused on *the temporal profile of online, UOC students in BBA accounting courses, and to which extent it could be related to their background, culture, and economical context.* Both quantitative and qualitative results were studied here. First, results of Exploratory Factor Analysis (EFA) showed a similar structure for the present and future scales of the Spanish ZTPI in our sample, when compared to previous studies in Spanish population. Principal components analysis (PCA) showed an acceptable three-factor structure (KMO=0.600; significant Bartlett's test, p=0.000) accounting for 41% of the variance. In particular, the PF factor showed a good internal reliability (α= .80; n=9 items), two different items from the original ZTPI. The FTP factor showed an α =.64; with 9 items, all in the original ZTPI, and finally, the PH factor had a good internal reliability (α=.77; n=7 items), with one item different from the ZTPI.

Three different groups emerged from the cluster analysis. All TP groups had a similar FTP factor ($F(2,67)=2.76$; $p=0.07$; $\eta^2=0.079$). The differences between the PF and PH for the three clusters were tested using one-way ANOVA: (F (2,64) = 50.33;η^2 =0.611) and PH (F (2,64) = 32.45;η^2 =0.503) with $p<0.001$. The first cluster (n=33; 49%) had high PF scores and high to moderate present hedonism. The second cluster (n=16; 24%) presented the lowest PF scoring, and the higher present hedonism. Finally, the third cluster (n=18; 27%) was characterized by low scorings in all the temporal frames, however, this group scored significantly lower in PH.

Interviews showed that students perceived their TP as individual point of view, but relate it to the cultural expectations. Students also talked about past feelings and behaviors and relate them to their present acts. In general, all the participants were focused on their studies. However, the third cluster students did not relate present effort to future gains.

Concerning student background, Principal components analysis (PCA) showed an acceptable one-factor structure (KMO=0.617; significant Bartlett's test, p=0.000)

with factor loadings as follows: PKF=.923 PEF=.919 and ICT=.335 and a 60.33% of the total variance explained. Cronbach Alpha without this ICT item increases to a good level ($\alpha = 0.86$).

Results for the RQ 4: *What is the relationship between students' age (and gender) and their TP?* It shows significant differences only for the age variable, and for the present hedonistic factor. In particular, Kruskal-Wallis test showed that the50-year and older age group presented higher orientation to present hedonism (χ^2 (2, n= 65) = 6.397,p= .004) than other age groups. The sample shows no significant differences for the present or future dimensions related to gender.

Focusing on RQ 5: *What is the relation between background and prior knowledge on assets and liabilities, and between each of these variables and student TP?* Correlation analysis pointed to background being negative and significantly correlated with present fatalism *(*r= .395, p <.001). The Non-parametric test (Kruskal-Wallis) showed that students with a *balanced* TP had a significantly higher academic and professional background on finance that the other two clusters ($\chi^2(2)=5.306$, p=.040). Correlation analysis also showed that Pre-test on assets and liabilities correlated negatively and significantly with present fatalism (r=.-.253, p< .05). A Kruskal-Wallis test failed to show significant differences among clusters (χ^2 (2, n= 65) = 2.488, p= .288); however, *balanced* students show a higher average scoring than other two groups.

The sixth research question aimed to analyze *the relation between students' TP and learning performance in the online course, during the entire semester (course performance) and in the first activity (PAC 1 performance).* Spearman Rho showed no significant correlations between student TP and PAC 1 performance, or for course performance. However, Mann-Whitney results showed a tendency of *balanced* students with higher course performance (χ^2 (2, n= 65) = 1.688,p= .430).

RQ 7: *What is the relation between time on task and performance in each phase of the game?* This was studied first using the Spearman Rho correlation; showing time students spend in the MetaVals task is significantly related to performance in the task (r = .69, p < .01). All the times and performances of each phase were positively and significantly correlated to each other (r>.641; p< .001); that is, students spending more time in the GBL task also perform better, and students who performed lower spent, in average, less time in the game phases.

Finally, RQ 8 focused on the role of *student TP on GBL time on task during the GBL activity*. Spearman Rho correlation analysis first, and non-parametric Kruskal-Wallis test afterwards, showed that TP was not related significantly to time spent in this MetaVals task (χ^2 (2, n= 65) = 0.318, p= .853).

Finally, the results for the hypothesis stated in our study were also analyzed:

Hypothesis 1: There is no statistically significant difference in the GBL task performance among the different TP groups. Results confirm this hypothesis: performance in the GBL task and in the PAC 1 is not significantly correlated to any of the TP factors (χ^2 (2, n= 65) = 0.581, p= .788). No significant differences among the three TP clusters and performance in the SG however, *balanced* students showed a higher scoring than other 2 groups.

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Chapter 5: Discussion

This chapter focuses on the discussion of the results, according to the theoretical framework (chapter 2) and the research questions and hypothesis stated in chapter 1. In order to help in the understanding of this section, we present each research question sequentially, and relate our results to prior studies 'outcomes and existing theories.

The first purpose of this study was to compare online student learning performance between a GBL task and a non-GBL task, in the context of an accounting course. In particular, we tested our research questions and hypothesis in a sample of BBA grade students in UOC. The second objective was to study learner TP profiles (comparing it with Spanish population results first, and to other cultures second) and to measure if these TP profiles were significantly related to sample variables (age, gender). Finally, we aimed to explore the relation between student TP and learning variables (background, learning performance, and GBL time on task).

The study also identified students' intrinsic motivation, learning performance, and student perception on what aspects of their course helped and/or hindered their learning in relation to their intrinsic motivation. The questions and hypothesis that guided the study will be discussed in each section of this chapter:

First we will focus onRQ1 results (section 5.1):

1a. Do students perform better in a digital GBL activity than in a continuous evaluation activity?

1b. Are these one-task learning performances significantly related to the entire course learning performance?

We will discuss the differences between the non-GBL task (PAC) and course performance, and also compare these with the digital GBL performance, basing our discussion on prior studies on GBL performance. Similarities shown in PAC and course results will also be related to the concept of *domain-specific* knowledge.

Secondly, we will discuss RQ2 results (section 5.2): What is the students' perception of games for learning in general, and for digital GBL MetaVals task in particular, in terms of learning, engagement, social aspects and temporal perception?

In this section we will focus on the three main aspects that students talk about when interviewed on SGs: engagement, social aspects and time. We will introduce two student profiles emerging from these thesis: *gamers* and *non-gamers*; and relate them to our results.

After focusing on both the digital GBL task and course performance, we measured student TP, related it to learning and demographic variables, and compared it to previous results in other Spanish and student samples. We proposed the following research question:

3. Which is the temporal profile of online, UOC students in BBA accounting courses, and to which extent is it related to cultural and economical context?

Discussion on the ZTPI (section 5.3) will allow us to show the cultural differences involved in TP. We will also discuss the three groups of students emerging from the cluster analysis (High fatalist, balanced and anhedonist) and compare it to the previous studies in the field.

After discussing the TP groups, we will focus on the fourth research question: RQ4.What is the relationship between: 4a. Student age, and 4b.Student gender, and student TP?

In this section (5.4) we will compare age group differences for the three clusters, and discuss the theoretical basis of this diversity. Furthermore, we will discuss why there are no significant differences among men and women in the ZTPI.

Fifth, we will focus on the relation between student background and literacy on assets and liabilities, and their TP (RQ5): Section 5.5 will focus on the factors composing student background (in particular we will defend the exclusion of ICT skills) and the relation of this variable to student prior knowledge; relating it to the particularity of an online context.

Next, The results for RQ6-What is the relation between students' TP and learning performance in the online course, during all the semester and in the first activity?- will be discussed on the basis of the differences on learning performance

among TP clusters, and will relate the fact that balanced students in our sample perform better, to results in prior studies in the field of TP. The UOC continuous assessment model will also be a key aspect to understand our results (see section 5.6).

Concerning Hypothesis 1 (section 5.7), we will show that our results match prior studies on digital GBL, and will further discuss the motivational aspects related by interviewed students in relation to these variables.

H1: There is no statistically significant difference in the GBL task performance among the different TP clusters (high fatalist and future, balanced, and anhedonist). That is, all the students involved in the GBL activity perform similarly, even being in different TP groups.

Finally, focusing on the digital GBL activity (MetaVals), we measured the relation between time on task and Performance for each phase of the game, and two last questions were discussed: RQ7. What is the relation between time on task and performance in each phase of the game?

In section 5.8 we discussed the positive but not significant correlation of time on task and performance in MetaVals relating it to prior studies both for online and GBL studies, and analyzed the possible reasons for these relation: game design, goal setting and the ease of playing the game.

Last but not least, we focus on the discussion of RQ8. What is the relation between student TP and time on task, during the GBL task?

We discuss the possible explanation on why TP was not significantly related to students' time on task in the MetaVals activity. Results are related to prior studies in the same field.

Since no other research, as far as the authors know, has conducted an analysis studying the implementation of a GBL task in an online adult course, this study is original and aims to give a new approach to the field of digital GBL and TP. Therefore the findings of this study provide new information for the fields of research on online learning, GBL, and TP. Quantitative data was provided by Universitat Oberta de Catalunya (UOC) BBA students and qualitative data was gathered through five student interviews. A sample of 67 students allowed to collect and retrieve the UOC data and to perform the Principal Component Analysis, and the

cluster analysis; ANOVA, Mann-Whitney and Kruskal-Wallis analysis were used to analyze the data. For the qualitative data, thematic analysis was conducted on all interviews where the themes emerged: motivation and engagement, social interaction, temporal aspects and performance aspects. In addition to addressing specific research questions and hypothesis, results were found on specific demographics.

The sample in our study was composed of 35 females (52.25%) and 32 males (47.75%), this is a similar ratio than in other UOC courses and other online institutions around the world (Jung, 2012).This is coherent with the online learners' profile observed also in previous studies among women (Jacobs & King, 2002).

The average age in our sample (*M*=34.66; *SD*=8.23) is consistent with thestudy by Romero and Usart, (2014) done with a different sample of UOC students (Age *M*=33.04; *SD*=10.47), and shows significant differences when compared to onsite students, who are usually coming from high school with ages ranging from 17-21 years. These results show that students in UOC have a significantly higher average age than onsite students; in fact, Sangrà (2002) explains that UOC target population are both mature students (older than 25), younger students replacing onsite with distance education, and profiles that combine onsite learning activities with distance education programs. The age profiles are also similar to those shown in other countries (Gilbert, 2001; Pallof & Pratt, 2003), which allow us to consider the sample as representative of the population of onsite and online higher education learners in a European context.

According to prior studies (Artino, 2010; Romero & Usart, 2013a), we must admit that students do not only engage in online or onsite courses based on their preference ('what I prefer'), but also on convenience factors ('what I need'). This could be related to the fact that older students are more likely to drop out of onsite universities than younger students (Thomas & Quinn, 2003), which in turn could be attributed to a conflict between family and work commitments (the Work-life balance; Romero, 2011): When onsite higher education does not give students enough time flexibility, older students with stronger family and work ties move to online models, as stated in previous research (Boeren, Nicaise & Baert, 2010). Online learning courses might be a solution for online learners with "children or family responsibilities" since they offer greater time flexibility than onsite learning

courses (Sullivan, 2010, p. 805). The online UOC model imposes less time constraints on students and may better fit the profile of a lifelong adult learner whose only convenient option is online education.

