Online and hybrid learning programs in the virtual world of Second Life.pdf

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Online and hybrid university-level courses with the utilization of Second Life: Investigating the factors that predict student choice in Second Life supported online and hybrid university-level courses

Abstract
The radical restructure of hybrid and online learning course delivery methods at university-level held in Second Life has been widely and positively acknowledged from a large academic literature body. However, it is still absent the clarification of students’ socio-cognitive factors that predict their choice to attend at least in one of these course delivery methods. The main purpose of this study is to examine the relation between several personal factors and students’ choice to participate in these contemporary methods. A targeted sample of 325 voluntary students (170 who participated in hybrid sessions and 155 who participated in online sessions) completed a survey to assess socio-cognitive factors (self-efficacy, metacognitive self-regulation and task value), achievement-related emotions (pride, anger, relief and shame) in academic settings (before and after finishing various learning activities) and satisfaction levels of each method with also final grades from their examination processes to be included. Logistic regression confirmed higher levels of students’ self-efficacy and satisfaction in learning outcomes for those who took part in (fully) online rather than those who enrolled in hybrid courses. The study results revealed that students would prefer to take further courses in the online course delivery method. Conclusive remarks may provide meaningful information to the educational community in order to understand better how the socio-cognitive constructs of motivation are related to the students’ participation in future-driven educational activities held in Second Life by using the online or hybrid course delivery methods.

1. Introduction
Information and Communication Technologies (ICT) services and transactions are without doubt the most important and worthwhile innovations to date, which have contributed to the enhancement of pedagogical outcomes in universities and other educational institutions to a significant extent. A novel phenomenon of the last decade is the enhanced educational and research interest in the utilization of Web 2.0-based sources, such as blogs, wikis, social networking sites or even social indexing tools (social bookmarking), and withal three-dimensional (3D) multi-user virtual worlds have claimed to be alternative options for the implementation of educational activities. Many academics, researchers and instructors (Bennett et al., 2012; Chen, Hwang & Wang, 2012) have argued that Web 2.0 sources have the potential to offer increased learning opportunities for students and instructors can also support the Lifelong learning activities. Web 2.0 as a unique “umbrella” of this open-ended
and digitally-infused dimension has many other dynamic characteristics that expect to promote a catalytic effect in the entire e-Education (Pellas, 2012; Salmon, 2009). Some of them are the following: a) the radical change of knowledge’s nature and the access to this one, b) the transformation of the learning context can offer multiple opportunities for constructivist, collaborative, ubiquitous, and lifelong learning processes and c) the expansion of e-learning environments can allow users to utilize formal or informal learning approaches or course delivery methods (either online or hybrid) to access on a novel knowledge domain or “edutainment” (education and entertainment) approaches in 3D multi-user virtual worlds.

These circumstances have led instructors and researchers to develop innovative educational models or methodologies with a unique design. Beyond that even as methods have been used to replace the face-to-face (f-2-f), have neither allowed the contact between students and instructors sufficiently nor have contributed positively to the easy acquisition of knowledge. Online and hybrid (blended) course delivery methods are the most eligible and reliable methods which have been recently implemented at university-level courses. Regarding the first method, online learning has a rudimentary structure and the same students can make selection of courses. This method can become a truly successful course delivery method in well-organized settings and inspire the interest of other people who want to continue their education or further practice their skills for professional or personal advancement, since they are (or not) in any academic sector. Indeed, significant solutions derived from the reduction or elimination of various financial costs can be offered, covering many serious educational needs in this contemporary era (Pellas & Kazanidis, 2014d).

Student engagement in online learning process can be provided by a set of interactive communication tools for instructors and students that may facilitate collaborative activities, even after the mandatory school’s hours (Kali, Levin-Peled, & Yudi Dori, 2009). Several studies (Lu, Chiu & Law, 2011; Janssen, Erkens & Kirschner, 2011; Sung & Mayer, 2012) in the online learning area with different two-dimensional (2D) platforms have presented positive results from the group comparisons, the construction of learning materials and the effectiveness of course delivery methods in academic performances according to students’ attitudes. The advantages were quite enough, however one significant disadvantage was the absence of users’ (instructor and student) presence that is needed sometimes during the learning process causing the lack of synchronicity, i.e. all users together in a common place at the same time try to exchange opinions or ideas to solve a problem by utilizing verbal or non-verbal communication tools.

Whilst online could not replace traditional teaching methods, "mixed" modes of learning (hybrid/blended) have been launched and many instructors or administrators have already utilized them in different learning platforms, such as Learning Management Systems
(LMS) (Burgess et al., 2010; Dziuban, Hartman & Moskal, 2004). These 2D environments seemed that could fill the gap created by users’ presences, both in a natural and artificial environment, in order to replace face-to-face communication or interaction with other users simultaneously. In addition, this option was supported by the combination of traditional classes with the online ones. As Harrington (2010) has pointed out, there is positive impact regarding hybrid delivery of learning material, but significant data concerning the implications of online mainstream content was lacked. In the light of these findings, Tselios, Daskalakis, and Papadopoulou (2011) have shown that the combination of face-to-face interaction based on online instruction could offer an added value to support learner-centered and collaborative learning processes. Other researchers (Marttunen & Laurinen, 2009; Gonzalez, Rodriguez, Olmos & Garcia, 2013) have stressed that learner-centered approaches can be amplified from the knowledge’s construction by promoting higher order thinking skills of students, like collaboration, reflection and of course finally cause their satisfaction. Moreover, in hybrid learning methods the instructor cannot merely use traditional and distance activities; instead he/she should organize an effective approach in which users need to exploit the strengths of collaboration and satisfaction with other peers (Matzat, 2013).

Benefits from the utilization of 2D platforms, like LMS or Web 2.0-based technologies (blogs, social media or wikis) are currently well-known. Although, students could not share synchronously their experiences in online and hybrid course delivery methods and many other researchers have found that these benefits cannot outweighed the drawbacks observed, as easily as the face-to-face and specifically in-class supported interactions, due to: (a) technical problems (Rivera, McAlister, & Rice, 2002) that may produce students’ feelings of isolation (Contreras-Castillo et al., 2004), (b) the lack of students’ learning experiences in online courses (Piccoli, Ahmad & Ives, 2001), (c) the wrong expectations that students have for online courses or the differences in their cognitive background , leading to lower levels of satisfaction (Kleinman & Entin, 2002), (d) the dissemination of learning material which is not more cost-efficient, enabling instructors to not organize well enough students’ coordination in the learning process (Tayebink & Putch, 2012) and (e) despite the multiple opportunities offered by 2D LMS students have to learn with other members collaboratively (mainly with asynchronous communication forms), sometimes a meaningful explanation of how personal factors influence their choice to learn in different course delivery methods by using 3D technologically-advanced environments is until recently lacked (Pellas & Kazanidis, 2013a).

A growing body of academic literature (Pekrun, Elliot & Maier, 2009; Schunk, Pintrich & Meece, 2008) has shown a widespread interest in exploring students’ emotions in the learning process that is always associated with enjoyment, boredom or frustration emotions, as significant predictors of self-regulated learning and achievements in traditional classrooms.
Hitherto educational researchers (Pekrun, Elliot & Maier, 2009; Zembylas, Theodorou & Pavlakis, 2008) have found that students’ involvement in 2D LMS may lead to more stressful, frustration or boredom situations and thence a sense of social isolation.

A recent study of Schrader and Bastiaens (2012) has shown that the relationship between virtual presence and non-trivial learning outcomes are partly mediated through an increased cognitive load. Obviously for this reason future studies may start to shift into innovative 3D interactive learning environments, like 3D multi-user virtual worlds. Instructional technologists and educators should explore the dynamic dimension of emotions or motivational constructs, such as self-regulation and academic-related achievements, in online and hybrid learning processes, contributing to more meaningful and comprehensive understandings of how students can learn in both course delivery methods.

