A cybernetic framework to articulate the organisational complexity of users’ interactions with the Jigsaw technique in an Open Sim standalone server

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Abstract

The purpose of this study was the utilization of an Open Sim standalone server in order to articulate and propose a theoretical cybernetic framework that delineated from the requirements of: (a) the systemic organizational structure of a learning process through the Viable System Model (VSM) and (b) the exploratory collaborative knowledge construction according to the "Jigsaw" learning technique for handling the interior organizational complexity of cyber entities’ (avatars) interactions in this virtual world. The community empowerment may initially be amplified from the implementation of this cybernetic framework for enhancing the dynamic and interactive dimensions of users’ (students and instructors) presence in Open Sim according to the processes of cohesion, coordination, and organizational processing that are quite complex during their first introduction.

Keywords: cognitive structures; cyber entities; cybernetics; collaboration; innovation; learning; Jigsaw; Open Sim; organizational complexity; Viable System Model

1. Introduction

The new generation of users is growing up in digital worlds and for this reason it is characterized that they are citizens of the “Net Generation society.” Students constitute the core of 21st society but this society may need technologically-advanced environments for a variety of educational purposes. Until nowadays students want contemporary learning paths that will motivate and increase their interest in learning. The global society is considering the learning approach as an interactive process in which students wish to participate. Therefore, it is expected that educational environments are trying to meet those needs. Teachers in nowadays have not only been responsible to “pass through” a novel knowledge field by structuring a didactic plan, but it is crucial for the same students to “learn by doing freely” activities according to the information that they gain and social skills that they need to communicate with others as a team. Students training in this occasion can involve the ICT transactions that must be supported by an educational interpretation of the scope of cooperation which is offered by the Computer-Supported Collaborative Learning (CSCL) scripts. This field is certainly not indicative in abstracting dimension-learning, but like all other educational processes need guidance and support from the instructor and students (Yuan et al., 2013).

Virtual worlds (VWs) have essentially became an interesting educational field in researchers’ rounds for exploiting the social interactions in order to learn students by participating in innovative learning activities in common three-dimensional (3D) visual space. The adjustment of various virtual environments was marked with various discussions related to concepts, such as environments with ambient interactive or multi-user virtual environments (i.e. MUDs, Multi-user domains or multi-user dimensions or multi-user dungeons), according to the last event that was appearing in the 1970's, long before the expansion of the Internet (Zheng et al., 2009; Sing, 2008). MMOGs (Massive Multiplayer Online Games) and MMORPGs (Massive Multiplayer Online Role Playing Games) are developments of MUDs were transformed into the well-known social VWs (Salazor, 2005; Steinkuehler, 2004). VWs are 3D computer-oriented environments, with a three-dimensional (3D) highly-artificial graphical environment, in which players can interact not only with the environment, but also
with other cyber entities (avatars) from all around the world. VWs are only a salient example of the networked society and the new digital culture that Web 2.0 transactions endorse.

The vast majority of users’ participation in online 3D multi-user environments (Muves) seems to discern as a powerful magnet for distributed users, giving incentives for socialization and creating new social networking sources for achieving students’ learning goals. The main feature of MMOGs is the common experience, the collaborative nature of social activities that depict the reward of socialization in a community of players (Chen and Duh, 2007). These “worlds” suggested for the development of communities that characterized by a “full range of social and material-practices” where young users introduced in a gradually complex social context (Steinkuehler, 2004). Many researchers have suggested that VWs can be used for education in different disciplines (Gee, 2010; Iqbal et al., 2011; Dalgarno, 2002).

From 2006 onwards the explosive growth of the “blogosphere” and Web 2.0 was already emanated from the user’s needs, and thence researchers have investigated or starting to place their courses in 3D technologically-advanced environments. VWs due to their inherent technological infrastructure can become valuable candidate platforms for various educational disciplines. VWs can also support most of today well-known instructional formats, as students contrast to “teachers-experts” lectures, performing in plenty of activities as a part of a larger community and sharing common goals and ways in order to attain into them (Conrad, 2011; Kale and Goh, 2012; McArdle et al., 2004). This social aspect of online VWs attracts more and more users, but until nowadays does not offer a larger isolation in front of a screen of a computer, but it has many characteristics of “persistence” (i.e. a virtual world that continues to exist even after a user exits from the world and that user-made changes to its state are, to some extent, permanent) (Koster, 2004).