Even though this is a *case study*, and as we have previously discussed in chapter 1 and 3, no generalizations can be extended to other populations. We can also state that our sample shows the average profile of, UOC BBA students in particular, and that can be somehow compared with online BBA students in general.

Focusing on the learning variables of the sample, most of the participants can be considered as having an average level of prior knowledge on assets and liabilities. Also, since less than the 17% of the participants were below or above the average scoring of ICT skills, we can also consider that our sample is ICT Skilled. These results match prior studies such as Verhoeven (2012), where university freshmen self-declared themselves as having low and average ICT skills, while few students were classified as experts in ICT. In the particular case of online higher education, Wan, Wang and Haggerty (2008) found that students' self-reported ICT skills had a significant relationship with learning effectiveness and satisfaction. However, in our study there was no correlation for self-reported ICT skills with any of the outcome variables or student TP. Further research with more concrete ICT tests could be conducted in order to advance in this field, however, as we have mentioned, this is not a core variable in our research.

The discussion of each of the research questions is introduced in the next section, before introducing the discussion of the hypothesis.

5.1 RESEARCH QUESTION 1 DISCUSSION

First of all, we aimed compare GBL with non- GBL learning performance in an online context from a quantitative standpoint. This is important both due to the lack of studies in this area and as a basis to understand the use of GBL methodologies in online higher education contexts. We stated our first research question: *1- What is the relationship between Learning Performance for the whole course, PAC 1 performance and GBL task?* And divided it into three operative questions to better understand the underlying relation among learning performance in the different activities while taking prior knowledge into account:

1 (a) is learning performance improving a digital GBL activity than in a continuous evaluation activity (PAC 1)?

Our results show that scorings in the GBL task were not correlated to the continuous assessment activity performance (PAC 1). This result could be interpreted in the light of the skills and contents learning processes that the students experience during the accounting course. On the one hand, students follow a continuous assessment model based on competence development, however, there is a content to be learnt or "memorized". A similar experience conducted in UOC (Sancho, 2012) compared students with continuous assessment model to those taking weekly practice and assessment quizzes and receiving automatic feedback.

Results suggested that this methodology could allow students in the sample to regulate their own learning processes while helping lecturers identify and react to problems in a responsive, timely manner; all these fostered students' interaction and also lowered drop-out rates. In our case, students engage (voluntarily) on the GBL task, and perform an activity that does not allow them to check the theory, but answer in a time-out context. This GBL task, therefore, forces students to show their real competence level, and leave aside the contents they have not yet memorized. This could cause the difference between PAC 1 and GBL task, but also between learning performance in the course and in the GBL task: a real competence training / evaluating activity, compared to content and competency acquisition tasks. This argument could also explain why the MetaVals task presents a higher variability compared to PAC 1 and whole course learning performance.

Secondly, we focus on the relationship between learning performance in the whole online accounting course (Course Performance) and learning performance in the first continuous assessment activity (PAC 1): 1(b) Are these one-task learning performances significantly related to the whole course learning performance?

Results showed that PAC 1 performance was significantly correlated to the whole course performance and, in particular, that student performance in PAC 1 could predict *course performance* in our sample.

This relationship between an online, non-GBL task (PAC 1) and a whole course learning performance had not previously been studied, up to the authors' knowledge. We believe that it can be related to the fact that the accounting course in the UOC model follows the European Space for Higher Education (Delgado & Oliver, 2006). This continuous assessment model allows teachers, but also students to evaluate their own progress during the whole course through different activities (four in our case). Therefore the course scoring comes out, in part, from this first task. However, we believe this result is interesting for teachers and program managers when helping less advantaged students from the very beginning of the course; if they focus on these students that start with *C*- and *D* scorings in PAC; they could try to help those students moving towards a "no prophecy is fulfilled" scenario. However, we have to be very careful when generalizing, and this outcome should be further studied in samples with a wider population.

Related to our context, Hess (2010) studied performance, learner engagement and teacher preferences of a GBL course, compared to a non-GBL course in an online program on American History: students performed significantly higher in the GBL course (A grade in average) than in the non-GBL course (B grade in average). Also previous research in high schools (Papastergiou, 2009) comparing instructional activities and GBL tasks with similar contents and learning goals, showed that the GBL scores were higher than other task performances. We do not match these results; in our case GBL performance is lower than PAC 1 and course learning performance. This could be due to the fact that a PAC is not an instructional activity, it is also designed to train competencies, but it allows students, as we have discussed, more time to check materials and comment with other real peers; especially when compared to a GBL. MetaVals task is a time restricted, 15 minutes exercise with a virtual peer; students have to act on the basis of what they already know, and

perform it on their own. Compared to these prior studies, we believe that the profile of older students who are not digital natives could also have an impact on GBL performance, as we will discuss in the TP profiles section (5.3).

However, we have to be cautious when interpreting these results, as a GBL task scoring is not comparable to a whole course performance grade. However, we also compare PAC 1 performance with GBL task, and still find the same difference; that is, students in the GBL task perform lower, although with a higher variability, than in non-GBL tasks. This allows us to propose to teachers in UOC BBA studies to implement these active tasks in their courses, to help them supplement the continuous assessment of students, especially regarding competencies. In this direction, Gikandi et al., (2011) found, in a qualitative review, that effective online formative assessments can promote a learner and assessment centered focus through formative feedback (such as the one present in GBL) and enhanced learner engagement with valuable learning experiences. What these authors name *authentic assessment activities* and *interactive formative feedback* could be key characteristics in the context of online formative assessment.

1(c) We focus on student prior knowledge on assets and liabilities and background as being variables that predict learning performance.

Research on prior knowledge in general, and *domain-specific* prior knowledge in particular, states that this could be a predicting variable for students' achievement (Dochy & Alexander, 1995; Thompson & Zamboanga, 2004). However, we fail to find a significant correlation between prior knowledge in assets and liabilities and performance (that is, *domain-specific* prior knowledge). Furthermore, GBL, PAC 1 and course learning performance correlate positively; we observe a positive trend between background (*general* prior knowledge) and performance.

Our results partially match the findings of Hailikari et al. (2008): these authors showed that performance *domain-specific* prior knowledge was the strongest predictor of student achievement for university students. These authors believed that both prior knowledge and self-beliefs should be taken into account when considering instructional support issues. Also the study done by O'Reilly and McNamara (2007) among High School students measured the relation between prior knowledge (using a content pre-test on sciences) with performance in a final test. Results showed that prior science knowledge were significant predictors for achievement in science. Our

measurement of the background coincides with their measurements of self-reported prior knowledge (number of years studying the subject); therefore we can state that students' self-reported years of prior study correlates with performance in GBL and not-GBL tasks.

On the other hand, we do not find the same results for prior knowledge measured with *domain-specific* pre-test. This could be due to the fact that learning contexts are different. This can be explained when looking at previous research in GBL: Hou (2013) analyzed school use of a SG in a similar manner: student's English score at the end of the previous semester was treated as his or her prior knowledge score; the average score completed by a player which was automatically recorded by the game, was the learning performance. Their results are similar to ours: they fail to find a correlation between prior-performance level and GBL performance. As Hou (2013) discussed, SGs are different from other learning tasks, and should be designed to provide *low prior knowledge students* with more incentives and *high prior knowledge students* with more challenging tasks to achieve a better performances after the GBL task.

The Bulu and Pedersen (2012) results showed that performance in a GBL task was not correlated to the level of prior knowledge because students with lower prior knowledge took advantage of both *domain-general* and *domain-specific* conditions, and scaffolds did not substantially benefit students with higher prior knowledge. This can be related to our metacognitive tool in MetaVals, but we admit that it deserves another study in this area, as it is not the focus of our thesis.

Finally, we can see that the first research question results (a, b and c) were consistent with Gredler's (1996) conclusions: Prior knowledge does not significantly affect student performance; however, the way the information is presented affects performance: GBL task and continuous assessment activities have different information coding; i.e. multimedia forms such as onscreen text, narration, static pictures, and animation (Gredler, 1996). This has previously been related to student performance in virtual environments through the Cognitive load (CL) theory (Sweller, 1994). In our study, the format of verbal instructions in the PAC affects the cognitive load (CL) level and achievement differently than multimedia learning GBL task. Students who used narrative PAC were found to have a greater CL but also to

perform better than those using simulations with on-screen text instructions (our GBL task).

However, we believe that the non-significance of our data requires further study to confirm the trend in larger samples.

Table 5-1
Summary of RQ1 discussion

Question	Discussion summary
What is the relationship between learning performance in an online accounting course, learning performance in a continuous assessment activity, and performance in a GBL task?	
1a. Is learning performance better in a digital GBL activity than in a continuous evaluation activity (PAC 1)?	Performance in GBL is lower than in PAC 1 and course. Higher variability The way how information is displayed affects performance: multimedia is more cognitive load demanding than writing. Time-limited GBL also allows students to use their real competence level, and does not allow searching for information or sharing it like in PAC 1.
1b. Are these one-task learning performances significantly related to the whole course learning performance?	PAC 1 learning performance is positively and significantly related to course learning performance. Students with a "X" grade in PAC 1 will probably get the same scoring for the whole course. This could be due to the fact that a 20% of the scoring comes from this first exercise, and the methodology emerges from this continuous assessment activities / model. GBL task learning performance is not related to course learning performance. This could mean that GBL task performance gives "space" to the performance of the course, and a practical exercise possibility that differs from the *PACs*, not only at a motivational level, but also from a performance standpoint.

1c. Is the student's prior knowledge on assets and liabilities a variable that predicts learning performance?	*Domain-specific* prior knowledge is not related to learning performance *General* prior knowledge (self-reported Background) is related to learning performance Students with prior knowledge in the subject don´t take advantage of scaffolds, but low performers do. This seems to leverage performances between the two student profiles prior knowledge (pre-test scoring)

5.2 RESEARCH QUESTION 2 DISCUSSION

The second research question: *What is the students' perception of games for learning in general, and the MetaVals task in particular, in online contexts, in terms of learning, motivation and time perception?* This was studied through the qualitative analysis of the five students' interviews.

In this first analysis we do not take the student's TP into account, but focus our discussion on the discourse related to performance and student engagement in games, Serious Games (SG), and MetaVals task; as a first step before introducing student TP variable

First, we would like to highlight that students who voluntarily engaged in the game were approximately 1/5 of the population (composed of all the students in the 2 courses). This could mean that students answering the questionnaires and in the interviews are biased towards game preference, as we will discuss later in this section when talking about student motivation.

Secondly, focusing on the categories found in section 4.6, we can relate them to two prior qualitative studies on GBL:

The study done by Hess (2010) using thematic analysis of the relationship between student performance and motivation in both courses showed that students and teachers of a game-based online course provided more reasons for student motivation than the students and teachers in the non-game-based online course. The thematic analysis of the aspects that students perceive to be helpful and/or hindering to their learning indicated that students and teachers of the game-based online course provided more desirable, more helpful, less undesirable, and less hindering aspects in their course than the students and teachers in the non-game-based online course.