At the beginning of the 21st century, 3D multi-user virtual worlds have become an integral part for fans of social networking (Web 2.0) sources and students who already preferred to acknowledge them as candidate platforms for visually-rich interactive activities through online or hybrid course delivery methods. 3D multi-user virtual worlds have rapidly become a key part of the modern global culture, and actually representing a new social phenomenon. Beyond this notion, the effective use of 3D interactive and multi-user virtual environments can adequately motivate learners to participate more easily in collaborative or self-regulated learning processes, obtaining a better relationship among students with the knowledge and better cooperation in their activities. Learners in these dimensions can interact with a common 3D virtual world, where each one in front of his/her computer screen, individually and dispersed from the others exposed in a pre-constructed virtual place (grid) that can offer extremely broad educational opportunities. This situation has been radically started to change the current “status quo” of e-Education and mainly online and hybrid course delivery methods.

As long as the popularity of 3D multi-user virtual worlds for educational activities may continue to grow at an exponential rate (Pellas & Kazanidis, 2013), there should also be growing scholarly interest in achievement-related emotions through hybrid or online course delivery methods (Artino & Jones, 2012; Schutz & Pekrun, 2007). Recent studies (Pekrun, Elliot & Maier, 2009; Schunk, Pintrich & Meece, 2008) have shown that in traditional (face-to-face) classrooms students’ affective factors, motivations and emotions are directly linked to their ability to self-regulate or achieve learning objectives. Artino and Jones (2012) have suggested students’ emotions with contemporary instructional methods can unveil real achievement-related emotions, such as enjoyment, boredom, and frustration, which are important predictors of learning, self-regulation, and achievement in (online) classrooms. Nonetheless, the dynamic dimensions of students’ emotions during their participation in
online or hybrid course delivery methods may be less overt than those who experienced during the traditional course delivery method (face-to-face). Apparently, it is reasonable to assume that students’ emotions are significant contributors to learning, self-regulation, and academic achievement in online settings. The present argument may begin to address this assumption.

The current research seeks to investigate the gap between online and hybrid learning course delivery methods that has recently identified the close link between students’ success, meta-cognitive self-regulation and achievement emotions in order to acknowledge the educational community the nexus between achievement emotions and self-regulated learning behaviors. Nowadays face-to-face interaction in the production of knowledge has been replaced with other eligible course delivery methods (hybrid and online) in 3D technologically-advanced environments. The current study intended to yield a deeper and obviously a more comprehensive understanding of how students’ factors may predict their choice for participating in these two contemporary course delivery methods held in Second Life.

The rapid growth of educational perspectives and instructional affordances that 3D multi-user virtual worlds have offered are today well-known. Notwithstanding, a nascent academic literature body (Dunn & Guadagno, 2012; Midha & Nandedkar, 2012; Siriaraya & Ang, 2012) has presented strong links between cyber entities (avatars) and human personalities, there are still unidentified motivational beliefs and achievement emotions that may drive students to participate in hybrid or online course delivery methods through Second Life. The current study assessed personal factors, i.e. (a) motivational beliefs (self-efficacy, self-regulation, and task value), (b) achievement emotions (pride, anger, relief, and shame) in academic settings, and finally (c) satisfaction in the virtual world of Second Life. Worth mentioning is that at the end of every approach – despite the course delivery method that was followed – the students’ satisfaction must be remained a high level in order to be ascertained the social or problem-solving skills which are necessary for the real life demands.

The purpose of this study was to examine the relations between several personal factors and students’ choices to attend them in hybrid or online course delivery methods. A theoretical model derived from social-cognitive theory was getting proposed. It was hypothesized that self-efficacy, metacognitive self-regulation and task value, achievement emotions (hope, pride, anxiety etc.), and satisfaction in hybrid or online course delivery methods may predict students’ choices to take a future-driven university-level course at least in one of these course delivery methods.

The present study is structured as follows: After the main Introduction (section 1), the Theoretical Underpinnings are presented (section 2). Initially, in subsection 2.1 the problem
statement and rationale of this study and the proposed conceptual model are analyzed in the 2.2 subsection. Components of this model are outlined in the next subsection (2.3). More specifically, the socio-cognitive constructs of motivation (2.3.1), achievement emotions (2.3.2), student satisfaction (2.3.3), technological capabilities and affordances of the virtual world Second Life are described (2.3.4). The third section is encapsulated other four subsections: (a) the design and procedure (3.1.), (b) the purpose and research questions (3.2), (c) the project setting, (d) the treatment (3.3) and measurement instruments (3.4) are meticulously qualified. In the fourth section, the sample and socio-demographic information (4.1), descriptive and comparative findings of both course delivery methods (4.2) are exemplified. This section is closed with reliability and validity of measures and logistic regression analysis of predictors which are analytically explained (4.3). The study results are presented in section 5 and major conclusive remarks are determined in the Conclusion (section 6). In the last section (section 7) some significant limitations along with our vision for next steps are indicated.

2. Theoretical Underpinnings
2.1. The problem statement and rationale

A significant core that this study investigated was the effect of self-efficacy, metacognitive self-regulation and task value that may predict students’ choice to participate in online or hybrid university-level courses by utilizing Second Life. Shen, Cho, Tsai and Marra (2013) have argued that student self-efficacy is a key component for a successful online learning process in learning environments because users (instructor and students) sometimes have not got the opportunity to interact with others in real-time. Even more, Lee and Choi (2011) have asserted that many students abandon the online course delivery methods due to lack of self-efficacy, and thus the hybrid method started to become more sufficient for various activities (e.g. laboratory experiments). Nevertheless, the user’s active interaction in an online environment has not only required satisfactory levels of self-efficacy, but it has also required a high level of self-regulation from all participants (Cho & Kim, 2013). In this line, Dinsmore, Alexander and Loughlin (2008) have stressed that metacognition and self-regulation have unique roots. In addition, Pintrich, Woters and Baxter (2000) have divided metacognition processes into three components: (a) knowledge about cognition, (b) monitoring of learning processes, and (c) control of the process.

During the learning procedure, there is a positive relationship between metacognitive skills and abilities of cognition that students gained as a substantial relationship giving them the ability to explain and identify cognitive activities directed to a target. As previous studies (Garner 1990; Ley, 2005) have mentioned, the reflection and prognosis of the respective
learning achievements are very important in order to recall the knowledge. Metacognitive experiences can involve the use of metacognitive strategies or metacognitive regulation practices that are emerged as important for this recalling. Metacognition according to the above is clearly understandable as the awareness of how individuals are thinking to find alternative solutions (Pellas, 2014).

The common premise of the above process is addressed to those circumstances in which someone can process the knowledge of what she/he already knows and what she/he did not know. On this occasion, it may predict students’ choice not only attending in a process, but also encouraging them to use something further, i.e. a picture that everyone has for his/her self and capabilities that can be achieved by them and as a result to enhance the task value of the learning process (Wigfield, 1994). Task value has an initial starting point on the expectancy-value theory and described human behavior as a construct of expectancies that someone has and the value of the goal toward which he/she is worked on (Eccles, Adler & Meece, 1984). Joo, Lim and Kim (2013) have recently proven the association of self-efficacy and task value as predictors of students’ satisfaction. In this vein, task value can also be related to the belief that the individual’s task is performed as valuable, and tended to predict the decision on whether to pursue learning further or not (Eccles et al., 1983; Wigfield & Eccles, 2000).

2.2. The conceptual model

This current study seeks to construct and elaborate a theoretical model based on motivational beliefs (self-efficacy, task value, and metacognitive self-regulation) and achievement emotions (enjoyment, hope, pride, relief, anger, shame etc.) with student satisfaction level and final grades of their projects in the hybrid or online course delivery method to be included (Figure 1).
The inspiration for the construction of the current model came from a previous work of Pekrun, Frenzel, Goetz, and Perry (2007) and its beneficial formalization for the theoretical assumptions and foundations of this study. This framework was also emerged from a socio-cognitive theory in order to illustrate students’ motivational and emotional perspectives at university-level courses. This model may explain how the proposed educational features of Second Life (i.e. instructional affordances) which are generally pointed out by the international literature (see a review of the literature from Wang & Burton, 2013; Pellas, 2012) in association with students’ motivational beliefs may influence their valuable capabilities and choice to participate in future-driven learning activities. These beliefs may influence achievement emotions, such as enjoyment or boredom, which then linked to various academic outcomes, such as satisfaction or dissatisfaction respectively (Pekrun, 2006).

