The influence of computer self-efficacy, metacognitive self-regulation and self-esteem on student engagement in online learning programs: Evidence from the virtual world of Second Life

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Abstract
While the widespread acceptance of social virtual worlds is being increased in the last years, little are known about how students’ personal factors can affect their engagement in online learning courses. The current study proposed and empirically examined a conceptual model that aimed to fill this gap. The main purpose is to present an extensive empirical data of 305 novice or expert students (153 graduates and 152 postgraduates) who enrolled in online courses at university level which were held in Second Life. On this occasion it was tried to be investigated, measured and finally verified the effects of computer self-efficacy, metacognitive self-regulation and self-esteem that can predict the students’ engagement as an overall multidimensional construct of factors (cognitive, emotional and behavioral). The results from the three-step hierarchical regression analysis revealed that computer self-efficacy, metacognitive self-regulation, and self-esteem in online courses were not only positively correlated with student’s cognitive and emotional engagement factors, but were also negatively correlated with behavioral factors. Educational implications from these results can provide a more expedient and meritorious instructional quality format aimed at reinforcing users’ engagement in Second Life for sequencing and pacing future-driven online courses.

1. Introduction
In this contemporary era, Information and Communication Technologies (ICT) can provide a great basis for online learning courses by creating independent web sources from users’ (instructors and students) regardless their location. In these dimensions a learning procedure is not only possible, staying at a distance, but also within geographically dispersed student groups or communities. Online learning is becoming a mainstream on the widespread dissemination of ICT services with Computer-Supported Collaborative Learning (CSCL) transactions. Also, the rapid development of Web and especially the new generation of Web 2.0 have enriched the “traditional” formalization of online course delivery methods. Additionally, Web 2.0-based applications can support the active collaboration between spatial distributed users beyond the multiple means of expression, communication, dialogue, negotiation, and ultimately the deep and meaningful learning (Alloway, T., Horton, Alloway, R. & Dawson 2013; Krauskopf, Zahn, & Hesse, 2012). A breakthrough in these aspects is the renewed interest of researchers (Daniels & Stupnisky, 2012; DeAndrea et al., 2012; Moore,
Dickson-Deane, & Galden, 2011) for the mechanisms in which emotional students’ reactions and behaviors in various learning procedures can formulate and influence the acquisition of knowledge or the development of their e-skills in online environments which is also being increased.

With the continuing escalation and diffusion of Web-based technologies and services, the online learning has become commonly accepted by the global academic community. This was proved by the vast majority of programs that implemented and operated with this instructional format as either an innovative learning course delivery method or as a supplementing approach to gain more easily students the new knowledge and instructors to pronounce their learning materials when they are spatially distributed. Sloan Consortium (2011) has reported for the online education in the United States of America that the number of students who took at least one online course in the fall of 2010 surpassed up to 6 million; while their online enrollment accounted for nearly one third percent (33%) of all students in Higher education. Therefore, it becomes vital for educators and scholars in nowadays to understand the efficient role of this course delivery method in order to exploit the online method with other innovative technologies in alternative and flexible technological modes.

Many well-known two-dimensional (2D) learning environments (see Learning Management System-LMS, such as Moodle or Blackboard or Massive Open Online Courses-MOOCs) are being used from Universities or Institutions as “warehousing of knowledge” where students and instructors share educational resources of the Web and communicate mainly asynchronously with type-based applications (messages on a specific forum and exchanging e-mails with other group members). Additionally, most recent “conventional” educational practices with 2D LMS in Higher education were primarily based on the oral or written communication forms and (re-) presentations of knowledge in different disciplines and answers in theoretical problems which were usually delivered by the instructor who acted as an “expert” on the one side, but on the other students could not recall or take the appropriate feedback from their instructor in real time.

This approach has been many times a target of criticism because:

(i) the learning materials were not always grounded according to students’ understandings and prior experiences that the real world can endorse;

(ii) the self-directed learning and critical thinking skills weren’t sufficiently cultivated because students were not involved in educational activities to discover or conquer from other information sources;

(iii) students do not possess the appropriate skills to apply the acquired knowledge of real-world problems that are often not well-established or were sufficiently encountered with practical points of view.
Thereupon, it is still emerging a gap of how can these technologies enhance not only the learner’s independence, but also encourages each individual to collaborate with others during the learning procedure, whilst they sometimes didn’t have the support of the instructor in real time or the responsibility of what they really want to learn. A variety of institutions in recent years of economical crisis always seek to find open source, low cost solutions or freely available learning platforms in which the degree of manipulation, development and adoption among users with the learning material can become meaningful and valuable.

Three-dimensional (3D) multi-user virtual worlds are in this era the most well-established candidate platforms for connecting multidisciplinary learning, virtual communities in which users (instructors and students) can learn collaboratively with others more easily (Pellas, Peroutseas & Kazanidis, 2013). All the aforementioned have led scholars and educators utilize VWs for purposeful educational practices in different disciplines (Bulu, 2012; Burgess et al., 2010; Dziuban, Hartman & Moskal, 2004; Hew & Cheung, 2010; Pellas & Kazanidis, 2013; Wang & Burton, 2013). It seemed that multi-user VWs can fill the gap created from users’ presences, both in a natural and artificial environment in order to be achieved the avatars’ co-presence communication and interaction simultaneously among users with the learning material and in a common virtual environment.

The emerging innovations of Web 2.0-based environments, in conjunction with technologically-advanced environments that support 3D desktop virtual reality (VR) interfaces have become another growing and interesting field of study. The reasons are as follows:

(i) The illustrious opportunity for users to interactively co-construct or co-manipulate a new knowledge domain with various visual tools and artifacts through a learning process in which collaboration and interaction among users is included.

(ii) The implementation of learning activities in a 3D common virtual place can help students to exchange and share ideas or even “transfer” their knowledge domain by interacting synchronously (VoIP, chat text, gestures) or asynchronously (IM) with other peers.

(iii) The interrelation between various factors that may affect learning in VWs like interactivity, representational fidelity and conceptual modeling techniques which are already known (Dalgarno & Lee, 2010; de Freitas et al., 2010).

Nowadays, Second Life (http://secondlife.com/) is regularly one of the most popular VWs composed with a multi-complex “cyber-sphere” of interactive variables (artifacts, exchangeable 3D visual objects, and multiple communication channels) that combined and interconnected through Web 2.0 sources and transactions. This VW can endorse a whole mixture of users’ roles, activities, relationships, interactions, circumstances and influences
who can participate as cyber entities (human’s embodied representation or avatars). Particularly noteworthy is the dynamic dimension that the 3D VR technology provides a highly intuitive way with the consubstantial interaction that governs between avatars, as it incorporates worthily interaction between a real and a virtual world.