We coincide with one of the Fu et al. (2009) dimensions for measuring student engagement: social interaction, and their other dimensions could also be compared to our results: *challenge* and *goal clarity* could be the *gamish* aspects of MetaVals, and *immersion and concentration* are related to the concept of *flow*. Finally, *control* and *knowledge improvement* are related to *cognitive and metacognitive aspects of SGs* that our students also relate to *engagement*.

Qualitative results for the five students interviewed in our research show little prior experience of students on Serious Games (SG) and also in online courses before

engaging in the UOC BBA. Only one of the students remembers playing online GBL activities in prior language courses. This agrees with the fact that GBL is not widespread in Spain secondary education (see Imaz-Bengoetxea, 2011 for a complete review), and that business games and simulations can only be found in higher business education courses (Fitó et al. 2013). There is another variable that could also be related to these results: student age. Participants in the interviews are in an older age range (34-49 years),which allows us to think that they studied high school in the 90s, when GBL in general, and online GBL in particular, were not used for learning (Faria & Wellington, 2004). In fact, one of our students admits that "at the time when I studied, videogames were just becoming known".

Before discussing the three main categories emerging from the interviews (engagement, social aspects, temporal aspects), we believe it is important to highlight the fact that some of the students interviewed in our research report experience and preference for games in general (non-educational), and they also report a lack of time at present, due to study and family restrictions. This agrees with the online learner profile discussed by Romero and Usart (2014): students with family and work ties engage in online learning because they can manage their study time better and make it compatible with other life aspects. Concerning this variable, we believe that students in our sample can be divided into two categories: *gamers* and *non-gamers*.

The gamer profiles engaged on MetaVals as a learning task to prepare for the exam, and also enjoyed it as an individual activity that allowed metacognitive judgments.

On the other hand, non-gamers enjoyed the activity as a game itself, and did not perceive it as a learning task. They would also prefer to play it with real peers, but believe it is not easy to perform synchronous activities in the UOC model.

Focusing on engagement, our students report high engagement in the MetaVals activity. The study done by Burguillo (2010) on SGs in higher education programming courses also reports that students assessed that the use of games was motivating and challenging. If we analyze the type of motivation students report, we can see that engaging in a GBL task is mostly the result of external coercion (All et al. 2014). As detailed in Chapter 2, players can be extrinsically motivated to participate, referring to engaging in the activity as a result of external coercion (All et al. 2014): our students do not report any coercion, they admit that they like to engage

in games, and one student reports that "I wanted to help the researchers, but I ended up engaging in the game without thinking about that". This clearly shows the intrinsic motivation power of MetaVals in particular.

Concerning identified regulation and integrated regulation, in our sample there is only one comment of a student who reflects on the lack of identified regulation, S4 explains that there are software programs that allow you to classify assets and liabilities, and that the goal of the game is therefore useless for her. However, this student also underlines that she enjoyed playing the game; thus we can conclude that this profile engaged due to intrinsic motivation for MetaVals. Following Ryan and Deci (2000), intrinsic motivation to perform an activity is associated with higher levels of enjoyment, interest, performance and higher quality of learning. When asked if they would like to play again, the students in general think that they would like to play, especially if the game is further developed, and also if they compare it to other activities or PACs. This links our results to those shown in Schønau-Fog and Bjørner (2012), allowing us to correctly assess the students' desire to continue playing as a measurement of engagement in the game.

Focusing on social aspects, students with the gamer profile admit that they rather play alone, or with a virtual peer than with a real peer, knowing that the synchronous games tend to present technical issues. Comparing to Doyle and Brown's (2000) online experience, our students did not report technical problems, they did not report any issues with the Internet or with communication in the interviews or via email. We believe this could be due to their prior testing of MetaVals (Usart & Romero, 2014b) and to the fact that it was a "virtual peer" game. This must be taken into account in case MetaVals aims to be implemented with real peers and synchronous online contexts, since it has also been reported in previous research with MetaVals and real peers, that the technical issues, in particular the Wi-Fi connections may cause stress and lower the ratings of the game experience among students (Usart & Romero, 2014 b).

In particular, students in the MetaVals task report that this activity helped them prepare for the final exam. This can be discussed on the basis of the study by Azriel et al. (2005), which showed that a GBL course in onsite undergraduate course was not a superior methodology for improving students' exam scores; however, the use of the game was as effective for reviewing class materials as the lecture method.

Finally, when focusing on temporal aspects leaving TP aside, gamer students report that they did not feel temporal pressure, maybe because they are used to more challenging commercial games (Kiili, 2005); on the other hand, non-gamer participants found it difficult to engage on synchronous real interactions in an activity such as MetaVals, because, in their own words, they perceive the UOC model as an asynchronous model that allows each student to progress at their own pace, "any time, any place" model.

According to Solé, Ros and Hopkins (2007):

> "Communication among students, counselors, and other academic administrative staff takes place asynchronously via personal email or one of the public spaces of the virtual campus, such as the classroom discussion forums" (p. 357)

Differently from the experienced gamer profiles, the non-gamer profiles are not used to playing online games.

Table 5-2
Summary of RQ2 discussion

	Gamers	Non-gamers
Engagement	They see MetaVals as a learning activity because they compare to not serious games they like.	They see MetaVals as a game, they have fun because they are not used to playing other games.
Social aspects	They like playing alone because they see it as preparing for the exam, which is also individual.	They would prefer social interaction, they like the competition level (ranking) because they are not used to online “virtual players”.
Temporal aspects	They did not feel temporal pressure maybe because they are used to more challenging commercial games (Kiili, 2005)	They see difficult asynchronous actual interaction in UOC, differently from the other profiles, they are not used to the interaction of online games.

In brief, quantitative data from qualitative students' answers on SGs in general, and on MetaVals task in particular, have allowed researchers to measure students' engagement for digital GBL. Positive engagement and motivation for MetaVals allow us to believe that implementing digital GBL tasks in online accounting courses, especially as a cognitive reflection tool, could help engaging students and help them training for final exams. Concerning the collaborative or social aspects of games, although the later could be limited to asynchronous interaction context of UOC, is also seen as interesting by students. Therefore, we can state that the implementation of MetaVals in online courses might be effective in general, although there are two important student factors: their own preference for games (being a *gamer*) and their temporal perspective, as we will further discuss in the next section.

5.3 RESEARCH QUESTION 3 DISCUSSION

After the discussion on game and course performance, we now focus on the second objective: the role of student TP. This objective will be studied with the following research questions and hypotheses, and allow us to deeply understand the results and relationships among learning and time variables. However, before starting to compare these variables, we first need to understand student TP in our sample. For this purpose we will first discuss the Spanish ZTPI construct validity for our sample (RQ3a), and secondly we will study the emerging clusters (RQ3b) in the light of previous research; finally we will focus on the relations among student TP and both learning and sample variables, comparing them to previous results in other Spanish and International samples of students.

3 (a) In our sample, the results of the Exploratory Factor Analysis (EFA) showed that the structure for the present and future scales (Present fatalist, present hedonist and future) was similar to the one found by the Spanish ZTPI when compared to previous studies in Spanish population, especially to the ones conducted by Díaz-Morales (2006) and Usart and Romero (2014c). We would like to highlight the fact that, even though no confirmatory analysis was conducted in this sample due to its limited size (Hair et al., 2010), results from the study by Usart and Romero are available and show the validity of this instrument in a similar context. Out of the 9 items having significantly different scores in comparison to English ZTPI and Spanish ZTPI previous studies(8, 15, 19, 23, 24, 35,38, 43, 44), we saw, in section 4.3, that four items are consistent with the Díaz-Morales study and two items are consistent with the original ZTPI in English. Only 3 items are different in all the previous studies as we will further discuss.

In our study the Present Fatalist (PF) factor showed good internal reliability with 9 items composing it. However, this is the factor that has more changes, when compared to prior studies: there are 6 items that differ from previous studies: Items 8, 19, 23, 24, 38 and 44. First, item 38 is consistent with the previous results from the English ZTPI and Spanish ZTPI (Usart & Romero, 2014c), but differs from the scores of Díaz-Morales (2006) that are slightly higher for past negativism. However, as the same author admits, this could be due to particular factors of that sample, and since our results are consistent with the results of prior studies, we can confirm that this item would also be PF in our Spanish sample.

Secondly, it is important to highlight that items 23, 24 and 44 match the original PF Spanish ZTPI loadings (Díaz-Morales, 2006), but not the original ZTPI structure. This allows us to believe that the sentences have negative sounds in the Spanish culture (see table 5.2), and it is more related to a "*fate governs my life"* sounds of these expressions, while they were originally validated as present hedonistic (PH) among the sample of American students:

Table 5-3
Spanish VS English sentences for PF / PH factors

Item 23: I make decisions on the spur of the moment.	Tomo mis decisiones en el mismo momento en que actúo.
Item 24: I take each day as it is rather than try to plan it out.	Afronto cada día como viene, sin intentar planificarlo.
Item 44: I often follow my heart more than my head.	Con frecuencia sigo lo que me dicta el corazón más que la cabeza.

Item 23, just as previous Spanish and Chilean studies, was related to a pessimistic vision of present. Finally, item 44 in particular names the heart and head, which for Americans could mean that they choose things they like or prefer more than things that have to be done, as hedonists do. On the other hand, in Spanish, it could mean that they believe there is a destiny and do not want to think about options, relating it to the fatalist factor. This is related to the fact that there are cultural aspects such as values that could be related to a different affective validation of the present in our culture, when compared to American or English contexts (Paez & Gonzalez, 2000). Results focused on ethnic differences (Zimbardo & Boyd, 1999) also refer to higher scores of PF among Hispanics than Caucasians or African Americans.

Thirdly, items 8 and 19 differ from all previous studies, both English and Spanish. In particular, item 19. *Ideally, I would live each day as if it were my last / Idealmente, viviría cada día como si fuera el último*; emerged as a hedonist sentence for all the previous studies, also in the both Spanish studies (Díaz-Morales, 2006; Usart & Romero, 2014c) and in the Chilean sample (Oyanadel et al., 2014). A similar issue was found with Item 8*: I do things impulsively / Hago las cosas*

impulsivamente. This sentence had always scored in the PH factor. We believe that our particular context of online UOC students in 2013-14 course could see these sentences as negative more than relating them to enjoyment, we admit that it deserves further study in wider Spanish samples to confirm if the political and economical context after more than 5 years of economical recession in Spain might in fact be changing the population average TP of a whole country or culture, according to (Jones & Brown, 2005).

Secondly, the FTP factor showed an acceptable internal reliability with a final structure of 9 items, all belonging to the original ZTPI, and also to the previous Spanish ZTPI studies, except 1 sentence: Item 43:*Imake lists of things to do / Hago listas de cosas para hacer.* This difference could be due to the profile of higher education students in Spain when compared to American students in onsite universities (Zimbardo & Boyd, 1999). In our online setting, as discussed in section 2.2.2, students could have some specific characteristics: adult learners (older than 25) with family responsibilities and full-time jobs (Green, 1996; Concannon et al., 2005); but at present more young students are also increasingly enrolling in online universities as a first option, probably due to the time flexibility promised by these models (Dabbagh, 2005). Some students also self-rate themselves high in ICT skills, and a considerable number are not very proficient in computer use or ICT (Kennedy et al. 2008). Finally, according to Toth, Daniels and Solinger (2011) the student's background, could have beneficial effects on episodic memory for both younger and older adults; specifically, older adults perform significantly better in an experience with dated material while younger adults showed the opposite pattern.