2.3. Components of the proposed model

2.3.1. Socio-cognitive constructs of motivation

Socio-cognitive constructs of motivation (or motivational beliefs) defined as assumptions and convictions that held to be true for an individual or a group, regarding concepts, events, people, and things. Skinner (1995) has referred that cognitive-motivational variables constructed by a person’s successful or failure learning experiences when interacted with them and affected posterior efforts in his/her similar activities. Bandura (1997) has also observed that “motivation is primarily concerned with the activation and persistence of
human behavior is also partly rooted in cognitive activities’’ (p. 193). Both motivational and self-regulatory factors can influence prior attainment and performance.

The three constructs of socio-cognitive factors are:
(a) Self-efficacy distinguished by Bandura (1993) as a component of motivation and related to behavioral changes of a person. Self-efficacy is also defined as students’ anticipations according to their academic causes, effects or tasks that an environment, according to their experiences can create (Bandura, 1997; Irizarry, 2002). Nowadays, many researchers have found that computer self-efficacy has positively predicted students’ academic outcomes. For example, those students with higher levels of self-efficacy have pronounced the following: (i) better performances are linked with students’ participation rates (Galpin, Sanders, Terner & Venter, 2003); (ii) levels of academic efforts in online tasks, such as emotional capacities generally judged their capabilities to use computers in diverse situations (Marakas, Yi & Johnson, 1998); and last but not least (iii) anticipated learning achievements (Ferla, Valke & Cai, 2009).

(b) Self-regulation has been just one part of students’ metacognitive skills developing the students’ capacity to control the processing of thought, in order to achieve their objectives (Vrult & Oort, 2008). Pekrun, Frenzel, Goetz, and Perry (2007) have noticed that “Self-regulation of behavior requires the flexible utilization of meta-cognitive, meta-motivational and meta-emotional strategies to adapt behavior to goals and environmental demands” (p. 27). Other studies (Dinsmore, Alexander, & Loughlin, 2008; Pintrich, Walters, & Baxter, 2000) have considered self-regulation as a component of metacognition, while several researchers (Stolp & Zabrucky, 2009; Veehman et al., 2008) have recognized metacognition as a component of self-regulation. Nevertheless, self-regulation can be achieved both by monitoring the process of thought, recognizing the stage in which the person is in relation to the original design solution, and by evaluating the objective or appropriate regulation of cognitive activities can be associated with the development of metacognition (Al-Harthy, Was & Isaacson, 2010; Hirashima & Horiguchi, 2003). The quality of a coursework in which students are engaged can be significantly improved, if the optical and interactive interface design may take into account the educational content combined with the development of their meta-cognitive skills (Josyula, et al., 2009).

(c) Task value is the concept of incentive work value of expected success, according to the self-perception of ability (self-concepts and competence beliefs) and subjective task values. Eccles and Wigfield (2002) have defined it as students' judgments of how interesting, important, and useful is a course for them. Indicative researching approaches (Artino, 2009; Pekrun, Goetz, Titz & Perry, 2002) have typically claimed that task value beliefs, like self-efficacy have positively predicted many important academic outcomes, such as cognitive
engagement or the task of disengagement, peer relationships and achievements and last but not least, the choice of students’ participation in future learning activities.

2.3.2. Achievement emotions

In educational psychology, the achievement goal theory (Elliot & Dweck 1988; Pekrun et al. 2006) is used to link achievement goals with achievement emotions, where the latter are associated with competence-relevant activities or outcomes. Achievement emotions are determined by the perceived controllability of activities and their outcomes with also insightful value to be also enclosed (Pekrun, 2006). Therefore, school programs and curriculums should cultivate each person as an entity in which the academic knowledge that is not only suited to individual needs, but it has a positive effect on the behavior, attitudes, and social activities of young people. Consequently, by creating an environment that concerned and provided well-established activities about students, it is imperative to nurture responsible, productive and achievement emotions (Elias et al., 2003). Achievement emotions are also related to the students’ achievements in various activities (academic learning, studying) and anticipated outcomes (academic success or failure) assessed in terms of the competence for the educational program quality assurance (Pekrun & Stephens, 2010).

These two dimensions have rendered four broad categories of achievement emotions (Pekrun, 2006; Pekrun, Elliot, & Maier, 2009): (a) activating positive emotions (e.g. joy, hope, pride), (b) deactivating positive emotions (e.g. relief, relaxation), (c) activating negative emotions (e.g. anger, anxiety, shame), and (d) deactivating negative emotions (e.g. hopelessness, boredom).

In the second axis of the proposed model, students were instructed to report on how they felt as members of their project when they attended in a (virtual) class, studied and concluded their participation by several tests or exams.

2.3.3. Student satisfaction

By utilizing hybrid or online course delivery methods, institutions of higher education have deemed as necessary to evaluate, manage better the learning processes in order to have better outcomes according to students’ initiatives, as an innovative way to improve their retention, and satisfaction by increasing the quality of the (online) classes. Hence, it is important to recognize the factors that may affect students' expectations and satisfaction in distance learning or web-based learning, because both factors can be used as indicators of adequacy regulations in the course design, and may help instructors to identify effective strategies or online services that can support students’ needs (Palmer & Holt, 2008). The same authors have emphasized to the importance of satisfying aspects, such as: (a) students’
confidence to simultaneously communicate with others online and learn; (b) students’ understandings of the course’s requirements; and (c) students’ accessibility in several learning sources with instructional guidance.

More recently, Paechter et al. (2010) have also distinguished that educators’ professional skills, ICT skills, and interpersonal communication skills are also very important and are slightly associated with higher students’ expectations or learning objectives. Some design features, of course, should also lay emphasis on collaborative learning opportunities and course structure. Based on a meta-analysis of recently published literature in the field of e-learning, Johnston, Killion and Oomen (2005) have identified that factors such as flexibility, communication and interaction with the instructor, feedback, clarity or adequacy of content, simplicity of access to resources, technological self-efficacy, technical support and guidance can play a central role in student satisfaction.

On the other hand, Hermans, Haytko, and Mott-Stenerson (2008) have also indicated from the structural model a strong relationship among three variables: satisfaction with the instructor, perceived ease-of-use technology, and satisfaction with the course. Moreover, satisfaction is associated with the hybrid or online course delivery methods, which met students’ needs, regarding to student-instructor interaction, instructor’s performance, and course assessment (Ali & Ahmad, 2011; Naaj, Nachouki & Ankit, 2012).

2.3.4. Second Life: Technological capabilities and instructional affordances

3D multi-user virtual worlds are increasingly becoming valuable candidate educational platforms for users (instructor and students) of e-Education who have the potential to be fully engaged and enhanced their (e-) skills through a plethora of learning processes (Coffman & Klinger, 2007). Learning activities in a 3D multi-user virtual world let students freely without additional financial costs or dangerous consequences of their actions to discover and acquire active experiences in realistic practice-based tasks.

Second Life (SL) is one of the most well-established social virtual worlds, offering a 3D networked interactive multi-user virtual environment, where (distributed or not) users can easily adapt interactive and collaborative learning approaches and utilize multiple communication tools (verbal, i.e. VoIP or non-verbal, i.e. IM, chat text or gestures). The educational applications, especially in Second Life are developing everyday at an exceptional rate in different disciplines, and particularly in higher education (Pellas & Kazanidis, 2012; Wang & Burton, 2012; Warburton, 2009).