Through the use of a multiple 3D-enabled (3D voice chat) communication systems for group activities, students can communicate with a large number of other users from around the world, and this maintains a sense of teamwork in an online community, as they are starting to involve in authentic (or at least pragmatic) situations which are sometimes resemble those of the real life. According to this extraordinary experience users in communities share information on matters that: (a) concern issues from them in real life situations as they can communicate with their instructor or call for advice and ideas (synchronously or asynchronously), (b) create or define interactions that they want to be involved in relation to environmental action, and (c) invest their time a seemingly “non-faceless” community.

Indeed, with the descendants of virtual environments, so-called “open-ended architecture” VWs, users interact and create their own open-ended environment and involved with others in order to co-create or coordinate their activities through an easy to use open source programming scripting language (OSSL) that is offered freely. One of the most well-established “open-code” environments is Open Simulator (or Open Sim) and its’ functional elements considered as key components for the further educational uses.

A virtual environment can provide a wide range of collaborative activities during the educational process. These activities may include the exchange and negotiation of knowledge sources, and potentially leading to conflict and change of the knowledge infrastructure, construction of the new knowledge and the development of social skills. The way in which CSCL brought some unforeseen obstacles for the design, dissemination and effective use of innovative educational software became more and more evident of research for educators (Matsuda et al., 2007; Stahl, 2006).

The conversion of the whole learning concept that is required must include radical changes for collaborative activities and teaching progressions of the e-Education. It is not surprising that the CSCL has often coincided with the e-learning scenarios and the organizational structures in computer networks. An e-learning scenario often dictated from the naive belief that the content can be digitized in the classroom and disseminated to a large number of students with limited costs. This content can provide a valuable resource for students, but also can be effective only within broader incentives and interactive context. Student’s interactions cannot be achieved without their “beneficial formalization” as groups
that require skillful planning, coordination and implementation of curricula, pedagogy and technology with the proposed cybernetics model (Pellas, 2012).

The objective of a cybernetic model in various learning approaches is to link students interactions with practical-based activities that should be supported by any 'open' or 'sustainable' virtual learning environment. The conceptual definition of cybernetics theory is until now understood through the study of communication or organization planning to control any system, either it is a computer or a human (Wiener, 1948). The use of both in the teaching and learning process presupposes with the hermeneutic approach and highlights the dynamic and functional elements of the “system” (Bertrand, 2003). The basis of the cybernetic “system” is expressed through a set of components whose properties are intertwined, so that users "totality" take action with various communication tools with the external environment (Ashby, 1956; Singy, 2011). The added value of the theory is to conjunct the online transaction and action of each human in the specific environment. The acceptance of autonomy factors in the teaching process and particularly those that proposed the students’ role in a learning activity referring to the pedagogical-psychological condition of 'self-control' and 'self-assessment' (Roos and Hamilton, 2012).

Combining the newest techniques and learning models it should be mentioned the common belief in which the technology-enhanced literacy in VWs is growing at an exponential rate. In these circumstances this study investigates the role of Open Sim as a learning environment, which includes up by cyber entities (avatars) and digital artifacts (visual tools). Certainly, the knowledge’s construction as a collaborative process can be shared among participants in conjunction with contemporary learning techniques, like the “Jigsaw.” The main objective of this “cooperative assembly” technique is to make every member of a heterogeneous group of students like a "cognitive" module, and able to take initiatives and responsibilities for teaching the module to the other members. The "Jigsaw" technique in the present study was used to reduce the racial conflict and support positive educational properties. Like a puzzle game, the contribution of each piece is an essential and integral part, in which students required to complete a specific project and as assembly all parts from students’ awareness should give their best effort for the best learning outcome (Aronson and Bridgeman, 1979; Huang et al., 2008).

The cybernetic framework enunciated in this study combined the concepts of a cybernetic model for better administration and organizational structure in order to be handled better the complexity between users’ interactions in Open Sim, according to the Viable System Model (VSM), as it was first-formulated by the British theoretical Anthony Stafford Beer (1926-2002). Moreover, the current framework gives the possibility of the creation and implementation of an innovative pedagogical way based on the collaborative technique "Jigsaw," in which there are distinctions between members (experts and novices) that required from them to participate together for a common purpose (Gallardo et al., 2008; Lao, 2008; Martinez-Mones, 2011).