Finally, the present hedonism (PH) factor showed good internal reliability, with a 7-item structure, and two items (15 and 35) scoring in a different factor when compared to all previous ZTPI psychometric studies. First, the item 15:*I enjoy stories about how things used to be in the good old times*/ *Me divierten las historias sobre cómo eran las cosas en los viejos tiempos*, was rated as a past positive sentence both in the Zimbardo and Boyd (1999) study, and also for Díaz-Morales (2006). This allows us to believe that UOC students are presently focused on learning, and report no time for fun (as it will be further discussed in RQ 3c) and they could relate their hedonist *fun seeking* personality to the present remembrance of past events (McElheran, 2012. Finally, item 35 scores high in PH, and it also shows a significant

scoring in the FTP factor. Previous studies show high FTP loading (Díaz-Morales, 2006; Usart & Romero, 2014c); PF loading (Zimbardo & Boyd, 1999) and Past Negative scoring (Oyanadel et al., 2014).). Furthermore, this sentence was difficult to translate, and written differently in Chile and in Spain: *"No disfruto el proceso y desarrollo de mis actividades, si tengo que estar pensando en metas, resultados y productos" / "Cuando pienso en mis metas y las cosas que he hecho, me siento feliz por el proceso que he seguido y las actividades que he hecho"* compared to the original sentence: *It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products*. We believe that these differences could be due to the complex construction of past, present and future tenses in the sentence, and the meaning and links that individuals can interpret when reading it. Therefore, we recommend further, cross-cultural studies before deciding whether to include this item in a definitive, ZTPI version, or implementing a more simple item such as *El proceso mismo de crear metas y objetivos me hace feliz.*

3 (b) After discussing the structure of the Spanish ZTPI in our sample, the next step for understanding the student TP profile is to focus on the three different groups that emerged from the cluster analysis. FTP scoring was high in all the groups, as expected in a higher education student sample (Ozcetin & Eren, 2010; de Bilde, Vansteenkiste & Lens, 2011). If we compare these scorings with previous studies, we see that the scores are higher than the original, onsite student sample results (Zimbardo & Boyd, 1999), but also differ from Díaz-Morales (2006) results in a wider population of Spanish individuals, and from the Chilean sample (Oyanadel, et al., 2014). This could be related to the particular online student profile of our sample; being consistent with Zabel's (1995) study on student TP in a correspondence HE course, who showed that participants in a distance course were more orientated to the future than the past or present. As highlighted by Romero and Usart (2014), online students have some characteristics that make them future-oriented, such as higher self-regulation. PH and PF are significantly different among the 3 clusters, and are decisive in the interpretation of the groups. We will discuss these clusters by comparing them to the prior studies that used this methodology among HE samples (Boniwell & Zimbardo, 2004; Boniwell et al. 2010). As discussed in Chapter 2, cluster analysis, although recently approved as a competitive method for

understanding complex TP profiles, has merely been focused on learning (Ozcetin & Eren, 2010).

More than 50% of the sample was in the first cluster, and was characterized by a high FTP orientation, a very high PF, and also a high PH scoring; this first cluster can be defined as *high in fatalist and future, which* corresponds to the *all high term used by* Kairys and Bulotaité (2014) . It also can be related to the Boniwell ,et al. (2010) negative cluster with high fatalism, high past negativism and low in other factors. Furthermore, Boyd and Zimbardo (2005) used the present and future ZTPI scales to describe a similar group: they described five hypothetical 'profiles' of individual TP, one named fatalistic (high PF, low PH, low FTP). This group of students shows a higher orientation to the future, which has been related previously to higher learning performances (Ozcetin & Eren, 2010; de Bilde, Vansteenkiste & Lens, 2011), but also to a higher PF, which has historically been related to introversion (Gjesme, 1983). One explanation to the high number of students in this cluster is the online learner profile (Romero & Usart, 2014): students who engage in higher education because *they want to (preference)*, are adults with no need for social onsite interaction, but students with high self-regulation of time and learning processes. On the other hand, those individuals who enroll in UOC due to *what they need (convenience)* might be in the other two clusters:

The second cluster, with low PH, high FTP scoring, and higher PH, was named *balanced* (also according to Kairys & Bulotaité and to the present and future factors of Boniwell & Zimbardo, 2004 balanced definition). Nearly one quarter of the students were in this *balanced* group, consistent with the results of Boniwell et al., (2010): 23% of the sample was in the BTP cluster. However, these authors explain that, in their study with a Russian sample, and after comparing methods for measuring TP, they found that the cluster-analysis method produced a large *balanced* TP group, as opposed to 7% using the cut-off point approach. So we believe that we have to be very careful with our results, and propose further studies with larger samples, and using other methods such as the percentile (Drake et al. 2008; Zhang, Howell & Stolarski, 2013) before admitting there is a balanced TP group. According to the findings of Romero and Usart (2014) on student profiles, these individuals could consciously evaluate their options for engaging in higher education and find online settings more suitable to their learning needs and future goals: balanced

students can adapt better to different life situations and although they look for fun and instant rewards, they can ignore them for future gain.

Finally, the third cluster was the less crowded and was characterized by low scorings in the three temporal frames; however, this group scored especially low in PH, therefore we named it anhedonist group. Comparing to previous studies, and taking into account the missing information on past frames (PP and PN), we can identify groups of students in the Kairys and Bulotaité cluster named *Present Fatalistic* and in one of the clusters identified by Boniwell et al. (2010), with high FTP, low PF and lower PH. These groups were related to high levels of a tendency to suicide and low well-being. In the next sections we will discuss the relation of this cluster with performance and time on task; however, we named this group the *anhedonist,* since PH scores were significantly lower than other factors. When observing the student characteristics of this last group, we can outline preference and convenience factors: these students have the lower FTP orientation of the sample, they might be individuals who do not think about future, long term goals; furthermore, PF is higher than FTP, and therefore, "fate governs my decisions" is important in this group. This together with very low present hedonism shows a student profile that could be somehow less motivated to learn (Bosato, 2001), and who engages in online learning because they were pushed externally to do so (e.g. by their couple; as student 4 answers confirm). We believe that a study done with onsite learners might help to a deeper understanding of this last profile.

3 (c) Interviews showed that students tend to reflect on their own TP from an individual point of view; however, they related it to the cultural expectations of "what is good and bad, what is expected from me" (Cited from one of the students' answers). This could be a good example on how TP is an individual construct that is shaped by culture and social differences, as stated by Jones and Brown (2005). Furthermore, when learners were asked to talk about their past, present and future and to grade it in relation to their BBA, they reported feelings and behaviors of their past and related them to their present acts. More, their present investment in studies was also related to future gains in their job and also to personal fulfillment. These links between learning, work and personal goals are in part consistent to Peetsma's (2000) theory on students FTP. The author divides FTP measurement into four life domains: school and professional career, social relations, personal development, and

leisure; and relates them to learning variables such as time invested in studying. In our interviews, students mostly focus on their learning and professional goals and experiences for past, present and future frames, but they also link them to their personal development. On the other hand, social relations and leisure are left aside or mentioned briefly. This could be due to the lack of time reported by students, together with the fact that participants in our study are old and have more family and work ties than younger students. We believe this part of the study deserves further research, maybe implementing the Peetsma FTP inventory.

Taking a closer look to each TP profile, we can see that the anhedonist cluster students did not relate present effort to future gain. From Haghighatgoo, Besharat and Zebardast (2011): Present hedonistic has a positive relation to being challenging and to total hardiness (described as a trait of personality in individuals who avoid the comfort and security of their regular work and seek progress and development). Results showed a positive relation between PH, control and total hardiness. Totally future orientation showed positive relation with challenging.

As discussed in section 2.3, previous studies showed that individuals with present fatalistic (PF) orientation show a deterministic disappointment toward life and future, and this factor has proved a positive correlation with aggression, stress, depression (Zimbardo & Boyd, 1999), and body activity (Milfont et al., 2008). In contrast, PF has a negative correlation with future outcomes and using approaches that seek meaning in life. In students, commitment may be the best way to escape determinism. In other words, many students are not independent when selecting their activities and values: they accept them under the pressure of their family and environment, and thus they may select the field of their study without any interest. In fact, this result may indicate a false control in different affairs: commitment and control act as shields that protect individuals against bad outcomes of present fatalistic orientations with limited senses of control (Crockett, Wienman, Hankins & Marteaut, 2009).

Summarizing: Factors for the Spanish ZTPI in our sample allow us to be consistent to the Spanish ZTPI results, in particular for the PF factor, and to affirm that there are some cultural aspects such as values that could be related to a different affective validation of the present in our culture, when compared to American or English contexts (Paez & González, 2000). Furthermore, our results could also be

consistent with a "short version" of the English ZTPI (Keough, Zimbardo & Boyd, 1997; Zhang, Howell & Bowerman, 2013). In order to confirm this, there are 3 sentences that deserve further study: Item, 35 should be studied in a cross cultural research, as it scores in different factors for each study; and finally items 8 & 19 could be related in our study to the present fatalism culture derived from the last five years of political and economical depression in Spain.

Concerning the second part of the question (3b), the three clusters identified correspond to the findings of previous studies among different samples in Europe and also to TP theory, both for the profiles and the number of individuals in each cluster. Particularly the balanced group shows that around a 25% of students has this orientation. However, the larger cluster is the one called the high fatalist and future as expected in the social and economic context in Spain. We must take into account that the past temporal frames are missing in our analysis, and further studies should be conducted in this direction. Finally, qualitative results from the interviews allow us to suggest that students in general talk mostly about their studies and family, focusing on the lack of time to combine both and the efforts to balance their work, studies and family times, and in a lower proportion, their jobs or job seeking. They report little information concerning other activities such as time spent with friends. This has been related to the Peetsma´s (2000) four-life *domains*, and thus we believe that asking students for past and future related to present UOC studies may differ from asking in a wider context. Balanced students report a self-awareness of their temporal balanced profile, and also explain how past positivism helps them. This allows us to believe that this cluster could be related to the balanced clusters found in previous studies where the *past* factors are also involved (Boniwell et al.,, 2010; Boniwell & Zimbardo, 2004). Finally, the anhedonist profile showed poor time management, negativity and a "fate drives my life" attitude during the entire interview. This clearly relates to a present fatalist-(past negative)-low future profile (Zimbardo & Boyd, 1999), and we believe that it is in these profiles where all temporal frames are below the average of the sample. Present fatalism is the highest and is really the factor that rules the whole temporal perspective.

5.4 RESEARCH QUESTION 4 DISCUSSION

After the discussion on student TP, we now focus on the TP predictors: age and gender. In RQ4 we asked: "What is the relationship between student age (and gender) and TP?"

4 (a) Focusing on age, results showed significant differences for the relationship between student age and student TP for the present hedonist (PH) factor. Particularly the older age group (> 50 years old) emerges as significantly more hedonist than younger students. This result coincides with prior research outcomes (Zimbardo & Boyd, 1999): individuals who see that future is fading (as fewer years are left ahead); tend to enjoy present and have less plans for the future, that is, they tend to be more PH.