Despite that VWs are widely being used for “edutainment” (education and entertainment) activities, there is no way to understand the educational impact that can provide on students’ engagement without logging in these worlds. The user’s motivation in a well-designed multi-user VW is not strictly theoretical when he/she gradually involved, but they are several social or emotional impulses that need to be amplified with various activities. Unlike to other role-playing online games, like World of Warcraft (WoW) or Sims online, in Second Life users do not have specific game narratives or objectives. However, (multi-user) VWs can offer game-oriented activities as parts of remarkable experiences with virtually-enhanced technologies. Specifically for Second Life there is a growing multiplication among users, with an exclusive number of up to 1 million users to log in every year, and boast a $29 million economy in large a part due to users’ purchases for their avatars (Linden Lab, 2011).

Interestingly, a meritorious term that could provide an intertwined with learning procedures through VWs is the “Virtual Education” (Noteborn et al., 2012). This arrangement enabled students to meet their personal learning needs that cannot be covered by the conventional educational system. With the abundance of ICT services and Web 2.0-based transactions this possibility provided as important, where students’ tools or artifacts (visual objects that formed or combined from primitives by the same users) are available online and can easily be used in the educational process (Karpova, Correia & Baran, 2009; Kabilan, Ahmad, & Abidin, 2010; Zuiker & Ang, 2011).

Main characteristics of this process can connect students to study collaboratively with other peers for a common purpose in the same virtual place. This can broadly refer to computer-supported collaborative (CSCL) approaches that facilitate interactions among users. The radical diffusion of VWs with the online course delivery method has emerged as an exciting multidisciplinary area of research that is being driven by the wealth of easily available information and the success of online social networks or social media sources (including VWs as part of these sources). Although, it is still lacking a deeper conceptual understanding of information in social computing, specifically for students’ personal factors that may affect their engagement in online programs that held in VWs.

On the other hand there is also a widespread premise in which the vast majority of Universities, Institutions and Organizations have already utilized Second Life for online university-level courses (see bibliography from Duncan, Miller, & Jiang, 2012; Pellas, 2012;
Wang & Burton, 2012) with positive or valuable evidence from their activities (mainly problem-solving or collaborative activities with inquiry-based or project-based learning procedures), where the students’ study in progressive corroboration through a set of different processes to achieve the learning challenges is being increased. In spite that the main goals of these approaches were the acquisition of communication and inquiry-based skills, like collaboration, communication, problem-solving skills, or the exploration of real ‘macroscopic or microscopic’ tasks, it is also essential to be announced the production of collaborative design schedules or artifacts from students exclusively, in order to reuse this environment for further studies.

Juxtaposing to the above, the online learning can be reckoned alongside in formal or informal university-level courses and can enrich the existing curriculum in which for many reasons cannot be taught in recent times (Sullivan, 2005; Thompson, Martin, Richards & Branson, 2003). The added value of this approach without demanding students’ prior cognitive, mental or emotional backgrounds or perspectives for teaching efforts with the use of VWs is still remaining unknown. Taking into account the emphasis on both academic performances and students’ achievements, it can be totally transparent that students acquired the knowledge through collaborative learning tasks. Concurrently, notable studies (Li, Lerner, J., & Lerner, R., 2010; Meece, Blumenfeld & Hoyle, 1988) have already highlighted the pivotal role of students’ engagement in the learning process.

In recent years, a renewed interest among researchers for the mechanisms, in which students’ emotional reactions or even behaviors during the learning procedure may “engage” them in educational practices for the acquisition of knowledge, has largely been growing. Students’ engagement also affects the acquisition of knowledge by proving a psychological investment in an academic performance level and it's composed with three interlocked factors (Appleton, Christeson, & Furlong, 2008; Friedricks, Blumenfeld, & Paris, 2004): (a) the behavioral; (b) the emotional (or affective); and (c) the cognitive.

Another significant point of view that the current study investigates is the effect of self-efficacy, metacognitive self-regulation and self-esteem on students’ engagement in online programs through VWs. Shen, Cho, Tsai and Marra (2013) have argued that self-efficacy is a key component for success in online learning generally and for online learning environments specifically because users (instructor and students) sometimes haven’t got the opportunity to interact with others. Hence, they may be remaining easily lost or socially isolated during the learning process (Cho & Jonassen, 2009).

Although, the user’s active interaction in an online environment doesn’t only require satisfactory self-efficacy levels, but also it requires a high level of self-regulation of all participants (Cho, & Kim, 2013). Dinsmore, Alexander and Loughlin (2008) have stressed
that metacognition and self-regulation have unique roots. In addition, Pintrich, Woters and Baxter (2000) divided metacognition processes into three components: (a) knowledge about cognition, (b) monitoring of learning processes, and (c) control of the processes. Beyond these circumstances and during the learning procedure there is a positive relationship between metacognitive skills and abilities of cognition that students gained as a substantial relationship which can give them the ability to explain and identify cognitive activities directed at a target. As Garner (1990) referred, it is the reflection and prognosis of the respective knowledge from students’ achievements during acquisition experiences as very important parameters for recalling the knowledge that students finally gained.

Metacognitive experiences involve the use of metacognitive strategies or metacognitive regulation practices (Brown, 1987). Metacognition in this notion is clearly understandable as the awareness of how individuals are thinking in different aspects and ways. The common purpose of this process is in which we process knowledge of what we know and what we do not know, 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 his/her self-esteem. Self-esteem may not only provide as a mediator between Internet information and the life’s satisfaction or loneliness, but it may also have a moderating role (Liu, Shen, Xu & Gao, 2013). Students who felt less capable in their school work benefited more from Internet information as they seek more in terms of their academic performance (Zhu, Chen, Chen & Chern, 2011).

The widespread acceptance of Second Life in Higher education and the presentation of affordances that can endorse as a candidate learning platform for the implementation of social-constructivism learning in various case studies (Duncan, Miller, & Jiang, 2012; Koutsabasis, Vosinakis, Malisova, & Paparounas, 2012; Pellas & Kazanidis, 2013) is already well-known. However, it is also crucial to determine how personal factors influencing the students’ engagement in Second Life, something that it is still lacking. Instead, a reasonable effort and rationale of “transferring the knowledge” in a VW would be an exceedingly intriguing process for researchers who want to divulge factors that can influence the students’ engagement and participation in educational activities or even envisage an added value on students’ participation and as result to understand their satisfaction (or not) in these online programs (Figure 1).
The purpose of the present study is to investigate and determine empirically the role of self-efficacy, meta-cognitive self-regulation and self-esteem in order to direct and indirect these effects on students’ engagement factors (cognitive, behavioral and affective) who have already implemented online programs and were held in Second Life and finally discuss their practical implications.