Although, it is raised a research question on how the instructor can handle the organizational complexity among users’ participation in collaborative activities held in a virtual world with an innovative “cybernetic” model?

Particularly insightful for the present study is the added value of this framework that can give a common basis to reach a potentially cybernetic formalization of students’ interactions in learning activities through VWs, with an emphasis on integrating innovative teaching techniques.

2. Theoretical Background

2.1. Virtual Worlds: Inherent characteristics and affordances

Most recent “conventional” educational practices with 2D Learning Management System (LMS) in Higher education were primarily based on the oral or written form and (re) presentations of knowledge in different disciplines and answers in theoretical problems were
usually delivered by the teacher, who acted as an “expert” on the one side, while one the other students could not recall or take the appropriate feedback from their instructor. The current approach was being a target of criticism because: (i) the learning materials are not grounded to students’ own understandings or experiences from the real world; (ii) the self-directed learning and critical judgment skills weren’t sufficiently cultivated because students were not involved in educational activities for discovering freely and simultaneously take information or arguing about it; and (iii) students cannot possess skills to apply the acquired knowledge for real-world problems that are often not well-established.

While most two-dimensional (2D) learning environments are until nowadays be used as “warehousing of knowledge” and followed the Course Management System (CMS) capabilities or MOOCs (Massive Open Online Courses) where students and instructor share educational resources of the Web and communicate mainly asynchronously with type-based applications (messages on a specific forum and exchanging emails with other groups); however 3D VWs are most well-coming candidate platforms for connecting multidisciplinary learning virtual communities where users can widely be adopted from their schools or universities.

VWs can also effectively support student-centered or collaborative models of learning through collaborative activities and in this vein to foster not only the students’ participation with the development of higher order thinking and cognitive skills (Leong, 2011; Yu, 2009). Ideally, educational organizations and institutes have demonstrated considerable interest in exploring teaching and learning possibilities with VWs (Bouta and Retalis, 2012; Dieterle and Clarke, 2008; Flavian et al., 2012; Kluge and Riley, 2008; Hetherington et al., 2008; Teoh, 2009). Furthermore, VWs can engage and attract younger learners’ attention in various ways.

Based on their instructional affordances VWs seem to be ideal as candidate learning platforms for the following reasons:

- The sense of (co-)presence that most users can “feel” when they immersed in a virtual grid that allow them to perceive it as a space where they belong to, rather than a digital environment they are interacting with, e.g. a Web site.
- The persistence workflow lets users reform the space and constructs their meaningful and effortful structures.
- The situatedness refers to the execution and implementation of training courses with unique meaning and significance in authentic (or at least pragmatic) frameworks. This can lead in two interlocked conceptual elements, which are: (a) Concept of reciprocity, i.e. the willingness of community members to resolve difficult situations and subsequent and (b) The notion of retribution, i.e. the causal link (the reasons that normal users are members of a community) with the result they want to gain.
- The users’ embodiment representation forms as cyber entities (avatars) allow users in a VW to efficiently interact with other peers (“being there”) with verbal or non-verbal communication forms, e.g. using nonverbal forms of communication, compared to other means of 2D technologies, e.g. chat, forums, wikis etc.
- The expressiveness of 3D animated or interactive 3D graphical representations or virtual places can be used to present abstract or complex concepts that are difficult to comprehend in a textual form using metaphors which help learners to interpret the environments or even construct their own interpretation and communicate with their teammates.
- The real-time simulation and 3D interactive capabilities of VWs can be exploited to implement students the appropriate tools or artifacts for experiential learning and problem solving activities.
- The conjunction with free plug-in modules of 2D LMS, like Moodle, and the utilization of both environments as a unique platform where students utilize Moodle’s tools (Post card blogger, Web-intercom and Quiz chair etc.) and visual artifacts or primitives for the “construction” of an innovative knowledge field.
The assessment of educational scenarios and proposed projects by the same users according to their contribution in practice-based exercises in order to unfold the discrepancy between the design of the evaluation task and the design of visual prototyping artifacts.