No significant differences among age ranges were retrieved for the FTP factor, although future TP scoring was higher among younger students than in older students in our sample. This result differs from the Díaz-Morales' (2006) study, which showed that future TP scorings increase with age. However, our result is consistent with findings of Romero and Usart (2014). This apparent conflict might be due to the fact that higher education students have, in average, a higher future orientation than population in general (Van der Veen & Peetsma, 2011). It might reflect the fact that older lifelong students are more focused on the present usefulness of what they learn; and so may have a *low future* TP when compared to younger students (who need to be more focused on the future to foresee the further benefits of their efforts). Results published by Mello and Worrell (2006) among an onsite, secondary education sample showed that young adult students had a significantly higher future orientation than older adults. Furthermore, the fact that medium age individuals show a higher orientation to the future and planning than older students could also be related to the fact that time perception is orientated towards the possibilities that we have in life to come (Lang & Carstensen, 2002).

Finally, Present Fatalism (PF) showed no significant differences with age in general, although older students have a higher PF than the other two groups. This is consistent with the findings of the study by Romero and Usart (2014), especially for online and blended-learning students. This could be due to the fact that those profiles

are less likely to be first-year students and may seek some degree of flexibility or independence (Hagel & Shaw, 2007), which could also explain the higher confidence and lower PF in our sample. Furthermore, and following the Díaz-Morales discussion, experience could explain the major relevance of the past as individuals grow old (Neugarten, 1999). This in turn could lead to a stronger relation between past negativism and present fatalism, it could indicate that a negative PN in middle ages could turn into pessimism and low expectancies in an older age (Lachman, 2000 which could therefore explain the changes that take place in these temporal frames (PF higher) in older ages such as the high PF in our >50 group.

4 (b).Focusing on student gender related to TP, our results showed a tendency of women scoring higher in PF and future TP than men. However, no significant differences for both present and future dimensions of TP are related to student gender.

First, PF was higher for women than for men. We have found results in prior studies that support this tendency, particularly in the studies by Díaz-Morales (2006) and Oyanadel et al. (2014) with the Spanish ZTPI that show that items in the PF scale for the English version were rated as PH in our culture; in particular, Oyanadel et al. believe that women have a perception of time closer to affect, while men show objective seeking and aim to actively reach their goals; this could be related to the fact that women have a tendency to believe in fate, while men believe in their achievements.

Future TP is higher but not significantly for women in our sample, when compared to male students. This meets Zimbardo and Boyd (1999) results in an undergraduate sample: the authors showed that women scored significantly higher than men in this factor. On the other hand, the findings of Díaz-Morales among a Spanish *non student* population did not show significant differences for the FTP factor, but also meet our results: women show a tendency towards a higher future orientation. This could be due to the fact that women tend to plan and organize activities and agendas more than men, and that they relate this planning to learning activities (Patton, Bartrum & Creed, 2004).

Finally, the PH factor was similar for women and men. Previous studies (Díaz-Morales, 2006; Oyanadel et al., 2014) are consistent with these results, which could be due to the fact that the Spanish ZTPI had different items in the present fatalism

and present hedonism factors when compared with the original ZTPI, as we have discussed in RQ3. This could be in the basis of the differences found between gender and age differences in Spanish and English samples, and allows us to believe that Spanish female students show a similar PH profile to their male counterparts. Furthermore, if we do not focus on the future implications (understanding that PF has a sense of future negativism, because PF oriented believe that fate will drive their destiny), we can understand that PH is a totally present oriented factor, and that there are little gender differences concerning this temporal frame, when compared to *past* and *future*, as we have discussed.

5.5 RESEARCH QUESTION 5 DISCUSSION

5 *What is the relation between student background and student prior knowledge on assets and liabilities, (5b) and between each of these variables and TP?*

(5a) Concerning student background, the Principal components analysis (PCA) showed an acceptable one-factor structure when eliminating self-reported ICT level, that is, student background is composed of student prior knowledge and experience on the subject, not on ICT. Therefore, we must admit that, in our sample, the background variable is only composed of experience and knowledge on the field of finance in general, as asked to the students. Furthermore, self-reported ICT level was not related to performance. This result could be contrary to Gredler's (1996) study on prior knowledge, where results showed that prior knowledge of both computer operations and content may impact student understanding of new material in a computer-supported learning environment. However, we are in an online context, with students showing a similar ICT level that was possibly more leveraged during the first course in UOC, where all learners must course a subject devoted to enhance student ICT level.

Pre-test scoring on assets and liabilities was significantly correlated with background; this could mean that students self-report of their prior background is accurate, and that the pre-test was designed to measure correctly students' literacy on assets and liabilities, a very basic and particular case of financial literacy, but important for citizens.

(5b) In the results chapter, data showed background as being negatively and significantly correlated to present fatalism (PF); and after a non-parametric analysis, we saw that students in the balanced TP cluster showed a significantly higher academic and professional background on finance than the other two groups. These results could mean that the higher a student scores in the PF factor, the lower his finance background would appear. More, if students are balanced (that is, low PF, high PH and also high FTP), then his prior experience and knowledge on finance will probably be higher.

Correlation analysis showed that Pre-test on assets and liabilities correlated negatively and significantly with PF. However, the non-parametric test failed to

show significant differences among clusters, although there was a tendency of balanced students to have higher average scorings in this variable. This result was also consistent with previous research on balanced TP and learning: students with a TP closer to the *ideal* TP show better learning results and higher exam grades (Pichayayothin, 2014).

There is a stronger correlation between self-reported prior knowledge and experience variables and performance than between pre-test results and performance. However, both show the same results; the higher the PF, the lower the background.

The explanation to these relationships could be twofold; on one hand, students with a PF profile do not engage on learning activities and are not good at work because they believe fate and outside variables govern their life; that is, they do not tend to make decisions on their own; and barely focus on future goals. This could mean that in the present TP determines what knowledge and experience I acquire, and therefore, that in the future I will have less accumulated knowledge and experience than other TP profiles. On the other hand, balanced students show higher prior knowledge and experience because these temporal profiles engage on learning activities and show a higher performance, which allows them to construct their literacy. Furthermore, balanced students can also adapt to any kind of situations and can leverage job and studies better, being also higher in prior experience, as shown in our sample.

Recent studies that focus on finance and TP have shown that individuals' prior knowledge on finance is negatively correlated with PF in an adult population sample (Rutledge & Deshpande, 2015) are consistent with our results. Because of the little research done in this field with *balanced* students, we believe that further studies should take this path, and deeply understand the variables involved in the relation between *balanced* students and prior knowledge and experience in finance.

5.6 RESEARCH QUESTION 6 DISCUSSION

Research Question 6 aimed to investigate the relationship between students' TP and their learning performance, both as the entire Course Performance and for the first activity (PAC 1 Performance). Results showed no significant correlation between student TP and *PAC 1* performance, neither between students TP nor for the entire course performance. We will now discuss these outcomes based both on quantitative and qualitative analysis.

6 (a) Although not significant, quantitative analysis showed a tendency for the *balanced* student cluster to perform higher in the entire course, when compared to the other two TP groups. This result is in line with previous studies showing a higher performance in future oriented students (Phalet, Andriessen & Lens, 2004), and may indicate that, although the different TP groups show similar results in the first activity, the time invested by the *balanced* profiles will be more consistent during the course (Romero & Usart, 2013b) and thus can achieve a better course performance. On the other hand, anhedonist students who perform high in PAC1, due to their low PH and FTP, may lose their motivation for learning during the next tasks and end up with a worst course performance. We will further discuss this statement in the light of student self-reported motivation factors on the next section (6b).

Nevertheless, the non-significant difference in performance could be explained by two cofounding variables: first, the homogeneity of course performance might be due to the high *Future* TP orientation in our three TP clusters, and second because UOC model is not a classic, future-oriented educational model. The vast majority of existing literature identifies *Future* TP as one of the temporal orientations that could be strongly related to learning, mostly because education has been defined as future-oriented (Boniwell, 2008; Malka & Covington, 2005; Zabel, 1995). Onsite, teacher-centered education pretends a significant acquisition of learning; it requires students to plan their process and set learning goals for different futures, for a further evaluation and retrieval of the results. However, the UOC model aims to overcome this future oriented model by implementing a continuous assessment system, adopting the challenge of helping students engage in short-term activities giving more immediate feedback than classical, *one-term* exam models. It is also important to highlight that student TP has been measured using different scales as discussed in

section 2.5 (FTP, ATS, ZTPI) and most of the studies did not measure clusters or *balanced* orientation as defined by Zimbardo and Boyd (1999).

However, in research focused on continuous assessment education, the findings by Usart (2012) were very similar to our outcomes: students' average scores in *eFinance course* (an online course with modules) were not significantly different for the three TP groups (present, future and balanced), and balanced students also showed an average course score 22 points higher than the other groups.

This allows us to claim that the relation between student TP and performance in online contexts differs from that in onsite education; *future* oriented students do not show a higher learning performance. Specifically, online learning contexts such as UOC BBA might require more self-regulation (Romano et al., 2005), which is a trait that has been positively correlated to balanced individuals, as stated by Harber, Zimbardo and Boyd (2003). This, in turn, has a negative relation to present orientation (de Bilde, Vansteenkiste & Lens, 2011) as shown by our results: the two groups with higher PF and PH orientation perform lower in the entire course than the balanced group (which is higher in future TP and PH).

If we focus on the relation between future TP and learning performance without dividing students into clusters, course performance is significantly correlated to future orientation ($r = .247$, $p < .05$). There is a statistically significant relationship between future orientation and learning performance in the online course. Beyond the differences among TP clusters discussed in RQ 6, we believe that the fact of having a higher FTP scoring is related to higher performance in the entire course is consistent to the previous literature on the field, and allows us to claim that the UOC model is, at least in our sample, also future-oriented, although it has some short term rewards, as discussed, which make it a good model for students who also have a high present orientation.

Results could be related to the fact that all students in our sample have a high and similar FTP scoring, which might hamper analysis of performance differences among our clusters. Therefore this might be the answer to the non-significance of the RQ6 results.

6 (b) In order to better understand the results stated above, from the *student voice*, we asked students, in the interviews, to talk about their own course

performance, motivation and time perception. Their answers can be related to different learning variables identified in prior research:

First, students in the high fatalist and future group see learning as an individual, cognitive process, where exercises, learning materials and readings are important. These students are motivated about their studies because of future gain and job opportunities, and they think about the exam and prepare for it consciously. This is in accordance with prior studies, where a high future TP was related to study persistence (time and energy spent on study activities; de Volder & Lens, 1982), study time (Zimbardo & Boyd, 1999) or investment in school (Peetsma, 2000; Van der Veen & Roede, 2005; Peetsma & Van der Veen, 2011), and study behavior (measured as study time and perceived study effort; Shell & Husman, 2001). Furthermore, present time-orientation in high school and university students yields to more negative motivational and learning correlates, while future oriented individuals seem to present stronger personal endorsement of one's present study activities (de Bilde, Vansteenkiste & Lens, 2011).

Secondly, balanced students in our sample welcome all the tasks that might help learning, no matter if they are alone or work in cooperation. These profiles, as predicted in prior research, show high academic engagement (Horstmanshof & Zimitat, 2007) and positive attitudes regarding study (Ozcetin & Eren, 2010).