Most notable studies (see literature review from Inman, Wright & Hartman, 2010; Pellas, 2012; Wang & Burton, 2012) have proven that Second Life can be a nascent 3D interactive-educational platform for collaborative activities based on (socio-)cognitive
theoretical underpinnings, such as Constructionism, Situated learning or Activity theory. Similarly noteworthy, some indicative examples of using Second Life in Higher Education were for the following reasons: (a) users (instructors and students) can provide innovative problem-based learning processes (Good, et al., 2008), (b) users can exploit social interactions with other participants in Second Life in order to better determine the impact of the anticipated learning outcomes (Zhang et al., 2010), (c) can co-design, co-manipulate and evaluate their collaborative activities (Pellas & Kazanidis, 2012); and last but not least (d) users may create distance courses at university-level associated with contemporary learning approaches (Pellas, 2014c).

Previous studies (Fallon, 2010; Jarmon et al., 2009; Petrakou, 2010; Pellas & Kazanidis, 2014d) have shown that Second Life can encourage collaborative, experiential, constructive approaches and promote changes from a superficial learning to a deepening of new one. Compared with other forms of asynchronous learning, like LMS, online forums or wikis, the virtual world of Second Life offers real-time interactions among members. Users can interact with other peers collaboratively in a low-cost 3D persistent environment that still exists even when users log out of it and the changes are somehow permanent. Also, by using a/synchronous communication tools users can give to other peers direct feedback (verbally and visually) in order to re-frame a contemporary “knowledge field” and subsequently learning (Duncan, Miller, & Jiang, 2012; Pellas & Kazanidis, 2012).

3. Research methodology

3.1. Design and procedure

Data gathered from students who participated in the winter semester of October 2011 until the end of the spring semester in June 2012, according to the general 25-week calendar that many universities have. The survey questionnaire was sent to overall 415 students from many places around the earth through email, and from some educational or academic lists (see Project setting) who shared experiences with others that utilized Second Life for collaborative activities in online or hybrid course delivery methods, resulting in 325 valid responses (response rate 78.3%). The probability sample is the most useful for making generalizations in order to have the best results (Cohen, Manion & Morrison, 2007).

The instrument for extracting the results was administrated as a self-report questionnaire through hyperlinks in students’ university email, or even in hard copies in order to help correspondents answering the questionnaire easily. Correspondents of this project were from the United States of America (125-38.4%), Australia (100-30%), United Kingdom (52-16%), Greece (30-10%); Italy (10-3%), Cyprus (8-2.6%).

This empirical study estimated the impact of an intervention on its voluntary target
The present data analysis of each course delivery method (1, hybrid and 2, online) was set at the beginning of the project of the main self-reported questionnaire, as a dichotomous categorical (scale) variable. Qualitative (nominal) variables were the socio-demographic characteristics, the motivational beliefs, achievement-related emotions in academic settings, student satisfaction, and final grades. The current contemplation indicated adequate the present cognitive model with a set of predictive variables and their relative importance. The statistical program SPSS (ver. 22) was used for data processing and reliability of the results.

### 3.2. Purpose and research questions

The purpose of this study is to examine and describe the relationship (positive or negative) between the personal factors and students’ choices to participate in the online or hybrid course delivery methods held in Second Life. These propositions are based on a theoretical framework derived from a social-cognitive approach, where students’ motivational beliefs (task value, self-efficacy and self-regulation), achievement emotions (pride, joy, boredom, etc.) in academic settings (before and after finishing their courses in Second Life), and satisfaction between each different course delivery methods to whether (or not) predict their choice of choosing at least one of the above course delivery methods. Two overarching research questions (RQs) guided this investigation are the following:

**RQ1:** Is there any significant difference in students’ preferences between hybrid and online course delivery methods by utilizing Second Life?

**RQ2:** Can students’ motivational beliefs, achievement emotions and satisfaction predict students’ choice in Second Life supported online or hybrid course delivery methods?

### 3.3. Project setting and treatment

The present study attempted to empirically establish a random sample from many places of the earth. Firstly, students’ previous experiences were asked, regardless their educational disciplines or sectors. Participants of this research were found from two well-known e-mailing lists where instructors or students promote ideas, solutions or experiments that they implemented through Second Life to other users daily with several announcements (Educators List-educators@lists.secondlife.com and Second Life Research List service-slrl@list.academ-x.com).

Herrington, Oliver and Reeves (2003) have underlined that student engagement is being
increased when learners are able to interact and create objects within a virtual environment. According to this perspectives, the sample that finally participated in this survey should firstly be focused their study on: (a) developing, designing, advising on and evaluating tools or artifacts in Second Life (e.g. by constructing PowerPoint presentations or artifacts to connect LMS or Web sources) which were implemented by the same students for formal or informal college-wide professional development, (b) facilitating the assess to expertise services and resources relating to technologically-advanced learning processes, (c) attending in collaborative activities that can be implemented according to the related interests or objectives of each Department (as students were from different disciplines) based on the interest of other colleagues beyond the exiting tasks in order to exchange ideas or other future-driven collaborative practices, (d) producing, editing or manipulating training materials based on Second Life functional characteristics to assist or run training workshops and in particular migrating learning materials in other sources (see Moodle or Blackboard).

Other two fundamental parameters for students’ participation in this study were:

(i) The implementation of the online sessions followed a 20-week university calendar (from the overall 25-week that most universities had), both in winter and spring semester (from October of 2011 until June of 2012).

(ii) the utilization of Second Life as an alternative platform in order to complete the entire online projects that finally implemented.

As it was noted above, the data were collected from two emailing lists and all questionnaires were sent to participants online via email in English language, as the most ecumenical language. The researchers firstly contacted through email on students’ instructors or supervisors, and they asked their permission to conduct with students who participated in online or hybrid university-level courses held in Second Life. According to their approval, the researchers have posted the recruiting letter and link to the online survey on a message board. The instructors also encouraged students to participate in the study. After that, volunteered students filled out the online consent form and directed to answer also the online survey on the website. This research was confidential and Internet protocol (IP) addresses were not collected upon completion of the survey.

3.4. Measurement instruments

Several instruments were used to collect data based on validated instruments, number of items implemented, and scales that currently presented. In order to validate the instruments, the construct reliability and average variance extracted (AVE) were calculated after modification of the instrument to suit the research context.

Section 1 has four (4) questions in order to collect demographic information from the
sample composed of four background and socio-demographic items, including one item used as a variable in this study entitled as: Decisions and students’ choices of each course delivery method were assessed with a single self-report item: “According to your estimation, can the learning material covered significant topics in the online (or hybrid) settings through Second Life, and if you had the choice will you prefer to implement other future-driven projects on it?” The response options were 1 for the hybrid or 2 for the online sections that were held in Second Life. The instruments of each section were used for the existing validated scales. Also, some other valid instruments in order to be measured students’ personal factors were used. These are as follows:

(a) Socio-cognitive constructs of motivation: Two subscales from Artino and McCoach (2008) were used to assess students’ motivational beliefs through an overall 31-item based on 5-level Likert-type instrument: (i) a 7-item self-efficacy subscale assessed student confidence in their ability to learn the material presented in a self-paced course delivery method and (ii) a 14-item task value subscale assessed students’ judgments of how interesting, important, and useful both courses were to them and finally (iii) a 9-item metacognitive self-regulation subscale intended to assess student use of metacognitive control strategies (e.g., planning, setting goals, monitoring one’s comprehension, and regulating performance).

(b) Achievement emotions: These emotions were measured with the Achievement Emotions Questionnaire (AEQ) of an overall 134-item 5-level Likert-type instrument based on two of the main three scales by Pekrun et al. (2011) in which they endorsed three subscales of 8-item for each one, assessed on class-related emotions, learning-related emotions, and test-related emotions. Worth noting is the fact that the specific instrument of items measuring pride, relief, anger, shame, before and after finishing tests or exams was answered only for those students’ who participated in (fully) online and hybrid processes in Second Life. These perspectives can help instructors to better understand students’ emotions for implementing further educational settings in Second Life.