2. Literature Review

2.1. Student engagement

The term of student engagement describes a learning task or a value to refer the cognitive process, active participation, and emotional involvement of students in specific learning procedures. A growing academic literature body (Fredericks et al., 2004; Glanville & Wildhagen, 2007; Shernoff & Schmidt, 2008; Kindermann, 2007) that attempted for this definition was recognized by three interrelated factors:

i) Cognitive refers to the extent and consumption of an intellectual effort that students spent in learning projects (e.g. students’ efforts to incorporate the new knowledge into previously well-known patterns and guide their understanding from a study through the use of cognitive and metacognitive strategies). Another notable fact is that the cognitive engagement includes learning goals, students’ intrinsic motivation self-regulation and abilities to implement strategies, in order to elucidate the new knowledge.

ii) Behavioral stimulates to the responded degree of active learning, as it also refers to the positive conduct, effort, and students’ participation in the classroom and learning procedures (e.g. active response of students in a previous teaching, such as the formulation of relevant questions, solving problems and participating in discussions with instructors and other classmates).

iii) Emotional discerns to the investment and emotional reactions (e.g. high levels of interest and positive attitudes) which enrolls the students’ interest, identification, and positive attitudes or values about the learning process.
Subsequently, the utilization of the above terms and their distinctions may vary from researcher to researcher. For example, Veiga (2012) considered the interest as a form of emotional engagement, and with the Program for International Student Assessment (PISA), it was provided as an international perspective of students’ engagement and motivation. In this case, the student’s interest reported as incentive, and concepts like the self-directed action and capacity to implement learning strategies associated as essential characteristics of cognitive engagement (Center for Mental Health in Schools, 2008). According to Chapman (2003), the students’ engagement in the learning process can be interdependent because students with positive attitudes towards learning (emotional engagement) can easily be adopted more with effective learning strategies (cognitive engagement).

Another fundamental study of Griffiths, Sharkey, and Furlong (2009) have referred fundamental features that may influence the student engagement, personal factors, such as expectations, self-efficacy, self-esteem, and on the state of the relationship with other students causing a considerable effect on the quality and the level of his/her involvement. Similarly noteworthy for the important meaning of engagement in online settings, Belcheir and Cucek (2001) have reported that the quality of online communications and the degree of interaction between users are also significant for the course completion depending on the learning content and the delivery method that is followed each time.

Last but not least, the student engagement in a workflow can become very crucial as it combines the student’s inspiration, creativity to participate in activities and also appropriate feedback from the instructor (Bakker, 2005). Bradford and Wyatt (2010) have also found in online university-level courses, alongside with a high level of communication forms that a learning environment can provide, may rank the student’s engagement in higher settings. In these circumstances, it is also crucial to be mentioned that the term of “engagement” can be conceptualized by a plethora of theoretical approaches differently. One of them should be categorized into 3D game-oriented environments, like those of VWs.

2.1.1. Engagement in 3D multi-user virtual worlds

Crucial points of engagement in 3D game-based VWs have denoted on users’ experiences or interests in the “flow” of sustainability and have frequently increased the popularity and associated learning outcomes (Franceschi et al., 2008). Engagement in these circumstances can be linked with the interactive attributes between users in order to achieve a trigger with other participants. Several studies (Dieterle & Clarke 2008; Peters et al., 2005) have also mentioned the engagement as an emotional state which can be linked with users’ triggers in order to receive and elaborate the new and meaningful knowledge in a learning
environment. Mount, Chambers, Weaver and Priestnall (2009) have underlined that the learner’s engagement can be achieved by the following processes:

(i) The interaction with other peers;
(ii) The appropriate feedback from the 3D virtual environment, and
(iii) The level of engagement that can be promoted from the students’ participation in learning activities.

Meanwhile, recent studies (Patera, Draper & Naef, 2008; Marshall, Rogers, & Scaife, 2005) devised a number of methods that can engage the students’ interest and challenge of their personal thinking. Although, Lim, Nonis, and Hedberg, (2006) have referred that engagement in 3D VWs might not necessarily lead to engagement in a learning task. Indicators of this disengagement may include only the activity around a 3D space, or slowness in submitting work required by the quests. According to this point of view, the instructor needs to understand reasons of refusing students to be engaged in learning tasks and provide a more striking manner in order to “attract” students’ consideration for the acquisition of new knowledge.

2.2. 3D multi-user virtual worlds and Second Life

Contrary to teaching and learning approaches with 2D systems (see blogs, wikis or Learning Management Systems-LMS), 3D multi-user VWs in these circumstances can provide many advantages than particular 2D technologies. These are as follows:

(i) The personalization of users as cyber entities (avatars) in a common place where they interact or communicate with others (even if they are spatially distributed or not) in specific learning procedures (Pellas et al., 2013).
(ii) The engagement of multiple learning performances (e.g. analyzing case studies and less experiential learning processes) (Verhagen et al 2012).
(iii) The utilization of simulations for teaching specific learning objects (e.g. constructing visual artifacts from avatars) (Masters & Gregory, 2010; Noteborn et al., 2012).
(iv) The quintessence of interactive activities which emerged in a common 3D persistent multimedia environment in real-time can offer a simultaneous existence for adult users (over 18 years old). These approaches can be enhanced in authentic (or at least pragmatic) metaphors of visual objects or artifacts combined in real-time interactive simulations to be refined rules of the spatial proximity, transformed by the social dynamic impressions and improved the learning process (Burgess et al., 2010; Pellas & Kazanidis, 2013).

The widespread utilization of 3D VR technologies that have from 2006 and now on to provide an alternative option in the e-Education field as a significant number of studies has
already stressed (Choi & Baek, 2011; Pellas, 2012; Vosinakis & Koutsabasis, 2012). On these dimensions, Second Life has approved as one of the most well-known virtual emulators that was firstly emanated and constructed from real-life situations (or at least roots from an illusionary world) in association with 3D desktop VR technology, where its users can utilize various communications forms. Until recently, it is considered as the most worldwide common-in use with up to 9 million active participants whilst it is in constant growth over the last seven years and offering users:

a) A 3D collaborative virtual “eco-system” environment (virtual grid) in which students can exchange data with various multimedia applications by utilizing multiple synchronous and asynchronous communication channels (VoIP, chat text, IM and gestures).

b) A direct visual feedback and comments to students from the system or from other peers to improve their performance in any area of their ”alternative” life.

c) A frequency of social interaction between digital cyber entities (avatars).

d) A common “place” in which users can reinforce the sense of co-presence to achieve common goals.