Finally, anhedonist profiles did not report good performance, they believe learning some contents is useless, and they also highlight how difficult it is to keep engaged or invest enough quality time in their learning activities or process. These results could be related to the negative study time reported by non-future oriented students (Zimbardo & Boyd, 1999), and the fact that students with low FTP do not have academic delay of gratification, defined as "students' postponement of immediately available opportunities to satisfy impulses in favor of pursuing chosen important academic rewards or goals that are temporally remote but ostensibly more valuable" (Bembenutty & Karabenick, 1998, p. 330).

All the profiles in our sample talk about what Husman, McCann and Crowson (2001) called *volitional control strategies* (college students reflecting future oriented thinking, e.g., thinking about future plans, imagining a goal's value, visualizing the successful completion of an assignment) and *future thinking* (Chiu, 2012). However,

anhedonist students draw a more negative picture of the future, and the rest of profiles have a more positive attitude towards future, as discussed in RQ2.

Concerning students' time perception, high fatalist and future profiles talk about flow ("*how time flies"*) in general, specifically describing that they experience *flow* when playing commercial online videogames. These results are interesting in the light of what Habibah, Mustafa, Roslan and Noah (2010) found in their study among high school students: future TP could be a predictor of flow in learning contexts, thus leading to better learning performance through intrinsic motivation. Therefore, we believe that the implementation of GBL tasks could help experiencing flow among students of all profiles, in special the anhedonist profiles and thus help them gain intrinsic motivation, and finally to increase their learning performance in these activities.

In short, we can state that student TP does not predict short-term performance (PAC 1) in our sample; however there is a tendency of the balanced students in our sample to perform better during the course (they show a high learning performance during the entire course). These results could be due to the UOC continuous assessment model, which differs from prior TP research studies that focus on future-oriented education with only one final exam. Furthermore, when looking at student motivation and time perception, we see that anhedonist profiles differ from the other two clusters; they are less motivated and engaged in learning, and report poorer time regulation, as predicted in prior studies.

5.7 HYPOTHESIS DISCUSSION

Hypothesis 1 predicted no statistically significant difference in the GBL task performance among the different TP groups. Results confirm the hypothesis in our sample, showing that student TP was not related significantly to performance in the GBL activity; Both high fatalist and future, and balanced clusters performed equally, while anhedonist students showed a slightly lower scoring in the game.

Our results on the relation between the students' TP and their performance in the MetaVals activity are completely consistent with the Romero and Usart (2013b) study of MetaVals in a blended-learning context, specifically, when future oriented participants showed a higher score for the collaborative phase. The similar results shown among the three TP groups in the game might be confirming the idea that a mix of fun and learning introduced by the GBL methodology (Moreno-Ger et al., 2008) neutralizes the different learning performances found in classical learning activities.

Furthermore, and despite the lack of studies in this specific context of GBL in online contexts, it has been observed that present focused individuals might perform better in instant feedback situations such as games and competitions (Zimbardo & Boyd, 1999), while future oriented students may engage in GBL seeking academic goals. The underlying reasons for these equal performances could lie on the fact that present-hedonists engage in games and instant-reward activities (Wassaraman, 2002), and this could explain the lower performance in our anhedonist group. Present hedonist face a GBL activity as an amusing, challenging activity. On contrary, future oriented students might be engaging in the GBL activity not for fun, but thinking on the learning outcomes and future outcomes of playing the game in an educational context. Finally, balanced individuals adapt their time orientation to the needs of the present moment, both having fun and thinking on the future learning gains (Zimbardo & Boyd, 1999. In order to understand student motivation to engage in online and GBL tasks, during the interviews we asked the participants about their feelings and thoughts on time spent, motivation and performance for online learning, focusing specifically on the GBL activity. Results show that high fatalist and future students prefer games with social interaction and competition elements. On the other hand, the goal of anhedonist students is to avoid studying, and they see GBL as

motivating and engaging, but don´t think about the learning aspects of these tasks. We can relate this to the GBL task results: performance is similar among groups, although students who are more oriented to the present engage thinking on the future learning usefulness of the activity (e.g. training for a final exam), as also discussed in Usart and Romero (2014b), while low future oriented engage just for fun. Consequences of the emerging qualitative results in our sample might be pointing at the underlying reasons for equal performance among groups.

In this aspect, the inclusion of GBL tasks in the curricula add a present-oriented learning methodology and provides students with instant rewards, usually giving immediate feedback to the player, and involving competition and social activities (Bateman & Boon, 2006; Bluemink et al., 2010; Romero et al., 2012). This active, student-centered learning approach involves competition and social interaction and forces students to think about the future – but also focuses on instant rewards (Bateman, & Boon, 2006). GBL could therefore help present oriented individuals improve their learning performance and engagement in these learning activities.

In brief: although all the clusters in our study perform equally in the MetaVals task, the motivation for each group appears to be different: while students with a higher PH and FTP orientation engage in the activity reflecting on the future consequences and reflect on their learning process; students with lower present and future orientations (anhedonist) engage *just for fun*, and do not focus on the learning process or specific content.

5.8 RESEARCH QUESTION 7 DISCUSSION

Finally, focusing on the MetaVals task, we measured the relation between time on task and the performance on each phase of the game. Results showed that time in each phase were significantly correlated to performance. That is, students who spent more time in the MetaVals activity also performed better. We discuss these results in the context of the ALT model (see Chapter 2.3). Pursuant to Fisher, Marliave, and Filby (1979), the time spent in academically relevant material having a moderate level of difficulty is related to academic achievement. In our study, we believe that MetaVals can be considered as a relevant learning activity, because the amount of

time spent in the game is a strong determinant of achievement. With the aim to compare our results to prior research in different educational contexts, the onsite, online and GBL context are discussed in relation to our results:

We coincide with the results of Wagner et al. (2008) in onsite education homework assignments: a positive relationship between performance and the quantity of time allocated by postsecondary learners. Also previous studies on time on task and performance in online settings have related time to the learners' performance, as the result of the students' self-regulation strategies (Levinson, 2006): temporal flexibility is higher than in onsite settings, and then students have to self-regulate their learning time and activities. In particular, a study among online pharmacist students (Wellman & Marcinkiewicz, 2004) found that time spent online by learners was weakly correlated with learning.

Finally, although research focused on the relationship between time on task and learning performance is scarce in GBL settings, Lewis (2007, p.918) observed that "the longer one spends learning, in general, the more one learns", but he subjects the influence of time on task to the relevance of the learning objectives addressed by the game. Also in the SG DimensionM (2010) case study, designed to teach algebra, the analysis showed an increase in the students' time on task, and a parallel increase in the students' performance and transfer of knowledge. There is not enough theoretical support to claim that time on task predicts learning performance in a GBL task, but we can affirm that time on task and performance in MetaVals correlate positively, and both variables could be predicted by student self-regulation, as mentioned above.

In the context of our study, we believe that learning goals were set properly in the GBL task: students could devote their time in the game as effective time, engaging in the learning task and not using it for technical issues or learning how the game worked. This is an important result, also outlined by students in the interviews: no technical problems and an easy-to-play game that allows them to focus on the learning activity: all these leads to the positive and significant relation of time spent in MetaVals and performance in this activity. Consequences of this finding will be discussed in Chapter 6.

5.9 RESEARCH QUESTION 8 DISCUSSION

To continue with the discussion focused on the MetaVals task, we now focus on the relation between student TP and time on task. Results show that student TP was not significantly related to time spent in the MetaVals task in our sample. However, the high fatalist and future group spent slightly more time than balanced and anhedonist students in the GBL activity. In this direction, Romero and Usart (2013b) study among blended-learning adult students playing MetaVals showed similar results: there was a tendency among present focused students to spend more time in this GBL activity, when compared to their balanced and future counterparts. Present-oriented students would be in a context of enjoyment and immediate reward provided by the GBL experience (Bateman & Boon, 2006) that could lead to more time spent in this activity, especially when compared to anhedonist profiles.

Clusters emerging in our study mix present orientations, and they are all high in FTP. In this sense, we have to pay attention to both present and future-oriented student characteristics found in prior research in order to understand the characteristics of each group.

First, present-hedonist (PH) individuals tend to engage in games and instant-reward activities (Wassarman, 2002); thus, they migh tbe facing the GBL activity as an amusing, competition activity, and spend more time playing than other profiles. Second, future-oriented students could also be engaged by the GBL activity, not for fun, but thinking on the learning outcomes and future outcomes as outlined by the high fatalist and future students in the interviews. Finally, balanced individuals could be adapting their TP to the needs of the moment, both having fun and thinking on the future learning gains (Boyd & Zimbardo, 2005), spending a reasonable amount of time but not as much as present and future-oriented students.

Chapter 6: Conclusions

Implementing a GBL task in online learning contexts is more than simply adding an interactive activity. When learning online, adult student variables, especially those concerning time and performance must be taken into account. However, it is difficult to come across with the crucial relationships among the learning and the personal variables.

In this last section we would like to highlight the interrelated aspects result of the present research that could be more relevant in the knowledge building of online contexts when implementing GBL tasks, taking into account student background, student TP and other demographic data.

6.1 CONCLUSIONS

The objective of our study was to investigate the implementation of GBL tasks in an online BBA course. In particular, our first goal was to compare GBL performance in relation to a continuous assessment (PAC) task, and to compare it to the performance of the entire semester. This study has been conducted within the framework of the ALT model and the Time Perspective (TP) theory, and thus our second objective aimed to understand student TP, its relationship with the amount of time students took to complete the GBL task, and performance. We would also like to highlight the new approach of including student TP in the analysis of GBL, as a completely new aspect provided by our study.

To provide a complete overview of the context, the researchers also implemented a qualitative interview study to retrieve student perception of games, learning, and to focus on student perception of time, time on task, motivation for games, and engagement in both the GBL and the continuous assessment activities.

Results show that implementing a GBL task in online BBA course could help to give a wider range of learning performances in a group, compared to the continuous assessment model of UOC. In particular, we have shown that PACs performance predict final performance in the semester, while the implementation of a

GBL task could both engage students and motivate them, while training for the final exam, without predicting that the score of the game would be similar to the final performance of the course. This offers great possibilities to designers and teachers for implementing these active methodologies when and in the manner they believe that it is more needed from the pedagogic perspective.

Student performance in the GBL task was different from their perception of the non-GBL activities, as well as when compared to the grades of the entire course. MetaVals showed a higher variability of scorings. This points to the fact that this GBL activity could be used to prepare the contents in a more practical manner. Furthermore, student time on task in the GBL task significantly correlated with performance in all the student TP groups. These results on the MetaVals game allow us to request a deeper analysis of the relationship between time spent in a GBL and performance; and also points to the hypothesis that GBL tasks could be open and realistic activities when compared to other learning activities.

Concerning student TP, the findings suggest some differences in all the sub-scales of the ZTPI, some of them due to Spanish culture and economical context, other items deserving further study; they could be related to the online student profile.

Furthermore, three TP groups emerged from the cluster analysis, based on the analysis of the ZTPI present and future factors. The first group showed students highly focused on present fatalist and future temporal factors; can be compared to prior studies results such as the negative cluster (Boniwell et al., 2010) and the Fatalist group (Boyd & Zimbardo, 2005).