According to this process, it was also configured in some subclasses the main questionnaire that Pekrun and Stephens (2010) have presented. Only class-related (hope, pride, anger, anxiety and hopelessness) and test-related (hope, pride, relief, anger and shame) emotions met this study’s needs for the evaluation of students’ emotions after finishing these lessons. Learning-related emotions included only situations by the time that the lessons were implemented (see recommendations from Pekrun et al. 2011) were obviously precluded. Hence, the investigation of students’ participation, before and after attendance in online or hybrid course delivery methods was crucial for this study, but not during their learning processes, because the researchers could not be at all virtual classes in time that several courses implemented in Second Life. Indeed, the subscales that served the study’s scope
finally adapted from Pekrun and Stephens (2010). The instruments were separated as follows:

(i) Class-related emotions: It was used in 9-item for researching hope, 9-item for researching pride, 11-item for researching anger, 13-item for researching anxiety, and 10-item subscale questionnaire for researching hopelessness of students’ emotions.

(ii) Test-related emotions: It was used in 16-item subscale for hope, 16-item subscale for pride, a 14-item subscale for relief, a 17-item subscale for anger, and a 19-item subscale for shame.

The student satisfaction instrument was measured in a 12-item questionnaire (5-level Likert-type) developed by Lin and Overbaugh (2007).

The overall reliability was calculated by using Cronbach’s alpha. In this case, values greater than a=.70 are taken into account to indicate an acceptable level of reliability (Singh, 2007). Data were analyzed by the independent-samples t-test and the paired-samples t-test for comparisons between the means of the motivational beliefs, achievement emotions, satisfaction and final grades of graduate and postgraduate students, and within subjects to compare the difference between the means of variables in hybrid/online-test, respectively. Values of p<.01 or p<.05 were considered as significant.

4. Results

4.1. Sample and socio-demographic information

The target-sample composed of 325 students and all of them agreed to participate in this survey. Table 1 depicts the demographic characteristics of this survey.

<table>
<thead>
<tr>
<th>Course delivery method</th>
<th>Mean</th>
<th>SD</th>
<th>Overall (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid (n=170)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21.4</td>
<td>4.14</td>
<td>170</td>
</tr>
<tr>
<td>Female</td>
<td>20.7</td>
<td>4.12</td>
<td>90 (53)</td>
</tr>
<tr>
<td>Online (n=155)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21.8</td>
<td>4.32</td>
<td>155</td>
</tr>
<tr>
<td>Female</td>
<td>20.4</td>
<td>4.55</td>
<td>88 (57)</td>
</tr>
</tbody>
</table>

n, number of students; M, Mean; SD, Standard Deviation

a The mean scores of students who participated with the hybrid course delivery method
b The mean scores of students who participated with the online course delivery method

The first intention was to be described the socio-demographic results from students’ e-profiles, as Table 2 summarized. All of the 325 students who participated in hybrid or online course sessions have agreed to complete the anonymous online surveys via email or hard copies.

Table 2: Socio-demographic characteristics of the sample
### Degree objective

<table>
<thead>
<tr>
<th></th>
<th>Industrial Informatics</th>
<th>Economics &amp; Business Administration</th>
<th>Civil &amp; Architectural Engineering</th>
<th>Computer Sciences</th>
<th>Industrial Informatics</th>
<th>Economics &amp; Business Administration</th>
<th>Civil &amp; Architectural Engineering</th>
<th>Computer Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate</td>
<td>12</td>
<td>13</td>
<td>5</td>
<td>26</td>
<td>12</td>
<td>13</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>(30)</td>
<td>(32)</td>
<td>(13)</td>
<td>(51)</td>
<td>(35)</td>
<td>(29)</td>
<td>(15.3)</td>
<td>(60)</td>
</tr>
<tr>
<td>Bachelor</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>11</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>(37.5)</td>
<td>(36)</td>
<td>(30)</td>
<td>(22)</td>
<td>(43)</td>
<td>(33)</td>
<td>(37.7)</td>
<td>(25.4)</td>
</tr>
<tr>
<td>Master</td>
<td>7</td>
<td>7</td>
<td>15</td>
<td>12</td>
<td>7</td>
<td>11</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>(17.5)</td>
<td>(17)</td>
<td>(39)</td>
<td>(23)</td>
<td>(20)</td>
<td>(24)</td>
<td>(47)</td>
<td>(18.6)</td>
</tr>
<tr>
<td>PhD</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(15)</td>
<td>(15)</td>
<td>(18)</td>
<td>(4)</td>
<td>(2)</td>
<td>(14)</td>
<td>(0)</td>
<td>(14)</td>
</tr>
</tbody>
</table>

- Overall: 40  41  38  51  35  45  32  43

### Previous experience with Web 2.0 applications

<table>
<thead>
<tr>
<th></th>
<th>Hybrid (%)</th>
<th>Online (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6 months</td>
<td>10 (25)</td>
<td>12 (30)</td>
</tr>
<tr>
<td></td>
<td>10 (23)</td>
<td>20 (40)</td>
</tr>
<tr>
<td></td>
<td>15 (43)</td>
<td>20 (44)</td>
</tr>
<tr>
<td></td>
<td>12 (37.5)</td>
<td>13 (30)</td>
</tr>
<tr>
<td>7-12 months</td>
<td>14 (35)</td>
<td>13 (32)</td>
</tr>
<tr>
<td></td>
<td>12 (31)</td>
<td>14 (27)</td>
</tr>
<tr>
<td></td>
<td>14 (28)</td>
<td>14 (31)</td>
</tr>
<tr>
<td></td>
<td>14 (31)</td>
<td>14 (31)</td>
</tr>
<tr>
<td>More than a year</td>
<td>16 (40)</td>
<td>16 (38)</td>
</tr>
<tr>
<td></td>
<td>16 (32)</td>
<td>17 (33)</td>
</tr>
<tr>
<td></td>
<td>10 (29)</td>
<td>11 (25)</td>
</tr>
<tr>
<td></td>
<td>6 (19)</td>
<td>16 (37.5)</td>
</tr>
<tr>
<td>Overall</td>
<td>40 (100)</td>
<td>41 (100)</td>
</tr>
<tr>
<td></td>
<td>38 (95)</td>
<td>51 (100)</td>
</tr>
<tr>
<td></td>
<td>35 (88)</td>
<td>45 (100)</td>
</tr>
<tr>
<td></td>
<td>32 (80)</td>
<td>43 (100)</td>
</tr>
</tbody>
</table>

### Students' status

<table>
<thead>
<tr>
<th></th>
<th>Hybrid (%)</th>
<th>Online (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-time student</td>
<td>16 (40)</td>
<td>12 (30)</td>
</tr>
<tr>
<td></td>
<td>13 (34)</td>
<td>11 (22)</td>
</tr>
<tr>
<td></td>
<td>30 (85)</td>
<td>32 (71)</td>
</tr>
<tr>
<td></td>
<td>30 (85)</td>
<td>24 (71)</td>
</tr>
<tr>
<td>Full-time student</td>
<td>24 (60)</td>
<td>29 (70)</td>
</tr>
<tr>
<td></td>
<td>25 (66)</td>
<td>40 (78)</td>
</tr>
<tr>
<td></td>
<td>5 (15)</td>
<td>13 (29)</td>
</tr>
<tr>
<td></td>
<td>2 (6)</td>
<td>19 (44)</td>
</tr>
<tr>
<td>Overall</td>
<td>40 (100)</td>
<td>41 (100)</td>
</tr>
<tr>
<td></td>
<td>38 (95)</td>
<td>51 (100)</td>
</tr>
<tr>
<td></td>
<td>35 (88)</td>
<td>45 (100)</td>
</tr>
<tr>
<td></td>
<td>32 (80)</td>
<td>43 (100)</td>
</tr>
</tbody>
</table>

### Previous hybrid/online course experience in virtual worlds

<table>
<thead>
<tr>
<th></th>
<th>Hybrid (%)</th>
<th>Online (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous course based in</td>
<td>23 (57.5)</td>
<td>32 (78)</td>
</tr>
<tr>
<td>online or hybrid</td>
<td>19 (91)</td>
<td>19 (65)</td>
</tr>
<tr>
<td>instructional formats</td>
<td>33 (95)</td>
<td>40 (90)</td>
</tr>
<tr>
<td>was not taken</td>
<td>20 (62.5)</td>
<td>30 (70)</td>
</tr>
<tr>
<td>Previous course based in</td>
<td>17 (42.6)</td>
<td>9 (22)</td>
</tr>
<tr>
<td>online or hybrid</td>
<td>19 (59)</td>
<td>8 (35)</td>
</tr>
<tr>
<td>instructional formats</td>
<td>8 (5)</td>
<td>5 (10)</td>
</tr>
<tr>
<td>was taken</td>
<td>12 (37.5)</td>
<td>13 (30)</td>
</tr>
</tbody>
</table>

- Overall: 40  41  38  51  35  45  32  43

### 4.2. Descriptive and comparative findings of hybrid and online course delivery methods
The descriptive statistics of scores that were calculated in each variable of fully online and hybrid course delivery method were shown in Table 3. The reliability evidence and dimensions of the scales were also calculated with the Cronbach’s alpha (α) coefficient. The t-test results revealed statistically significant group differences for two of the nine variables with also final grades to be included.