The vast majority of previous studies (Dieterle & Clarke, 2008; Henderson, Grant, Henderson, & Huang, 2010; Pellas & Kazanidis, 2013; Vosinakis & Koutsabasis, 2012) has unveiled many positive results from the utilization of VWs in different disciplines (like history, sociology, ethnography or collaborative design). In these attempts researchers have promoted students’ cognitive and behavioral aspects, skills or experiences. The social dimensions of learning can take place in online settings where students are organized in communities, interacted with digital materials and artifacts, and learning scripts implemented by the same users. Apparently, the social learning process can be occurred by (Cheung & Lee, 2009; Knutsson, Blåsjö, Hållsten, & Karlström, 2012):

a) Interacting with other peers verbally (VoIP, chat text) or non-verbally (gestures).

b) Negotiating or exchanging ideas and alternative modes with interactive tools.

c) Elaborating or implementing design learning scripts by using the Linden Scripting Language (LSL).

d) Inciting the learners’ cooperation and participation to join collaborative activities.

However, the instructor’s managerial responsibilities in VWs are more complicated than is vastly different from a straightforward 2D LMS (Learning Management Systems). Obviously a virtual classroom requires an operating framework of rules, behaviors and goals in order to become students practically "seekers of knowledge” and not merely recipients of directives and regulations. This may require from Second Life to become sustainable and viable as a learning platform for future-driven learning activities.
2.3. Students’ personal factors

2.3.1. Self-efficacy

Self-efficacy has been distinguished by Bandura (1993) as a component students’ personal factors related to behavioral changes that often affected students’ motivation. Self-efficacy is a significant component of Bandura’s (1986) social cognitive learning theory. The same author has also noticed self-efficacy as an individual’s confidence is an ability to control someone his/her thoughts, feelings or actions, and therefore to understand how this treatment can influence the anticipated learning outcomes. Worth bearing in mind is the origin of self-efficacy that referred as the main belief in persons’ abilities for the organization and execution among several series of effects (Bandura, 1977).

Self-efficacy is the core of Bandura’s socio-cognitive theory emphasized to the observational role of learning and social experience in the development of human’s personality. The conclusion of this approach indicates that students with higher levels of self-efficacy are able to control their behavior can achieve the anticipated outcomes. Zhang and Lu (2002) have underlined that self-efficacy is associated with the development of incentives, i.e. people with high self-efficacy had a strong level of motivation.

Computer self-efficacy (CSE) as a neologism was defined by Compeau and Higgins (1995) as "a judgment of human’s capability to use a computer" (p. 192). Several studies (Cheng & Tsai, 2011; Paraskeva, Bouts, & Papagianni, 2008; Tseng & Tsai, 2010) have found that computer self-efficacy is higher for students that received previous training or had prior experience in computers before taking other distance learning courses. Users with heightened CSE are likely to believe that computer learning is valuable to them, and computers for a large variety of tasks are increasing the level of self-efficacy (Vekiri & Chronaki, 2008). In addition, students with higher CSE tended to spend more time by using online learning technology and were more easily engaged in the learning processes (Bates & Khasawneh, 2007).

2.3.2. Self-esteem

Self-esteem refers to a unique perspective that compromises every individual’s value, and postulates his/her self-description and self-evaluation in various fields (Branden, 2001). As a measurable variable, it includes decisions whether are professional or educational. The success and inspiration of the assessment resulting from other peoples' opinions of a person that deemed to affect this personal assessment (Judge & Bono, 2001). Self-esteem was also devised as a powerful outcome predictor for the academic performance (Peixoto & Almeida, 2010) or the exercise behavior (Vartanian & Shaprow, 2008). Furthermore, self-esteem has
also been considered as an important result in learning tasks because of its close relationship with psychological well-being (Neff, 2011).

Hence, by using the Internet in the early years of school, it can be associated with a sense that students have for themselves with the mediated context (Johnson, 2011). This finding is consistent to Chen, Charlie and Hsiao-Han (2008) have found evidence to link self-esteem and Internet addiction in a workplace.

2.3.3. Self-regulation

Self-regulation is the human’s ability to control the process of thought and action in order to achieve several objectives (Vrugt & Oort, 2008). Pekrun, Frenzel, Goetz, and Perry (2007) have noticed that self-regulation required the utilization of students’ meta-cognitive, meta-motivational and meta-emotional strategies to be modified behaviors into goals. In this notion, metacognition can be defined as a complex construct which can involve students’ cognitive knowledge and cognitive regulation. Concurrently, there are various types of cognitive knowledge, i.e. declarative, procedural, conditional or different types of regulation, like planning, monitoring, or evaluation.

Metacognitive abilities are essential knowledge aspects or beliefs of each person, concerning with the following (Dawson, 2008):
(a) multiple factors that affect a person’s belief;
(b) several students’ functions;
(c) students’ actions or learning strategies; and
(d) interactions between users that contain all of the above to succeed a common goal.

Contrary to the cognitive functions of all the above, it can be also used in order to be accomplished the students’ goals. Self-regulation can be achieved by:

(i) monitoring the process of thinking,
(ii) recognizing the stage, in which the person in relation to the original design solution can evaluate the objective; and
(iii) clarifying the cognitive regulation, in which metacognitive capacities can be achieved (Al-Harthy, Was, & Isaacson, 2010).

The quality of an environment can significantly improve the students’ engagement if the optical and interactive graphical computer interface (GUI) design ratifying to the educational content that is associated with the development of meta-cognitive skills (Josyula et al., 2009).

**Scope and statement of research questions**
The aim of this study is to investigate and determine the role of self-efficacy, meta-cognitive self-regulation and self-esteem in order to direct and indirect these effects on engagement factors (cognitive, behavioral and affective) and finally discuss their practical implications that implemented with online programs in Second Life.
Accordingly to this provision the emerging research questions are as below:

**RQ1:** How can self-efficacy, meta-cognitive self-regulation and self-esteem affect (positively or negatively) the student’s engagement in online programs which were held in Second Life?

**RQ2:** To what extent self-efficacy, meta-cognitive self-regulation and self-esteem related to student engagement in online programs which were held in Second Life?

### 3. Method

#### 3.1. A rationale behind this study

A growing academic body (Artino, 2010; Chang et al., 2013; Clayton, Blumberg, & Auld, 2010) has discovered students’ preferences for online learning environments and their engagement with the learning material is associated with self-efficacy. By utilizing a learning environment, it is first of all significant to be mentioned that students’ activities should be implemented according to their demands or needs in order to be conquered the knowledge in meaningful activities (Kaplan, Assor, & Roth, 2002).

The description of this process and the way that students interact with other peers in the learning environment are particularly important and should be based on the psychological factors during their engagement in the teaching process. This can create a dynamic model that makes each variable unique and important to the educational process. In other words, it would be more useful for instructors and educators understand students’ factors that help them to persuade in more adaptive socio-cognitive strategies in a learning environment. They have also more options on how to interact with educational materials and further understand how to gain the new knowledge. This research attempts to examine whether the virtual environment of Second Life can support students’ personal factors that not only influence their choice to participate in an online program, but to know how these factors may affect their engagement and performance (Marchand & Gutierrez, 2012).