The second emerging TP group relates to the balanced vision of TP defined by Zimbardo and Boyd (1999) Students with a balanced TP seem to optimize their study time and therefore show higher grades. This echoes recent work of Boniwell and Zimbardo (2004) and of Boniwell et al. (2010), who found that balanced individuals, on average, use their time better leading to more well-being.

An important finding of our study is the occurrence of an anhedonist group: students in this cluster show a low scoring in all temporal frames related to lower worry measurements about time, pressure and management. As far as the authors know, this profile has never been discussed and it could be a counterpart of the

balanced group deserving further research in other fields and in relation to learning variables. Furthermore, this group, although not significantly, shows lower performance during the PAC and the entire course, giving us a strong argument for the implementation of GBL tasks to help these profiles (27% of the students) that participate in the online learning process.

We believe that these results are very useful for the design and implementation of GBL tasks in online settings, as will help low hedonist and low future individuals to engage in the learning process.

Table 6-1
Student TP profile, preferences and performance in GBL task

Student TP Profile	Preference and Performance in GBL task and in the semester
High Fatalist and future	Social Gamers / Individual Serious Gamers without time for games or family , they perform higher and spend more time in the game, and have a poorer performance during the entire semester.
Balanced	Punctual gamers / balanced Serious Gamers. Do not play, they prefer spending time with family, they score high in the semester and also perform high in the GBL task, but spend less time than the fist cluster.
Anhedonist	Neutral gamers / Neutral Serious Gamers. Score low in GBL and in the whole semester. They spend less time in MetaVals, and could have little interest on games and time, although interviews show good work-life balance.

Another significant factor we found was prior knowledge. Learners report that they were able to use the information that they learned in other courses and rely on the prior knowledge needed for the new course. This is consistent with previous research by Arbaugh (2008), who found prior experience of the students in online learning to be a predictor of satisfaction and perceived learning.

The results of the present study indicate that students' age can be linked to student TP, specially to the present hedonist (PH) factor; on the other hand, gender differences were not significant. These findings, as a group of factors, have implications for faculty and instructional designers when implementing learning

tasks such as GBL, to provide adult students with quality adult online learning experiences, and to adapt it to each learner profile (see table 6.2).

Table 6-2.
Guidelines for the actors involved in the implementation of GBL in online learning contexts

Actor	Use of GBL and student TP
Instructional designers and professors	Implement GBL tasks in the courses to change an asynchronous model of PACs continuous assessment and give wider ranges of scores, allowing students with different TP to have a good performance and be motivated to learn. MetaVals could be used to train specific competences or skills in addition to the PACs.
Online counselors	Use GBL tasks when they believe it is better, and with the students profile they think it can be more useful. They don't make it compulsory, allow students train individually before the exam.
Students	Take advantage of a more student-centered activity, engage in an instant-reward activity, and train for the exams. Reflect on their level of certainty, differently from PACs, where they just read and use all the materials without time outs. Reflect on their own TP.

In brief: When deciding how to include GBL tasks the curriculum, student TP and *time on task* must be taken into account, especially if there is an aim to optimize learners' time and helping improve knowledge acquisition processes.

Firstly, when designing or adapting, and implementing a GBL activity, teachers and practitioners should consider student TP. Being aware of each learner TP profile could help designers in the adaptation of GBL tasks. These educational tools provide instant rewards to players, and the results of our case study could point to the fact that Serious Games (SG) may counterbalance the future orientation of formal education by helping present oriented individuals engage more in learning activities. The inclusion of educational games in adult formal education could help increase present-oriented students' learning performance.

Secondly, game and instructional designers should consider the Academic Learning Time (ALT) model (Beginning Teacher Evaluation Study, Fisher et al., 1980) to determine the flexibility of the allocated time, and allow the learners to engage in a certain amount and quality of time on task. Beyond the amount of time on task, the learners should be aware that this quality would be related to their effective learning times (Romero & Barberà, 2012). Teachers could regulate the learners' time on task during the GBL activity, and adapt their external regulation according to their student TP.

One of the innovative aspects of this thesis is the implementation of a qualitative study of student TP and engagement in GBL. Concerning the qualitative study, students emerged as gamers (they like videogames and engage in online commercial games) in general, although they were older than 35. Participants in general liked the idea of using SG for learning, but it is a fact that they had not found these activities in prior onsite or online courses. Thus, the implementation of more *hands on* activities would be greatly appreciated by adult learners, and could give researchers more tools to diversify the learning process, and make it more adaptable to the needs of the learners. This allows us to be very positive about the acceptance of the GBL task by the learner; however, the teachers voice should also be heard to assure the learning outcomes when implementing these tools.

Concerning methodological aspects, we believe our qualitative and quantitative methodologies might be the basis for a deeper understanding of cultural and student profiles of TP, since we not only take into account the objective results of an activity, but also the deeper motivations and feelings of students when engaging in these learning tasks.

6.2 LIMITATIONS OF THE STUDY AND FURTHER RESEARCH

This research addressed some limitations that can be considered for future research, as we will discuss.

Firstly, researchers involved in the study, not professional videogame designers, designed the MetaVals game. Students' comments in the interviews also show that MetaVals could be improved, or that a more *gamish* SG could be implemented to meet gamer profiles. We believe that MetaVals should be developed

in a more rich multimedia interface, because it is valued among students because it is a metacognitive tool, it has the possibility of playing in dyads, and because of the content training, as complementary to the UOC PACs methodology.

Secondly, other variables such as game preference, culture, and time spent on leisure games or different demographic characteristics could be added to paint a more complete portrait of the relations among variables. We believe that further studies in other universities and with non-university students could help in this goal.

Thirdly, the sample size is limited, and there is a participant bias due to the non-compulsory participation, both in the GBL task and in the interviews. Nevertheless, we believe this study is a starting point for a broader research that could engage other online universities and business education, lifelong learning institutions.

Fourthly, and related to the previous point, the profile of students who answered the interviews, that is, the participants in the qualitative study, was of adults older than the average of the quantitative sample. Future work should be done on a larger student sample from various age groups.

Finally, MetaVals game is a GBL task that lasts around 15 minutes; this does not have to be a limitation. According to existing studies, there are more negative aspects when implementing longer GBL tasks or entire courses, such as accessibility, frustration, staffing concerns, lack of instructional design, and lack of understanding of the educational benefits (Annetta et al., 2006; Buckley & Anderson, 2006; Delwiche, 2006; Moshirnia, 2007; Virvou et al., 2005), leading to poor learning outcomes.

However, we believe it could be interesting to study the relation between student TP and performance in longer games, or in GBL online courses such as the one represented by Hess & Taryn (2010). They compared student learning experiences and outcomes between a serious game-based and non-game-based online course among 92 higher education students. Results showed a significant difference between course performance and methodology: students in the GBL online course had an A average, whereas students in the non-game-based online course had a B average. Furthermore, student motivation indicated that there were more reasons for student motivation in the GBL course. The thematic analysis of what aspects are

perceived by students as being helpful and/or hindering to their learning indicated that students and teachers of the game-based online course provided more desirable, more helpful, less undesirable, and less hindering aspects for their course than the students and teachers in the non-game-based online course.

As we have seen, there are factors that could be improved in further releases, however, these do not hamper our results at all, as we are working in an exploratory standpoint. After highlighting these factors, we now share the following suggestions for researchers, derived from the findings in the study.

1. Future research should focus on the role played by the teacher in GBL implementation and online tasks, to understand if the number of students engaged could increase with this variable, as a factor for extrinsic motivation.

2. Future studies should be conducted with an experimental design: implementing a control and a treatment group would help researchers to further evaluate the effectiveness of GBL tasks in online courses.

3. Future research efforts should allow for a large randomized sample to further investigate the Spanish ZTPI structure, and the effectiveness of the GBL tasks in online courses different than the one conducted in our case.

4. Future research should take into account the past orientation of student TP to confirm and expand the clusters emerging in our study, and compare the results with other studies.

5. Future research should be conducted to investigate the relationship between the amount of time students take to complete their course, and compare it to the relation of time and performance in GBL.

6. Future research should conduct an analysis about the extent to which the content of each course matches each other and the depth and breadth of assignments for each course to further support the findings on performance of this study

7. Future research should focus on collaborative GBL, the social aspects of games and link them to TP. i.e. the anhedonist profiles need more social feedback and interaction in the game, such as competition elements.

8. Further research should focus on the data of the confidence level retrieved from the MetaVals game to understand the metacognitive aspects of the students

engaged in this activity, relate it to TP and to performance, and relate them to motivational aspects.

9. Future research with groups of *gamer* and non-*gamer* students should be implemented. This could help clarify the results found in our study and relate this characteristic to student performance in GBL and student TP.

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Appendices

Appendix A
Recruitment Letter for Learners (Informed Consent Form)

Participació a projecte de recerca

Bon dia,

Em poso en contacte amb tu com estudiant de l'assignatura **d'Introducció a la comptabilitat / comptabilitat financera** del Grau en Administació i Direcció d'Empreses, per proposar-te realitzar una activitat no avaluable, però que t'ajudarà a practicar els conceptes d'actius i passius. Ara que has acabat la PAC 1, t'agraïria si pots dedicar 30 minuts a realitzar aquest joc:
www.metavals.eu

Per accedir només cal posar el teu mail uoc (estudiant@uoc.edu) i la contrassenya: **uoc/ uoc 3**

El joc té un test previ i 4 pantalles i abans de cada una teniu les instruccions del que cal fer, és molt senzill, només heu de classificar els ítems en actius o passius i posar el vostre grau de certitud per cada resposta.

Per suposat, les vostres respostes seran tractades de manera totalment confidencial, i només serviran per al projecte de doctorat. Per qualsevol dubte o comentari, o si voleu estar al corrent dels resultats de la teva intervenció, pots contactar amb mi a:

Mireia Usart
Ajudant de recerca, eLearn Center, UOC
musart@uoc.edu

Appendix B
Reminder Letter for Learners

Bona tarda,

Adjunt trobaràs un breu document amb els teus resultats en el test de perspectiva temporal.

Voldria agrair molt sincerament la teva participació a l'activitat, però alhora convidar-te a acabar el joc de finances, això no et portarà més de 30 minuts, i només cal que entris a metavals.eu amb el teu mail uoc i posar com a contrassenya "uoc". No has d'accedir al test (que ja l'has fet), sinó seguir endavant i entraràs directament al joc.

Moltes gràcies de nou,

Mireia Usart

Appendix C
Pre-test on finance and Spanish ZTPI

Nota: En todas las preguntas caben una o varias respuestas correctas.