Multi-user VWs defined as three-dimensional (3D) computer-generated environments that respond in real-time to user actions, in which interactions with other peers adopted in a visual and auditory stimuli. The basic elements are as follows:

(i) The illusion of a 3D place or space where users in the form of 3D substantial virtual characters (avatars) are interacting together in a visually “physical” environment;

(ii) The communication between peers by utilizing verbal (VoIP, IM, and chat text) or non-verbal forms (e.g. gestures that composed each user’s emotional state with facial expressions or body and communicate others) of communication; and

(iii) The procedure that is “active” in a common virtual “space” or “place” (Hew & Cheung, 2010; Duncan et al., 2009).

In this case it is given to users the opportunity to freely move through the virtual space with the assistance of a keyboard and a mouse to run, walk, and interact with visual objects that can lift or move from the entire virtual “eco-system” without distractions. Examples of multi-user VWs that have widely been used for educational purposes include Second Life (see the literature review from Pellas, 2012), Active Worlds (Dickey, 2005), and Croquet (Reis et al., 2011).

Many researchers and scholars (Mikropoulos and Natsis, 2010; Vosinakis and Koutsabasis, 2012; Pellas et al., 2013) have used temporary the 3D virtual reality (VR) technology that endorsed in a VW as a “constructionist tool”, where its features can be adequately combined with other artifacts in order to construct a truly novel platform for enhancing the learning procedure. Constructive approaches support that learning occurs when the learners’ exploration uncovers an inconsistency between their current knowledge representation and experience, and this process takes place within a social context. Some of the most appropriate features that can reinforce the learning process in a VW are as follows (Pellas, 2012; Sherman and Craig, 2003):

i) the (co-) manipulation of time’s and space’s sense, specifically where students need to practice in a common virtual space to co-create 3D visual prototyping to design easily tangible artifacts and simulate users’ behaviors or characteristics of their artifacts;

ii) the visual feedback from the environment and from other avatars that use multiple communication forms (synchronously and asynchronously);

iii) the sense of interactivity between students’ artifacts and multiple simultaneous activities participants which are driving to a narrative flow of the 3D experience;

iv) the scripting and animating usage of constructive scripts for the creation of functional 3D prototypes;

v) the innovative virtual persistent workflow for educational activities, because VWs aren’t learning platforms per se, and in this vein students should work in a 3D multi-user environment and everything must be configured from the beginning according to their needs or demands. In this case creating a new dimension from the correlation between participants and the “medium” (i.e. in our case the category of “open source” VWs like Open Sim) is getting emerged.

These virtual environments can offer an “open” and “alternative” way of learning to students through exploration, experimentation, design and production of learning. Furthermore, cyber entities can provide an increased motivation for students’ participation, social interaction and cooperation with others (Becker and Mark, 1998; Celentano and Nodari, 2004). Because of their “open-ended architecture” VWs can be used depending on the needs of the action (educational scenarios) and provide opportunities for creative learning processes through teaching techniques role-play (Gardner and Horan, 2011; Morse et al.,
2009), Jigsaw (De Lucia, 2008) and problem-solving situations (Bignell and Parson, 2010). Regarding to the feeling of learners’ satisfaction in virtual environments, previous researchers (Bayne, 2008; Dickey, 2005) have shown that users prefer virtual worlds because the opportunity to move freely in three-dimensional “grid”, to meet other people and interact with them, experiencing learning approaches through a virtual "travel” in the world of knowledge. These environments can provide a whole mixture of roles, activities, goals, conditions, circumstances and influences that give to each cyber entity the best conditions for the development of learning processes.

Although a key aspect from the use of 3D virtual reality (VR) technology is only one component of this new complex system that endorses humans’ relationships or responsibilities which are falling in a broader social and educational environment. It is not just an adjunct of real life’s situation, but it seemed as part of the educational environment and not as a simple tool, enabling us to change the whole educational “status quo.”

Similarly noteworthy, collaborative e-learning scripts (or scenarios) can be defined as the process of learning, which takes place at least some of the essential learning "horizontal" interactions between students and other "vertical," i.e. those that determine the conditions of activity with users and environment. Given these advantages resulting from the use of collaborative learning in education, most modern educational platforms designed primarily to promote effective support collaborative learning scenarios, with the CSCL approach (Konstantinidis et al., 2010). Also, the concept of “persistence” involves efforts of others to foster self-organization, collaborative action-based frameworks and co-responsibility for users to find solutions for problems that they encountered (Gmor, 2012).