Table 3: Descriptive statistics and independent t-test samples for the seven measured variables by online and hybrid course delivery method

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s alpha</th>
<th>t statistic</th>
<th>M</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self-efficacy</td>
<td>.82</td>
<td>1.41</td>
<td>2.49*</td>
<td>.564</td>
</tr>
<tr>
<td>2. Self-efficacy</td>
<td>.88</td>
<td>4.23*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Metacognitive self-regulation</td>
<td>.84</td>
<td>.67</td>
<td>2.35</td>
<td>.632</td>
</tr>
<tr>
<td>2. Metacognitive self-regulation</td>
<td>.87</td>
<td></td>
<td>4.14</td>
<td></td>
</tr>
<tr>
<td>1. Task value</td>
<td>.81</td>
<td>.73</td>
<td>2.67</td>
<td>.556</td>
</tr>
<tr>
<td>2. Task value</td>
<td>.83</td>
<td></td>
<td>3.87</td>
<td></td>
</tr>
<tr>
<td>1. Class-related emotions</td>
<td>.79</td>
<td>.89</td>
<td>3.18</td>
<td>.336</td>
</tr>
<tr>
<td>2. Class-related emotions</td>
<td>.79</td>
<td></td>
<td>4.65</td>
<td></td>
</tr>
<tr>
<td>1. Test-related emotions</td>
<td>.81</td>
<td>1.12</td>
<td>2.71</td>
<td>.752</td>
</tr>
<tr>
<td>2. Test-related emotions</td>
<td>.84</td>
<td></td>
<td>4.53</td>
<td></td>
</tr>
<tr>
<td>1. Satisfaction</td>
<td>.85</td>
<td>1.54</td>
<td>2.81*</td>
<td>.721</td>
</tr>
<tr>
<td>2. Satisfaction</td>
<td>.88</td>
<td>4.22*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Final grade</td>
<td>-</td>
<td></td>
<td>65.55</td>
<td></td>
</tr>
<tr>
<td>2. Final grade</td>
<td>-</td>
<td>3.48</td>
<td>87.75</td>
<td>.003</td>
</tr>
</tbody>
</table>

Note: n, number of students; 1, hybrid course delivery method (n=170); 2, fully course delivery method (n=155); M, Mean Difference.

*p<.05
Bonferroni adjustment was used to control for inflation of type I error associated with multiple comparisons (alpha=0.05/9=0.0059). The self-reported variables were measured on a 5-point, Likert-type agreement scale. Due to missing data, the overall n reported is less than the 325 students who involved in the present study.

The above instructions work if all grades are reported to each student on a standard 100-point scale that ranges from 50 to 100.

Students’ participation in hybrid and online groups in Second Life revealed some interesting comparative results from motivational beliefs and achievement emotions that can be distinguished as follows:

- The difference between the scores of hybrid and fully online program self-efficacy variable was found significant (p=.021). The average score of fully online course delivery method was calculated as 4.23, while the average score of hybrid was 2.49. The effect size of the study (Cohen’s d) was .564. This value indicated by a medium level of the effect size according to Cohen’s Standard (Cohen, 1988). It can be confirmed that students have found online programs more useful than with the hybrid.

- The difference between the scores of hybrid and online metacognitive self-regulation variable was not found significant (p=.537). The average score of online course delivery method was calculated as 4.14, while the average score of hybrid was 2.35. The effect size of the study (Cohen’s d) was found .632.
• The difference between the scores of hybrid and online task value variable was not found significant \( (p=.619) \). The average score of online course delivery method was 3.87, while the average score of hybrid was 2.67. The effect size of the study (Cohen's \( d \)) was .556.

Supplementary to the achievement emotions, we have also analyzed and presented the data below:

• The difference between the scores of hybrid and online’s class-related emotions variable was significant \( (p=.002) \). The average score of online course delivery method was 4.65, while the average score of hybrid was 3.18. The effect size of the study (Cohen's \( d \)) was .336. This value indicated a small level of effect size according to Cohen's standard. According to the obtained findings, it can be stated that although the difference between the scores of both methods was found significant, the class-related of both was low.

• The difference between the scores of hybrid and online test-related variable was not found significant \( (p=.645) \). The average of online scores was 4.53, while the average of hybrid scores was 2.71. The effect size of the study (Cohen's \( d \)) was .752. 

Last but not least, the difference between the scores of hybrid and online class-related satisfaction variable was significant \( (p=.007) \). The average score of hybrid instructional format was 2.81, while the average score of online was 4.22. The effect size of the study (Cohen's \( d \)) was .721. In contrary to the class-related this value indicated a large level of effect size according to the Cohen's standard. It can be stated on this occasion that students’ satisfaction with the online course delivery method through Second Life was higher than those who participated in hybrid.

4.3. Reliability and validity of measures

Before conducting the analysis, the suitability of data for factor analysis was measured. It is crucial to be noticed the present sample (325 participants) were more than 300 and this may be a good sample for a confirmatory factor analysis as Comrey and Lee (1992) have pointed out. Convergent validity was achieved if loadings of measures into respective constructs were at least .60 (Kline, 2005).

Table 4 showed the range of loadings between .62 and .83, thus it was established convergent validity. This distinction can be determined by means of the square multiple correlations (SMC) of each indicator and the total coefficient of determination (Bollen, 1989). Indeed, all squared multiple correlations (R-square) should be at least .40 (Bollen, 1989). The composite reliability (CR) of all constructs was above .60 (Bagozzi & Yi, 1988) and average variance extracted (AVE) was above .50 (Fornell & Larcker, 1981), and thus further
supporting the convergent validity that was needed.

Table 4: Standardized factor loadings range, Square Multiple correlations range, Composite Reliability Average Variance Extracted, and t-value range

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Factor loading range</th>
<th>Square Multiple correlations range</th>
<th>Composite Reliability</th>
<th>Average Variance Extracted</th>
<th>t-value range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>7</td>
<td>.74-.76</td>
<td>.74-.77</td>
<td>.87</td>
<td>.84</td>
<td>9.412-10.475</td>
</tr>
<tr>
<td>Metacognitive self-regulation</td>
<td>9</td>
<td>.62-.64</td>
<td>.79-.81</td>
<td>.82</td>
<td>.85</td>
<td>8.785-9.547</td>
</tr>
<tr>
<td>Task value</td>
<td>14</td>
<td>.61-.67</td>
<td>.74-.79</td>
<td>.79</td>
<td>.86</td>
<td>7.586-8.967</td>
</tr>
<tr>
<td>Class-related emotions</td>
<td>20</td>
<td>.62-.65</td>
<td>.71-.73</td>
<td>.86</td>
<td>.82</td>
<td>8.147-8.847</td>
</tr>
<tr>
<td>Test-related emotions</td>
<td>66</td>
<td>.71-.73</td>
<td>.75-.77</td>
<td>.83</td>
<td>.92</td>
<td>8.975-9.477</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>12</td>
<td>.81-.83</td>
<td>.84-.87</td>
<td>.87</td>
<td>.91</td>
<td>9.888-10.466</td>
</tr>
</tbody>
</table>

Note: *acceptable level of reliability or validity; values set at 1.00 for identification purpose; AVE, summation of squared factor loadings/(summation of squared factor loadings) (sum of error variances) (Fornell & Larcker, 1981)

4.4. Confirmatory factor analysis

Brown (2006) has described the use of confirmatory factor analysis (CFA) to specify a structural model indicated which variable load on can be correlated with each factor. In this case, the fit of this data to this model can be measured through SPSS (ver. 20) to provide construct validity evidence for the survey subscales and to substantiate the hypothesized factor structure. Specified factor loadings as a set of regression statements from the factor of the observed variables are also included. Loadings that were not specified, assumed to be fixed at zero (0). Goodness of fit tests and measures provided along with diagnostic information to help us determine weak points of the current model.