1-El activo de un balance empresarial puede definirse como:

a-Diferencia entre Ingresos y Gastos
b-Diferencia entre cobros y pagos
c-Inventario de bienes y derechos
d-Valor contable de la empresa
e-La persona más trabajadora de la empresa

2-El pasivo en un balance puede definirse como:

a-Diferencia entre deudas a favor y en contra
b-Suma de capital propio y capital exigible
c-Capital propio menos capital exigible
d-Partidas que han financiado el activo
e-La persona más perezosa de la empresa

3-Marque con una A las cuentas de activo y con una P las cuentas de pasivo, no marque aquellas que crea que no pertenecen al balance:

a-Maquinaria
b-Deudas de clientes
c-Reservas
d-Efectivo
e-Intereses
f-Dividendos pendientes de pago
g-Dividendo pagado a cuenta
h-Parientes en primer grado de accionistas

Test sobre su Perspectiva Temporal

*1 Evalúe cada uno de estas afirmaciones según: 1(en absoluto me representa) a 5(Me siento totalmente identificado)

	1	2	3	4	5
01. Pienso que reunirse con los amigos en una fiesta es uno de los placeres más importes de la vida.	○	○	○	○	○
02. Las imágenes, sonidos y olores de la infancia traen recuerdos maravillosos.	○	○	○	○	○
03. El destino determina mucho de mi vida.	○	○	○	○	○
04. A menudo pienso en las cosas tan diferentes que pudiera haber hecho en mi vida.	○	○	○	○	○
05. Mi decisiones están muy influidas por las personas y las cosas que me rodean.	○	○	○	○	○
06. Creo que el día de una persona debería planificarse por la mañana.	○	○	○	○	○
07. Me gusta pensar en el pasado.	○	○	○	○	○
08. Hago cosas impulsivamente.	○	○	○	○	○
09. No me preocupa si las cosas no se hacen a tiempo.	○	○	○	○	○
10. Cuando quiero conseguir algo, me fijo unas metas y considero los medios para poder conseguirlas.	○	○	○	○	○
11. Si los pongo en una balanza, tengo muchos más recuerdos buenos que malos.	○	○	○	○	○
12. Cuando escucho mi música favorita, pierdo la noción del tiempo.	○	○	○	○	○
13. Preparar el trabajo para el día siguiente y cumplir con los plazos se antepone a la diversión de hoy en la noche.	○	○	○	○	○
14. Ya que las cosas serán lo que serán, realmente no me preocupa lo que pase.	○	○	○	○	○
15. Me divierten las historias sobre cómo eran las cosas en los «viejos tiempos».	○	○	○	○	○
16. Las experiencias dolorosas del pasado permanecen en mi memoria.	○	○	○	○	○
17. De una vez por todas, voy a vivir mi vida tan plenamente como sea posible.	○	○	○	○	○
18. Me molesta mucho llegar tarde a mis citas o compromisos.	○	○	○	○	○
19. Idealmente, viviría cada día como si fuese el último.	○	○	○	○	○
20. Los recuerdos felices de los buenos tiempos están muy presentes en mi mente.	○	○	○	○	○
21. Cumplo con las obligaciones para con mis amigos y jefes a tiempo.	○	○	○	○	○
22. He tenido mi ración de abuso y rechazo en el pasado.	○	○	○	○	○
23. Tomo mis decisiones en el mismo momento en que actúo.	○	○	○	○	○

24. Afronto cada día como viene, sin intentar planificarlo.	○	○	○	○	○
25. El pasado tiene demasiados momentos desagradables y prefiero no pensar en ellos.	○	○	○	○	○
26. Es importante poner excitación a mi vida.	○	○	○	○	○
27. He cometido errores en el pasado que ojalá pudieran deshacerse.	○	○	○	○	○
28. Es más importante divertirse con lo que uno está haciendo que conseguir hacer la tarea a tiempo.	○	○	○	○	○
29. Tengo nostalgia de mi infancia.	○	○	○	○	○
30. Antes de tomar una decisión, valoro los costes y beneficios.	○	○	○	○	○
31. Tomar riesgos hace que mi vida no sea aburrida.	○	○	○	○	○
32. Es más importante para mí divertirme cada día de mi vida que estar pensando en el destino que me espera.	○	○	○	○	○
33. Pocas veces salen las cosas como yo quiero.	○	○	○	○	○
34. Es difícil olvidar imágenes desagradables de mi infancia.	○	○	○	○	○
35. Cuando pienso en mis metas y las cosas que he hecho, me siento feliz por el proceso que he seguido y las actividades que he hecho.	○	○	○	○	○
36. Incluso cuando me divierto en el presente, retrocedo en el tiempo para compararme con momentos pasados parecidos.	○	○	○	○	○
37. Uno no puede planificar el futuro porque las cosas cambian mucho.	○	○	○	○	○
38. El camino de mi vida está controlado por fuerzas en las que no puedo influir.	○	○	○	○	○
39. No tiene sentido preocuparme por el futuro ya que de todos modos no puedo hacer nada.	○	○	○	○	○
40. Termino mis proyectos a tiempo, avanzando de manera estable y continua.	○	○	○	○	○
41. Me encuentro «fuera de onda» cuando los miembros de mi familia hablan de cómo solían ser las cosas.	○	○	○	○	○
42. Me arriesgo para poner excitación en mi vida.	○	○	○	○	○
43. Hago listas de cosas para hacer.	○	○	○	○	○
44. Con frecuencia sigo lo que me dice el corazón más que la cabeza.	○	○	○	○	○
45. Soy capaz de resistirme a las tentaciones cuando sé que hay trabajo que hacer.	○	○	○	○	○
46. Me dejo llevar por la excitación del momento.	○	○	○	○	○
47. La vida de hoy es demasiado complicada, preferiría la vida más sencilla de antes.	○	○	○	○	○
48. Prefiero amigos que son espontáneos más que predecibles.	○	○	○	○	○
49. Me gustan los rituales y tradiciones familiares que se repiten regularmente.	○	○	○	○	○
50. Pienso en las cosas malas que me han ocurrido en el pasado.	○	○	○	○	○
51. Me mantengo trabajando en tareas poco interesantes si éstas me ayudan a salir adelante.	○	○	○	○	○
52. Gastar lo que gano en placer hoy, es mejor que ahorrarlo para la seguridad del mañana.	○	○	○	○	○
53. Con frecuencia la suerte compensa más que el duro trabajo.	○	○	○	○	○
54. Pienso en las cosas buenas que me he perdido en mi vida.	○	○	○	○	○
55. Me gusta ser apasionado en mis relaciones íntimas.	○	○	○	○	○
56. Siempre habrá tiempo para ponerme al día en mi trabajo.	○	○	○	○	○

Guardar | Enviar el cuestionario

Appendix D

Interview questions

a) Preguntas generales

1. ¿Qué edad tienes, y cuánto tiempo llevas estudiando en UOC?

2. ¿Has realizado algún otro curso que incluyera juegos educativos, en caso afirmativo, puedes describir la experiencia (lugar, tipo de juego, finalidad) brevemente?

3. ¿Te gustan los juegos en general?[1]; ¿Te consideras un aficionado a los videojuegos (como la wii, etc)? ¿Por qué motivos (que es lo que te gusta / no te gusta de los juegos?

4. ¿Te ha gustado la experiencia del juego MetaVals? ¿Recomendarías el juego?

b) *Sobre el juego y el factor temporal (TP, ToT):*

1. ¿Cuánto tiempo dirías que has pasado jugando en total?
2. ¿En la fase colaborativa, has dedicado más tiempo que en la individual?
3. ¿Cuál de las tres pantallas o fases de juego has preferido y porqué?
4. ¿Hubieras preferido todo el juego sólo o con más interacción con otros alumnos?
5. ¿Te sorprendió el resultado sobre tu perspectiva temporal? Tienes alguna pregunta sobre ello?

c) Sobre el juego y el aprendizaje

1. ¿Has pensado en el juego como una actividad de aprendizaje o has jugado y disfrutado de la actividad, sin pensar en su carácter formativo?

2. ¿Cuál es tu opinión sobre utilizar actividades como el MetaVals en cursos sobre contabilidad y otras materias del grado?¿Crees que te ayudan en el aprendizaje?

d) Sobre el contexto actual y su perspectiva

1. Actualmente, hasta que punto piensas que el futuro será mejor? Puedes poner un número del 0 al 10 a la visión del presente? Y del pasado?
2. Como te han cambiado la vida y las perspectivas desde que estudias ADE?
3. Porqué te matriculaste en estos estudios?
4. Que piensas hacer cuando termines el grado?

Appendix E

Course Syllabus

- Introducció a la comptabilitat (Professor: Dolors Plana Erta) http://cv.uoc.edu/tren/trenacc/web/GAT_EXP.PLANDOCENTE?any_academico=20152&cod_asignatura=71.520&idioma=CAS&pagina=PD_PREV_PORTAL

- Comptabilitat financera (Professor: Dolors Plana Erta) http://cv.uoc.edu/tren/trenacc/web/GAT_EXP.PLANDOCENTE?any_academico=20152&cod_asignatura=71.522&idioma=CAS&pagina=PD_PREV_PORTAL

Appendix F
Publications emerged from this PhD thesis

Usart, M., & Romero, M. (2014). Spanish Zimbardo Time Perspective Inventory construction and validity among Higher Education Students. *Electronic Journal of Research in Educational Psychology. 12*(2).

Romero, M. & Usart, M. (2014). The Temporal Perspective in Higher Education Learners: Comparisons between Online and Onsite Learning, *European Journal of Open, Distance and e-Learning, 17*(1), 190-209. ISSN 1027-5207

Usart, M., & Romero, M. (2014). Time Factor Assessment in Game-Based Learning: Time Perspective and Time-on-Task as Individual Differences between Players. In T. Connolly, T. Hainey, E. Boyle, G. Baxter, & P. Moreno-Ger (Eds.) *Psychology, Pedagogy, and Assessment in Serious Games* (pp. 62-81). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-4773-2.ch004

Earp,J., Ott, M., Popescu, M. Romero, M. & Usart, M. (2014). Supporting Human Capital development with Serious Games: An analysis of three experiences, *Computers in Human Behavior, 30,* 715–720 ISSN 0747-5632

Romero, M. & Usart, M. (2013). Serious Games Integration in an Entrepreneurship Massive Online Open Course (MOOC). *Serious Games Development and Applications Lecture Notes in Computer Science 8101,* 212-225

Usart, M., Romero, M & Barberà, E. (2013). Measuring students' Time Perspective and Time on Task in GBL activities. *eLearn Center Research Paper Series, 6*, 40-51.

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Romero, M. & Usart, M. (2013). Time Factor in the Curriculum Integration of Game-Based Learning. In Sara de Freitas, Michela Ott, Maria

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Romero, M. & Usart, M. (2013). Desarrollo de las competencias de colaboración con el uso del serious game MetaVals. *Teoría de la Educación. Educación y Cultura en la Sociedad de la Información, 14*(1), 123-142 ISSN: 1138-9737

Popescu, M.; Romero, M. & Usart, M. (2013). Serious Games for Serious Learning Using SG for Business, Management and Defence Education. *International Journal of Computer Science Research and Application, 3* (1), 05 – 15. ISSN 2012-9564,

Romero, M. & Usart, M. (2012). Game Based Learning Time-on-Task and Learning Performance According to the Students' Temporal Perspective. Proceedings of the 6th European Conference on Games Based Learning, 4-5 October 2012 Edited by Dr Patrick Felicia, Waterford Institute of Technology: Ireland,. ISBN: 978-1-908272-70-6

Usart, M. & Romero, M. (2012). The role of students' TP in Game Based Learning. Proceedings of the 8th elearning and software for education. Bucharest: Romania. ISSN 2066 – 026X