While the dynamic of emotions during the online learning procedure might be less clearly understands from the experiences in the traditional classroom instruction, it is still more reasonable to presume several socio-cognitive constructs of motivation which are may also be important contributors in students’ engagement and learning achievements in online environments. The present study is a first step to address this supposition. More particularly, this study seeks to fill the gap between the students’ factors that may affect their engagement in online learning programs. Until nowadays, it has recently increased the researchers’
interests, not to identify the close link between self-efficacy and online success (Antino, 2008; Hurley, 2006; DeTure, 2004; Miltiadou & Savenye, 2003), but it also has been acknowledged the urgent need to amplify other students’ personal factors, such as self-efficacy, self-esteem and metacognition which must have a close association with their engagement in online learning course.

The present study addressed to close this gap by examining the complex relations between socio-cognitive constructs of motivation and students’ engagement in online programs. Thus, this study intended to yield a more comprehensive and empirically-optimized understanding of how students’ personal factors may affect their engagement in online programs which were held in the virtual world of Second Life.

3.2. Research methodology

The scientific empirical research that the present study followed, aiming to control certain theoretical assumptions associated with specific theoretical concepts. Each individual empirical research achieves a partial representation of social reality on the empirical level.

3.3. Setting the project

The present study attempted to empirically establish a random sample and it was decided that participants must be from all parts of the earth. Based on the above it was asked the prior experiences of learners where they involved, regardless their educational disciplines or sectors in order to answer the present questionnaire.

Participants of this survey 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).

The inspiration behind the exploration of student engagement in multi-user virtual worlds is becoming an important issue (Ho, 2010; Masters & Gregory, 2010; Pellas & Kazanidis, 2013). Based on this common premise the current project goes one step further and attempted to understand the relationships of students’ psychological factors applied with the engagement factors (behavioral, emotional and cognitive) and which are related positively or negatively with their engagement in activities. Thus, the present study attempted to establish a random sample and decided that the participants must be from all parts of the earth. Based on the above it was asked the prior experiences of learners after completed their activities in Second Life, in which they involved, regardless their educational disciplines or sectors.
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. In this vein the sample that finally participated in this survey should firstly focused their study on: (a) developing, designing, advising on and evaluating tools or artifacts (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 procedures, (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), and how to increase other colleagues awareness beyond the exiting practice 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 from other sources (see Moodle or Blackboard).

Other two fundamental parameters for students’ participation in this project 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 questionnaires were sent to participants online via email. The authors of this study contacted online with instructors or supervisors and asked for permission to conduct with students who identically study in online courses at university level. According to their approval the researchers 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 students filled out the online consent form, they were directed to fill out the online survey on their email.

3.4. Participants

The target-sample of this empirical study was composed of 305 (n=305) graduate and postgraduate students (124 female and 181 male). The mean age of all students was almost 23 years old (SD=4.04). Below, Table 1 presents some significant demographic characteristics.

<table>
<thead>
<tr>
<th>Table 1: Target-sample from the online course delivery method</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=305</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>N=305</td>
</tr>
</tbody>
</table>
The mean scores for the ages of group participants that enrolled with the online course delivery method.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Novice users of Second Life</th>
<th>Expert users of Second Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>22</td>
<td>4.13</td>
<td>24</td>
<td>4.25</td>
</tr>
<tr>
<td>Age Range</td>
<td>124 (72)</td>
<td>56 (59)</td>
<td>77 (71)</td>
<td>70 (29)</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>152 (28)</td>
<td>39 (41)</td>
<td>76 (60)</td>
<td>82 (40)</td>
</tr>
<tr>
<td></td>
<td>210 (76)</td>
<td>95 (24)</td>
<td>153 (67)</td>
<td>152 (33)</td>
</tr>
</tbody>
</table>

\[ a \] The mean scores for the ages of groups that enrolled with the online course delivery method.

\[ b \] Standard Deviation

3.5. Measures

The questionnaire was based on relevant researches, divided into two sections and translated in the English language. Section 1 has 4-item for demographics and 57-item from the engagement scale, and Section 2 with 43-item from computer self-efficacy, metacognitive self-regulation, and self-esteem included Likert-type scale items with a response scale ranging from 1 (strongly disagree) to 5 (strongly agree). The main instrument was separated according to the following principles:

(a) Student Engagement in the Mathematics Classroom Scale (SEMCS): The construction of the first subsection was from Kong, Wong, and Lam (2003) instrument. Users answered 57 close-ended questions. Questionnaires for both sections attempted to examine the following indicators of the three engagement factors with the following dimensions:

(i) the emotional engagement (EE) with 22 items (a=.78): interest (6-item), achievement orientation (6-item), anxiety (5-item), and frustration (5-item);

(ii) the behavioral engagement (BE) with 14 items (a=.77): attentiveness (6-item), diligence (6-item) and time spent (2-item); and finally

(iii) the cognitive engagement (CE) with 21 items (a=.79): surface strategy (7-item), deep strategy (7-item) and reliance (7-item).

(b) Internet Self-Efficacy Scale (ISES): Torkzadeh and Van Dyke (2001) have developed a 17-item instrument for measuring the individual’s self-perception and self-competency when interacting with internet sources. The measurement progress converged by Bandura’s conceptualization for self-efficacy. The computer self-efficacy questionnaire was used to measure student levels of self-efficacy in relation to distance education technology.

(c) Metacognitive self-regulation scale (MSRS): The MSRS (Artino & McCoach, 2008) is a 9-item instrument intended to assess students’ use of metacognitive control strategies (e.g. planning, setting goals, monitoring one’s comprehension, and regulating performance; a=.79).

(d) Self-Linking/Self-Competence Scale-Revised (SLCS-R): According to Tafarodi and Swann (2001), the SLCS instrument consisted of double-based 8-item (i.e. 16-item) subscales respectively, for measuring: (i) self-competence (SC) and (ii) self-linking (SLink.).

From the entire questionnaire which was separated into sub-scales, it was needed at the beginning to be adapted only the Kong Wong, and Lam (2003) instrument. For example, in
the Deep strategy (cognitive engagement) subscale when it was asked “When I learn mathematics, I would wonder how much the things I have learnt can be applied to real life”, it should adapt this question with a gap in the case of each course, e.g. When I learn……., I would wonder how much the things I have learnt can be applied to real life”. According to these adjustments, it was avoided any misunderstandings about the online university-level courses which students completed, and they freely fill the gap in accordance to their disciplines.

3.5. Treatment

Data were gathered from students who enrolled in the winter and spring semester courses. The questionnaire sent to users by email, resulting in 305 valid and voluntary responses until June 2012. The survey questionnaire was sent to overall 351 students from many places around the earth via email, resulting 305 valid responses (response rate 87%). Students who didn’t follow specific instructions in order to complete the entire questionnaire excluded from this survey. The instrument to extract the results administrated as a self-report web-based questionnaire via email to all correspondents. Filling in the questionnaire did not take more than 50 minutes.