Below, the summary was compared with the main criteria of the present model and previous works that often used for regarding it as an acceptable model are also referred. These are:

(a) The Normed Fit Index (NFI) was 1.22 and exceeded the limit of .95 (Schumacker & Lomax, 2004);
(b) The Goodness of Fit Index (GFI) counted .99 and exceeded .90 (Byrne, 1994)
(c) The Comparative Fit Index (CFI) was .98 and exceeded .93 (Byrne, 1994)
(d) The Root Mean Square (RMS) is less than .043, ideally less than .05 (Steiger, 1990).
(e) The relative chi-square (or otherwise named as a normed chi - square) \[x^2 (96, n=325) =5.78, p=.003\] was less than 2 (Ullman, 2001). According to this value equals the chi-square index divided by the degrees of freedom;
(f) The Root Mean Square Error of Approximation (RMSEA), was .99;
(g) The Standardized Root Mean Square Error of Approximation (SRMR), was .96;
(h) The Turker-Lewis Index (TLI) was .96, greater than .90 (Hu & Bentler, 1999).
Table 5 presented the goodness of fit indices (GFIs) for this model.

<table>
<thead>
<tr>
<th>Model</th>
<th>Chi-square</th>
<th>df</th>
<th>p</th>
<th>NFI</th>
<th>NNFI</th>
<th>CFI</th>
<th>GFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Model</td>
<td>1.73</td>
<td>96</td>
<td>.003</td>
<td>1.22</td>
<td>1.82</td>
<td>.98</td>
<td>.99</td>
<td>.99</td>
</tr>
</tbody>
</table>

Note: df, degrees of freedom; NFI, normed fit index; NNFI, non-normed fit index; CFI, comparative fit index; GFI, adjusted goodness of fit index; RMSEA, root mean square error of approximation ($n = 325$).

Depending on other indicators, which were frequently used, and these criteria that are merely defined as guidelines to be illustrated in a field where previous models generated CFI values of .70 only and a CFI value of .99 represented progresses. Thus the present model should be acceptable (Bollen, 1989).

**4.5. Logistic regression analysis**

The logistic regression is a method of multivariate statistical analysis utilized a set of independent variables to investigate the motion of a categorical dependent variable. The present analysis helped the researchers to investigate the unique contribution of the independent variables predicted group membership (online and hybrid). For the construction of the present model, nine (9) independent variables (final grades also included) were chosen as predictors which may be either categorical or continuous, or even a mix of both in one model. This technique allowed the exploration of the predictive ability of sets or blocks of variables, in order to be better specified the entry variables, considering to the size and nature of the present sample. Also, the number of cases in this sample should be concerned and a number of predictors (independent variables), which are included in this conceptual model.

The current study had a large number of predictors, where researchers may have problems with the analysis (including the problem of the solution failing to converge). In these circumstances the logistic regression was more useful for predicting the presence or absence of a characteristic or an event. This forecast was based on the construction of a linear model and the determination of values was taken by the coefficients of independent variables that used as predictor variables. Apart from providing a logistic regression analysis, this model gave the ability to assess the effect of each independent variable in shaping values of the dependent variable (multi-collinearity of course delivery method). Outlines can also influence the results of logistic regression and can be used for investigating the unique contribution of the independent variables in predicting group membership (1, hybrid and 2, fully online program).

In this analysis, age, gender, and final grades were included to control for their potential effects on the outcome. Table 6 provided a summary of the logistic regression analysis. These results not only supported, but also extended the findings gathered from the
independent-samples t-tests. All model fit statistics improved by the additional 9 variables to this model. Similarly noteworthy, the likelihood ratio R-square test was used to assess the proportional reduction in deviance produced by the model with eight predictors when compared to the null model and thus the results revealed a 73% reduction in deviance, a large effect (Menard, 2000). Thereof, the final model classification characteristics improved when it was compared to the null model. In particular, according to Table 6, 64.5% of students were correctly classified (−2 log likelihood=536.95; \(x^2(9)=29.15, p<0.001\)) and the likelihood ratio \(R^2\) (i.e., the proportional reduction in deviance produced by the final model when compared to the null model) was .073. Three variables were statistically significant predictors of group membership: task value (\(b=−.32, p<0.01\)), self-efficacy, (\(b=.21, p<0.01\)), and satisfaction (\(b=.52, p<0.001\)).

The odds ratios indicated that membership in the online preference group was 1.33 and 1.79 times more likely for every one unit increased in the self-efficacy and satisfaction subscales respectively. This describes that in spite task value was not being statistically significant different at the mean level, it was a significant predictor of group membership. The group membership based on online instructional format was .86 times less likely for each member, while the task value subscale was increased. Henceforth, logistic regression analysis confirmed that students who participated in online university-level courses were predicted at higher levels of self-efficacy and satisfaction, but lower on task value beliefs.

Table 6: Model summary of the logistic regression model with 9 independent variables predicting the hybrid and online group membership.

<table>
<thead>
<tr>
<th>Variables</th>
<th>b</th>
<th>SE</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>−.08</td>
<td>.09</td>
<td>1.34</td>
</tr>
<tr>
<td>Age</td>
<td>.29</td>
<td>.23</td>
<td>.92</td>
</tr>
<tr>
<td>Socio-cognitive factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.21*</td>
<td>.19</td>
<td>1.33</td>
</tr>
<tr>
<td>Metacognitive self-regulation</td>
<td>−.15</td>
<td>.15</td>
<td>.66</td>
</tr>
<tr>
<td>Task value</td>
<td>−.32</td>
<td>.16</td>
<td>.86</td>
</tr>
<tr>
<td>Achievement emotions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class-related emotions</td>
<td>.15</td>
<td>.17</td>
<td>1.16</td>
</tr>
<tr>
<td>Test-related emotions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>.52**</td>
<td>.17</td>
<td>1.34</td>
</tr>
<tr>
<td>Final grade</td>
<td>−.01</td>
<td>.03</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Note: b, unstandardized regression coefficient; SE, standard error around the coefficient for the constant; OR, odds ratio.

1, hybrid; 2, online program.

*p<0.01.

**p<0.001.

Table 7: Model fit statistics

<table>
<thead>
<tr>
<th>-2 Log Likelihood</th>
<th>Likelihood ratio (x^2)</th>
<th>Likelihood ratio (R^2)</th>
<th>%Correctly classified</th>
</tr>
</thead>
<tbody>
<tr>
<td>536.95</td>
<td>29.15*</td>
<td>.073</td>
<td>64.5</td>
</tr>
</tbody>
</table>

Note: The−2 log likelihood for the null model=566.10; percent correctly classified in the null model=62.6.
Breakthroughs in these aspects from the overall 325 correspondents, 257 (79%) indicated that if they had the choice, they would like to take future aviation courses in an online course through Second Life. In these circumstances, the chi square analysis revealed that the proportion of male and female in the two self-selected groups did not differ \( \chi^2 (1) = .68, p = .53 \).