The plurality of interactive and multimedia elements can describe a virtual world as an “eco-system” based on the environment that gives to users an environment for various activities, but also enhances human’s intuitive and “kinesthetic” interactive communication with other members, basically with a server-based VW such as Open Sim (see Diagram 1).

2.2. Open Simulator: Anticipated validation and inherent technological characteristics

The establishment of VWs, as an impending phenomenon of the last decade can be combined with the depiction of real life’s situations and inspired further lifelike circumstances of collaborative learning scripts. However, during this procedure it is necessary to articulate and create a conceptual framework in order to handle the organizational-teaching process, which will help users to manage both artifacts from the virtual environment, and users’ interactions from those who participate in educational activities. This distinction clearly indicates intensive thoughts to use an "open source” VW and specifically Open Sim

Diagram 1: Key elements of an “eco-system” standalone server
that is characterized as an open source 3D multi-platform server-based and multi-user 3D virtual platform. It frequently recapitulates the “equipment” one of the most well-known simulated virtual environments, like those of Second Life (SL). The “open-ended” architecture of this “world” can be used as a social place or for activities, like education, training, and visualization.

It is pretty remarkable to refer that the "technocratic nature” of Open Sim can be depicted with a freeware open source server platform is working in tandem compatibility with the client viewer of SL. Currently in this position, Open Sim uses the SL’s protocol for communication between the client viewer and the server. The open source modeling language and the script is the same as those in SL, but in this occasion it is more “open-ended”. Users can co-manipulate a private land (grid), in which they co-create whatever they want, without any restrictions. Of course, this assumed that the Open Sim server may be installed on the user's computer. Indeed, each user has access to the virtual world created by the administrator. Also interoperability with Second Life protocols has been a design goal since 2007 from some researchers (Capalini, 2010; Rico, 2010).

Open Sim uses an “open-grid architecture” known also as "hyper-gridding” which allow users to teleport between other multiple “Open Sim-based” virtual worlds by providing a hyper-linked map that indexing in other public grids. In any occasion, public grids retain the teleportation links to each other, without being online in the same grid. These budding multiverses normally contain user generated content and may be based around user contributed resources (Capalini, 2010).

The legalization (validation) of functionalities that Open Sim have was the highest response of the system which may have a positive effect on the cooperation of distributed students (Dohi and Ishizuka, 2010; Ryoo et al., 2011). The logic conviction behind the choice of designers that significantly affect the suitability of a platform for education is the advancement to be identified certain factors that affect the users’ participation in these environments. Hence, affordances that might be raised are as follows:

(a) The low or without cost performance of learning, in contrast to SL.
(b) The virtual places and spaces which can be easily modified from users each time.
(c) The use of a standalone mode offers portability, transferability, and “back up” issues of the objects that might be created from all users in a common virtual place.
(d) The macroscopic and microscopic configuration of all objects, primitives or artifacts with all virtual artifacts and objects.

2.3. The Jigsaw teaching technique

It is also important before starting a learning procedure to highlight distinctive roles that should be known from students’ relationships with their instructor in order to delineate responsibilities of each one. At this point, however, it is still requiring attention because all users should have a responsibility of their actions in the environment. This means that the management of groups is the key to success collaborative learning processes. Given that it is theoretically difficult for many students to be adapted to a new environment bounded as learning firstly it should be decided the best possible management that must be based on a technique or a method that facilitates the user to acquire new experiences and share with others.