However, it should be noted that in the design and completion of the current questionnaire did not differentiate nor further investigated the status of the novice or expert users, because this study wanted to get an overall view from students’ experiences. This means were not separated the novice or experts’ answers after the implementation of their online university-level courses in Second Life. It was decided to present opinions from all participants without distinctions because it was conducted at first time a survey like this and their opinions or experiences should be included.

4. Results

4.1. Socio-demographic information

The first intention is to describe the socio-demographic results from users’ e-profiles, as Table 2 portrays. Among to 305 members (n_{graduate}=153; n_{postgraduate}=152), all of them enrolled in online sessions and agreed to complete anonymous online surveys. Correspondents of this project were from the United States of America (57.5%); United Kingdom (50.29%); Australia (50.5.6%); Greece (55.8.2%); Italy (54.4%); Cyprus (39.2.6%).

<table>
<thead>
<tr>
<th>Table 2: Socio-demographic frequencies of the sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n=305 ) (%)</td>
</tr>
<tr>
<td>Graduate students (%)</td>
</tr>
</tbody>
</table>

17
1. Fields of Study

1.1. Industrial Informatics
43 20 23
(14) 8 (44)
1.2. Economics & Business Administration
35 20 15
(11.5) 8 (16)
1.3. Civil & Architectural Engineering
60 30 30
(20) 92 (8)
1.4. Computer Sciences
167 82 85
(54.5) 77 (40)

2. Prior experience with Web 2.0 applications

2.1. 1-6 months
32 15 17
(15) 14 (22)
2.2. 7-12 months
155 74 81
(48) 26 (24)
2.3. More than a year
118 64 54
(37) 60 (67)

3. Students’ status

3.1. Part-time student
161 83 78
(53) 51 (49)
3.2. Full-time student
144 70 74
(47) 49 (51)

4. Prior online course experience with LMS

4.1. No prior course of this type
139 68 71
(30.4) 36 (17)
4.2. Took previous course of this type
166 85 81
(69.6) 64 (83)

4.2. Descriptive statistics

The descriptive statistics of scores calculated for each variable of the “fully online program scale” as Table 3 shows. For the reliability, evidence of scales and dimensions from the Cronbach’s alpha coefficient were also calculated. The current instrument has been reported as valid and reliable. The overall reliability of three-factorial calculated with Cronbach’s alpha (α). In this case values were greater than α=.70, and thus indicated an acceptable level of reliability (see recommendations of Singh, 2007). Values of p<.05 are considered as significant.

<table>
<thead>
<tr>
<th>Online program held in Second Life</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivational Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISES</td>
<td>17</td>
<td>3</td>
<td>5</td>
<td>3.22</td>
<td>.58</td>
<td>.13</td>
<td>.28</td>
<td>.85</td>
</tr>
<tr>
<td>MSRS</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td>4.12</td>
<td>.65</td>
<td>.16</td>
<td>.27</td>
<td>.79</td>
</tr>
<tr>
<td>SLCS-R</td>
<td>16</td>
<td>2</td>
<td>4</td>
<td>3.52</td>
<td>.33</td>
<td>.22</td>
<td>-.22</td>
<td>.82</td>
</tr>
<tr>
<td>Engagement factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The descriptive statistics have also shown that the overall student engagement had a slightly greater level (M=3.81). Moreover, the Cronbach’s alphas for the emotional engagement, behavioral engagement and cognitive engagement subscales were quite outstanding, ranging from .78 to .79. Also, for the motivational variables and metacognitive self-regulation ranking from .79 to .85, and thus were higher than .70 (Clark & Watson, 1995).

4.3. Reliability and validity of measures

Initially, even before conducting the analysis it was examined the suitability of data for factor analysis. It is crucial to notice that as Comrey and Lee (1992) have stressed that more than 300 participants may be a good sample for staring a confirmatory factor analysis. Therefore, the current data were suitable, because it included 305 participants. Convergent validity was achieved if loadings of measures into respective constructs were at least .60 (Kline, 2005).

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

<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$^a$</th>
<th>t-value$^b$ range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISES</td>
<td>17</td>
<td>.73-.75</td>
<td>.72-.73</td>
<td>.85</td>
<td>.84</td>
<td>8.212-8.492</td>
</tr>
<tr>
<td>MSRS</td>
<td>9</td>
<td>.61-.63</td>
<td>.78-.80</td>
<td>.82</td>
<td>.85</td>
<td>8.285-9.014</td>
</tr>
<tr>
<td>SLCS-R</td>
<td>16</td>
<td>.62-.64</td>
<td>.75-.76</td>
<td>.81</td>
<td>.86</td>
<td>7.586-8.247</td>
</tr>
<tr>
<td>SEMCS$^b$</td>
<td>57</td>
<td>.71-.73</td>
<td>.73-.77</td>
<td>.84</td>
<td>.82</td>
<td>7.347-8.571</td>
</tr>
</tbody>
</table>

$^a$acceptable level of reliability or validity; values set at 1.00 for identification purpose.
$^b$Student Engagement in the Mathematics Classroom Scale that endorses the measures for the three engagement factors.

EE, emotional or affective engagement; BE, behavioral engagement; CE, cognitive engagement
4.4. Confirmatory factor analysis

The confirmatory factor analysis substantiated the hypothesized six-factor structure of the survey. The appropriate model fit statistics have argued with the recommended standards that Hu and Bentler (1999) have previously noticed. According to this notion:

(i) the chi square was statistically significant, $\chi^2 (296, N=305)=251.481$, $p<.001$;
(ii) the normed chi square (NFI=1.72) was less than 2.00;
(iii) the comparative fit index (CFI=.91) was slightly less than .95; and
(iv) the root-mean-square error of approximation (RMSEA=.04) was less than .06.

Overall, the findings suggest that the fit for this structure are satisfactory.

4.5. Pearson correlation analysis

The Pearson correlations in Table 5 indicate that metacognitive self-regulation and self-efficacy were positively related to each other ($r=.51$, $p<.01$) and to students’ engagement. As it was expected, the extent in which student metacognitive self-regulation were positively related to the self-esteem ($r=.52$, $p<.01$) with the cognitive ($r=.32$, $p<.01$) and emotional engagement ($r=.62$, $p<.01$), but negatively with the behavioral factor ($r=-.60$, $p<.01$).

Meanwhile, users’ self-efficacy was related to their self-esteem ($r=.25$, $p<.01$) and to engagement factors: cognitive engagement ($r=.55$, $p<.01$), behavioral ($r=-.32$, $p<.01$), and emotional engagement ($r=.54$, $p<.01$). As for users’ self-esteem, Table 5 below depicts that it was positively correlated with cognitive engagement ($r=.85$, $p<.01$) and emotional engagement ($r=.63$, $p<.01$), but negatively with the behavioral ($r=-.75$, $p<.01$).