5. Discussion

The primary purpose of the current study was to investigate the relation between several socio-cognitive constructs of motivation and students’ choices of course delivery method through Second Life, by utilizing a social-cognitive approach. Findings partially confirmed the hypothesis that motivational beliefs, achievement emotions in academic settings, and satisfaction can predict the students’ choice to take further courses through the online course delivery method. Additionally, primary distinctions indicated that the students’ instructional choices were closely related to self-efficacy beliefs and overall satisfaction in a mutual online program. The current findings have extended previous research in virtual environments suggested that students’ assurance and satisfaction can be important for learning outcomes in online situations and likely may affect their decisions on whether or not taking further courses in online settings (Bowman, Gabbard & Hix, 2002).

Moreover, it is clearly understandable that self-efficacy in online sessions was positively related to achievement outcomes, and self-efficacy beliefs could also influence students’ participation in future-driven learning tasks. As it was expected, students with greater confidence have the ability to learn better in online course delivery methods. Likewise, students who were satisfied with a recent online learning experience were also more likely to choose online learning programs again through the utilization of 3D multi-user virtual worlds in the future, a finding that is consistent with previous empirical studies (Bulu, 2012; Hew & Cheung, 2010).

Inevitably, the study results revealed that when hybrid and online methods were compared in relation to 9 independent variables, there were significant differences in favor of online. Also, other findings from this research have shown that although students were positive emotions participated in both hybrid and online course delivery methods, some of them were satisfied with the latter one more. Thus, students’ satisfaction with online programs was higher than those who participated in hybrid. Results for the online method proved as more positive that those in hybrid, probably because students have found this process more flexible, for interacting with other peers. This opportunity can be valuable due to the use of multiple verbal and non-verbal communications tools or artifacts and visual tools.
that Second Life offered as a nascent learning platform. The study results also suggested that those students who found the learning content interesting, important and useful they may also prefer to attend in an online courses in the future.

At some particular points, self-efficacy for online learning programs was positively related to the achievement emotions, consistent with other findings (Nicolaidou & Philippou, 2004; van Dinther, Dochy & Segers, 2011). Students’ self-efficacy beliefs in this study have also a positive impact on their choices for further online collaborative activities. Clayton, Blumberg, and Auld (2010) have found that students’ self-efficacy was an important factor to choose an online learning experience than a traditional classroom experience and specifically “students’ self-efficacy beliefs usually increased if they have a successful online experience” (p. 361). The study findings were also consistent with Anderson and Emmers-Sommer (2006) who have confirmed this occurrence.

Taking all the above into account, online instructors may be able to positively impact on students’ course delivery method choice by addressing firstly their self-efficacy beliefs (Artino, 2008b; Paraskeva, Bouts & Papagianni, 2008). In fact, this may produce better learning practices that can strengthen the implementation of tasks in a virtual environment, such as collaborative or decision-making approaches related to communication protocols (Hewagamage, Nishakumari & Wikranamake, 2011). An interesting finding in this study was that membership in the online preference group was predicted by lowering task value beliefs.

According to Templelaar et al. (2012) study, achievement emotions appeared to have a moderately strong effect on students’ preferences for online learning, whereas in Artino and Jones (2012) study the positive achievement emotions have seemed to affect elaboration and metacognition. In the present study, metacognitive self-regulation was not a significant predictor. Although, from the obtained results, the difference between the scores of both methods variables were found significant, the class-related emotions of online and hybrid sessions were at low levels.

The quantitative analysis between students’ motivational beliefs, achievement emotions, satisfaction and anticipated learning outcomes of the comparative tests indicated that students’ online intervention and support greater their engagement to a considerable extent. Finally, students were able to respond better in online sessions and corroborated in a constant process of learning, in order to understand the basic principles of collaborative learning tasks with their peers in Second Life as a candidate learning platform. This suggested that the proposed students’ intervention in this virtual world may facilitate the continuous feedback of main principles governing the concept of learning, i.e. the (collaborative) co-construction of knowledge among students who participate in various activities that can lead to a more secure and confident understanding of concepts. Evidence from this study
confirmed the preference of online learning as a reliable and robust course delivery method that is related to the extent in which students can understand the respective value of the course content.

Another noteworthy point of view is the success of educational activities in Second Life that appeared to depend largely on the dynamic relationship emerged between students and the modified virtual learning environment. It is assumed that in nowadays a digital educational platform in order to be well-designed needs a graphical user interface (GUI) that is more attractive, functional and ergonomic, enabling students to enhance or retrieve cognitive skills and become more effective in learning tasks. Based on this idea, instructors should take into account parameters related to the degree and type of interaction, the details of applications that are able to be reorganized, and finally as well as the ability that provided for an effective assistance to control the 3D persistent workflow of Second Life.

6. Conclusion

In conclusion, the present study offered some of the most fundamental theoretical and practical perspectives. From a theoretical point of view, it is truly understandable that students of Higher education have indicated more likely online processes held in Second Life that continued to be an equally important part of learning in the “Net Generation Society.” From a practical point of view, the current findings unveiled the valuable penetration of Second Life for the implementation of various courses in Institutes or Higher Education faculties, by encouraging students’ participation mainly in online settings, as the logistic regression analysis proved.

To sum up, the pedagogical affordances by utilizing Second Life can essentially impact collaborative learning processes providing an innovative knowledge domain for students’ engagement in online sessions (Pellas, 2014a). Nevertheless, instructors need to find innovative online processes that enhance their dual role, which is not only to provide the appropriate feedback to students in real-time situations, but also to facilitate their active participation, and as a result:

(a) To help learners collaborate with other peers in a common 3D multi-user environment.
(b) To provide evidence of a meaningful learning process.
(c) To create opportunities and benefits for students’ equation in order to elicit their positive and negative provisions as heterogeneous teams (due to their age, or cognitive background) that may be enrolled in the course.

At this stage certain factors that should be defined may have an important role in the development of collaborative processes. Some of them are really important and should be
taken into consideration before students’ introduction in Second Life.

Three significant educational implications that should be determined are as follows:

- The increased interest of students for the implementation of alternative learning approaches which were held in Second Life. Hence, it would be useful to repeat the study with students who are more accustomed to learning in virtual environments, since they have used different platforms as part of the global Web 2.0 community, and thus enjoyed their engagement in these platforms. Perhaps this factor should be considered as a crucial point because logistic regression analysis confirmed that users who participated in online sessions through Second Life were predicted at higher levels of self-efficacy and satisfaction, but lower on task value beliefs.

- The instructor of an online program may be able to positively impact the students’ choice to participate in online course delivery method by addressing their self-efficacy beliefs and satisfaction.

- Last but not least, it was not yet cleared whether users can be attributed to the promotion of collaborative climate in order to discourage selfish behaviors or simply to the additional intervention of the instructor with the appropriate feedback to students. According to this data, students’ participation in online tasks may work more effectively than in hybrid. Therefore, the design and promotion of innovative educational services held in 3D multi-user virtual worlds, must concern scholars and educational researchers to explore alternative options to facilitate students’ interactions at the level of actual problem-solving situations in realistic settings by modifying learning activities and introducing a new evidence for collaborative learning activities.

7. Limitations and future directions

Some of the most important limitations that should be considered when interpreting the current findings are as follows:

(a) It was not used the learning-related scale questionnaire from Pekrun et al. (2011) study something that may help scholars and researchers to understand students’ emotions during learning processes with both methods.

(b) Students’ characteristics may differ from other universities, and as a result the findings of this study cannot be generalized so easily.

Future-driven studies should explore the relationships between students’ motivational characteristics, and their use of cognitive and metacognitive learning strategies, or their academic achievement in online or hybrid course delivery methods in virtual communities of inquiry (Pellas, Peroutseas & Kazanidis, 2013b; Pellas, 2014b). It is an alternative method
that can provide in various ways a content analysis of online discussion boards that might be especially useful for exploring the relations between students’ self-regulation and the extent in which their online interactions indicated the most appropriate processing for the knowledge’s construction in collaborative settings through 3D multi-user virtual worlds.

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