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MSRS</td>
<td>1</td>
<td>.51*</td>
<td>.52*</td>
<td>.32*</td>
<td>-.60*</td>
<td>.62*</td>
</tr>
<tr>
<td>2. ISES</td>
<td>1</td>
<td>.25*</td>
<td>.55*</td>
<td>-.32*</td>
<td>.54*</td>
<td></td>
</tr>
<tr>
<td>3. SLCS-R</td>
<td>1</td>
<td>.85*</td>
<td>.75*</td>
<td>.63*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. CE</td>
<td>1</td>
<td>.68</td>
<td>.47*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. BE</td>
<td>1</td>
<td>.68*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EE</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.01

EE, emotional or affective engagement; BE, behavioral engagement; CE, cognitive engagement

4.5. Hierarchical multiple regression analysis

A multivariate regression determined to explain if the set of three independent motivational variables, meta-cognitive self-regulation self-efficacy, and self-esteem can be used to predict the three engagement factors (dependent variables). The influence of gender,
students’ ages and users’ experiences from the utilization of the Second Life was examined in preliminary analyses, but neither variable related to either outcome, and thus they were not retained in the final regression models. Consequently, univariate F-tests connotes that these variables were all significantly related to the set of predictors.

Table 6 presents a summary of the regression analyses for each dependent variable. As it was indicated that the final model for emotional engagement was statistically significant, and the overall model effect was $R^2=.55$. In step 2, the addition of the two variables that correlated positively to the model explained an additional 15% of variance, and metacognitive self-regulation was a positive individual predictor of emotional engagement ($\beta=.36$, $\beta=.27$, $p<.01$, respectively). In the final step, the addition of self-esteem to the model explained an additional 5% of variance, and this variable, replaced metacognitive self-regulation as a significant predictor of emotional engagement ($\beta=.37$, $p<001$).

The second model for behavioral engagement was statistically significant and thus the overall model of this procedure was $R^2=.44$. In step 2, self-efficacy and metacognitive self-regulation correlated negatively with behavioral engagement ($\beta=-.35$ and $\beta=-.29$ $p<.01$, respectively). The model explained 13% of the variance. The final step of the self-esteem was a significant predictor of behavioral engagement ($\beta=.12$, $p<.01$) and explained an additional 2% of the variance.

The final model for cognitive engagement was also statistically significant, and the overall model effect was $R^2=.42$. In step 2, the addition of self-efficacy and self-regulation to the model explained an additional 14% of variance, and were both significant positive predictors of cognitive engagement ($\beta=.22$ and $\beta=.19$, $p<.01$, respectively). In the final step, the addition of self-esteem to the model explained an additional 6% of the variance. In this case, self-efficacy remained a positive predictor of cognitive engagement ($\beta=.22$, $p<.01$), and also metacognitive self-regulation ($\beta=.19$, $p<.01$) and self-esteem ($\beta=.13$, $p<.001$) were both positive predictors of cognitive engagement.

Table 6: Summary of Regression Analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Emotional Engagement</th>
<th>Behavioral Engagement</th>
<th>Cognitive Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>SE $B$</td>
<td>$\beta$</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.24</td>
<td>.08</td>
<td>.29*</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.29</td>
<td>.07</td>
<td>.36**</td>
</tr>
<tr>
<td>Meta-cognitive self-regulation</td>
<td>.36</td>
<td>.08</td>
<td>.27*</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.39</td>
<td>.06</td>
<td>.36*</td>
</tr>
<tr>
<td>Meta-cognitive self-regulation</td>
<td>.16</td>
<td>.08</td>
<td>.27**</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>.36</td>
<td>.07</td>
<td>.37*</td>
</tr>
<tr>
<td>$F$ ($3, 154)=54.214$,</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21
The correlation with the engagement scale and computer self-efficacy seems that significantly (p<0.05) affected the price of the learning procedure. The correlations between the three variables are not inversely related to the overall engagement. This comes from the coefficients b (unstandardized coefficient B) regression (B=0.104 for computer self-efficacy, B=0.026 for metacognitive self-regulation and finally B=0.59 for the self-esteem), something that positively contributed it. Of the three factors, the one that influenced values of the overall engagement (i.e. Standardized coefficient Beta) mostly at an absolute value, as Table 6 shows is self-efficacy (Beta=0.104). One of the most indispensable elements is that when self-efficacy prices were increased, then engagement factors changes of one standard deviation and values of others remain stable.

Table 7 depicts multicollinearity proceeds between independent variables on this model and the results from Tolerance and Variance Inflation Factor (VIF) statistical measures. More specifically, it disclosed that the independent variables are uncorrelated; a tolerance of less than 0.20 or 0.10 and/or a VIF of 5 or 10 and above indicates a multicollinearity problem (O'Brien, 2007), and as a result it concluded that no multicollinearity problems existed.

Finally, from Table 7 it can be mentioned the mean of the inter-rater reliability (IRR) coefficients for computer self-efficacy, metacognitive self-regulation and self-esteem was .923, .822, .756 respectively, above from .70, indicating that the values can be aggregated at a unit of analysis.

Table 7: Results of multiple collinearity statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Betaa</th>
<th>Tolerance</th>
<th>VIF</th>
<th>IRRb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer self-efficacy</td>
<td>.104</td>
<td>.550</td>
<td>1.022</td>
<td>.923</td>
</tr>
<tr>
<td>Metacognitive self-regulation</td>
<td>.026</td>
<td>.544</td>
<td>1.020</td>
<td>.822</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>.059</td>
<td>.575</td>
<td>1.016</td>
<td>.756</td>
</tr>
</tbody>
</table>

a. Beta, standardized coefficient
b. IRR >.70

5. Discussion

The current study examined the relationships between computer self-efficacy, self-esteem and the metacognitive self-regulation with the students’ engagement factors.
(emotional, behavioral, and cognitive) in online programs held in Second Life. In Sun and Ruenda (2012) study, online activities and learning materials increased the students’ emotional engagement, but it wasn’t increased behavioral and cognitive engagement factors. Consistent with these results the current research indicates that the motivational beliefs were both positively related to cognitive and emotional engagement factors, but negatively to behavioral engagement factor, according to students’ academic achievements.

According to previous studies (Artino, 2008; Artino & Stephens, 2009; Harnett, 2012) and consistent also with these findings, it can be suggested that motivational beliefs can affect the students’ engagement in fully online programs through Second Life and it can foster students’ learning in various science topics. To provide such evidence, it must be supplied an environment adaptive for well-structured tasks depending on students' needs and interests (Azevedo, 2005; Graesser, McNamara & VanLehn, 2005).

There are some other interesting points of view that should be noticed for the escalation of learning procedures through Second Life, and currently unveiled from this study. Firstly, for the metacognitive self-regulation, it was positively correlated with students’ engagement. In addition, it ascertained that computer self-efficacy, self-esteem and metacognitive self-regulation were significant predictors of emotional and cognitive engagement factors, but negatively for the behavioral. In this notion, students’ who believed that the online instructional format in Second Life was enthralling seemed to produce more engaging learning materials, and affected students’ outcomes cognitively and metacognitively.

Howard, McGee, Hong, and Shia (2000) results indicated that metacognitive self-regulation was related to students’ cognitive engagement. The current results can provide similar results to antecedent studies (Al-Harthy & Was, 2010; Lee & Baylor, 2006) which have shown that additional or valuable components, neither precisely associated to students’ achievements, nor composed to their choice for future enrollment in similar online courses.

As Pullman and Allik (2008) have noticed the low general self-esteem cannot necessarily be a signal for a poor academic performance. The students’ success in the present study was better in cognitive and academic level, and with more modest academic abilities compensated deficiencies by raising their self-esteem. Several studies (De Feyter, Cayers, Vigna, & Berings, 2012; Ferla, Valcke, & Cai, 2012; Jones et al., 2012) have shown that factors like ease of use, perceived usefulness, and students' attitudes in contemporary approaches were influencing students by using their previous experiences to solve problem-based activities.

The current study also indicates that computer self-efficacy was a significant predictor of students’ engagement, at the correlation level. Similarly noteworthy it is essential to understand the role of computer self-efficacy in previous researchers (Odaci, 2011; Scott &
Walczak, 2009; Shea & Bidjerano, 2010) that have emerged from the relationship between antecedent variables (like students’ perceptions, academic procrastination, or even the acceptance of this technology) and learning outcome expectancy. In this case computer self-efficacy at the hierarchical and multicollinearity proceeds correlation level was a significant predictor of students’ engagement, and as well as it was predicted the overall engagement from the other two variables in higher levels. Consistent with Bates and Khasawneh (2007) study this means that participants with higher levels of computer self-efficacy may be engaged in the learning process easier. The engagement in this vein can involve students in activities only when they can precisely control and manage the learning environment (Holley & Oliver, 2010).

From all the aforementioned, it was unveiled that without considering other factors, such as the instructor’s support or students’ e-skills and perspectives; self-esteem had a direct effect on students’ cognitive and emotional engagement. This suggests antecedent variables to be decisive factors for increasing students’ engagement in distance education through virtual worlds. Thence, it can be proved that Second Life may become a nascent virtual learning environment and offer a valuable extension to online learning, by illustrating processes, interrelations and practical implications which are equally valuable and sustainable.

6. Conclusion

The study results from the present study suggest some interesting implications for online educational practices through Second Life. Instructors should be challenged to discern the students’ engagement in this environment with artifacts, learning materials, and studies through collaborative-interactive workflows. Second Life however, does not simply involve technical expertise. It can be augured as a widespread socially 3D VR desktop system for implementing various learning scripts with multiple 3D capabilities and affordances for exhorting students’ creativity and collaboration. Furthermore, students’ self-efficacy can be promoted in several ways, by:

(a) Including the appropriate guidance and feedback prompt from the instructor.
(b) Encouraging students to set challenges, proximal goals.
(c) Providing various (fading) scaffolding activities, in order to accommodate their metacognitive self-regulation and the appropriate feedback from the instructor.

From these findings, it can be also accredited that the faculty staff of online courses should design instructions and learning requirements in a manner to help learners not only appreciate the value or importance of the learning material, but also to support and scaffold their attempts, in order to handle them. Although, the instructor should consider for students who do not have previous experiences with virtual worlds, and help them more, before
participating in online courses that can be held in Second Life. In these circumstances the instructors must provide the necessary technical guidance and pay attention to their prompt feedback.

Perhaps the most intriguing findings must be focused on both positive attitudes and responses of learners (see positive self-efficacy correlation), with the integration of virtual worlds in e-learning courses. Some of the most interesting implications that this research achieved are as follows:

- The level of students’ self-efficacy appeared that can affect the way they treat in different learning processes and circumstances. More specifically, students who felt more effective in the learning process regulated with their strategies and metacognitive skills.
- Students, who believe in their capabilities, exhibit their behavioral engagement that supported learning, unlike to those who did not believe in their abilities.
- Students with high self-efficacy sense have chosen more challenging educational activities, used effective learning strategies, and persisted longer in educational activities, but they have faced the difficulties and set high academic goals. Moreover, higher level of self-efficacy may lead to better academic performance and self-regulation.
- Students who were effective are more likely to study hard, persevere and not need assistance to complete an activity. These students use cognitive and metacognitive strategies to increase their understanding.
- Self-efficacy also relates to leverage concepts such as interest, value, utility, and positive emotional response. These characteristics of self-efficacy suggested the existence of a relationship between self-efficacy and academic performance.
- Students' self-efficacy increased when they involved easier in educational activities and promote learning in meaningful ways. However, effective learning did not require the efficiency to be at very high levels, but just high enough to support engagement in current and future online activities. This suggests that participants can interact with educational activities and constantly to contemplate for solutions (cognitive engagement). Therefore, the proportion of positive evaluation and correlation of variables with the overall engagement can be obtained in an easier way and extend the benefits in activities with VWs.

7. Limitations of this study

Some notable limitations that should be considered when interpreting the current findings are as below:
(a) The sample size was voluntary, and thus it was used a simple, cross-sectional, post only design. Although in this respect, cross-sectional designs often benefit from high construct validity (Judd & Kenny, 1981), and results are limited by the respect to inferences that can be drawn.

(b) The reasons that might someone have anxiety or even lower levels of self-efficacy remain unknown after the correlation and regression analyses.

(c) The separation of novice or expert users with their answers in the main questionnaire was not possible, and thus the inclusion of the final results was not provided in this study. Maybe future works should point out the main differences between the experts and novice users, according to their answers, also with the same questionnaire.

8. Future work

A further consideration that must be established is the relationship of the flow experience in virtual worlds and other significant psychological factors (e.g. self-regulation) with students’ engagement in a structural equation analysis. A future work will contribute to the investigation and measurement of learning effects on the virtual flow and these processes can be mediated by its preconditions in virtual worlds.

Other interesting issues are these of design and usability of 3D virtual environments for educational activities which can be answered (or can be combined) with other qualitative research methods to gain deeper insights for further purposeful ways of interoperate virtual worlds technical functionalities with the already existing 2D LMS (e.g. Moodle). In order to get a better idea of the effectiveness and better support in learning activities with multi-user virtual worlds, designers and educators should try to configure more attractive applications in order to promote students’ participation in technologically-advanced environments.

References