At these stages considered the Jigsaw teaching technique as one of the most remarkable teaching techniques which can support efficiently participatory learning scenarios in a socio-constructive framework, even in online virtual environments (Bouta and Retalis, 2012). The utilization of this teaching technique in a VW can help students to better cooperate and coordinate with other groups to achieve a common goal (Konstantinidis et al., 2010). Thence, the use of this technique may offer an improved capacity for students to develop interpersonal and interactive relationships, adopting roles resemble to those of reality as each user is modeled in a VW as an iconic figure and looks like to be “immersed” with an embodied presence in realistic or at least illusionary conditions.
The basic principles of this teaching technique show the trend of repositioning forth the principles of reciprocity of learning communities and awareness of responsibilities and personal commitment in an environment dominated by the team spirit where students try to find solutions on problem-centered learning situations (Chou and Hart, 2010; Pellas and Kazanidis, 2012). Unlike to Barkley et al. (2004) study that the Jigsaw technique is characterized by moderate levels of online portability in 2D educational learning environments, Konstantinidis et al. (2010) stressed that this teaching technique in VWs can be enhanced through the development of specific virtual tools or artifacts according to the specific metaphors or affordances that a VW can replicate (e.g. gestures and visualization tools for questions and ideas).

Collaborative learning describes a situation in which students expect to participate in certain forms of interaction in a shared multiuser environment (both in artificial or physical situations), but there is no guarantee that it can attain what it without the help of the teacher. It is needed apparently to be adopted serious guidelines and specific activities that students should follow to achieve a common purpose. Main problems faced in contrast from the conventional classroom in which it can be emerged such as embarrassment, lack of concentration or team spirit to tackle problem-centered situations and lack of collaborative activities, which often focus on impersonal presence of the user a simulated environment in a computer. The main objective that can be clearly amplified before students’ introduction in VW based on the Jigsaw phases can be based on: a) the students’ familiarization and utilization of capabilities or communication tools that can be replicated from the environment in order to be sufficiently co-construct users a collaborative climate or facilitate the acquisition of knowledge, b) taking advance of students’ prior experiences in parallel instructional settings, c) the managerial responsibilities that each team of students into Jigsaw groups should have, and d) the assessment based on first impressions or even expectations that students might have before and after finishing the leaning activity.

Based on this fact and on the basis of collaborative activities which were used in previous pilot studies that considered from the above technique (Pellas and Kazanidis, 2012), in the current study the framework that is proposed, it should be followed the beneficial formation of students’ groups within a virtual environment. In this part team members are enabling on participating in the context of a collaborative activity to achieve a common goal, depending on their individual contribution and finally to evaluate their project.

Figure 1 depicts a diagrammatic representation of collaborative activities based on the Jigsaw teaching principles. Phase 1 suggests the students’ introduction in a learning environment and they separated in groups to participate in the collaborative script. Phase 2 provides the appropriate circumstances for the collaborative process in learning tasks. Formative evaluation plans and suggestions from initial results must be discussed in Phase 3 and in lastly Phase 4 it can be defined the summative evaluation of all groups.
Significant purposes and benefits of the utilization of the Jigsaw technique in the learning process can be derived from the following (Huang, T.-C., Huang Y.-M & Yu, 2011; Konstantinidis et al., 2010; Lai & Wu, 2006): (a) strengthen the composition of heterogeneous groups as teams or as individuals, as there are specific roles for each user, (b) students can collaboratively synthesize the knowledge gained at the end of the learning treatment like a puzzle to construct their own knowledge within the context of successive attempts in order to engage students in collaborative activities, (c) students may show a greater degree of effort as team members for the final learning outcome in specific organizational and educational contexts, (d) as a teaching technique can effectively support scenarios of a participatory learning procedure within socio-constructive framework in virtual environments, (e) the widespread use of this technique in a VW can help users to be adapted more easily in collaborative tasks and this would improve conditions for better cooperation and coordination among group members to achieve a common goal, and last but not least (f) may improve the ability of users to develop better aptitudes and interpersonal relationships with others.

2.4. The scope of this study

With the rapid proliferation of collaborative e-learning processes, universities and institutions confronted the difficult problem of choosing and managing an appropriate technological environment that fitted their budget, technical resources, curriculum, pedagogy, and the profile of the student body. It is a common conviction for modern e-learning practices that the use of virtual environments (or worlds), should include studies with pedagogical models that related to the integration of innovative teaching methods, which rely on how users have access to them.

In this vein the conceptual outset of this research is to create a theoretical “cybernetic” framework to articulate the users’ interactions and pedagogical principles from the complexity of cooperative learning activities in the virtual world of Open Sim. The main scope of this study is to propose a multi-method framework that can be prospectively used
and assessed in Open Sim grid the functional characteristics. Two fundamental points of view are as follows:

- Open Sim should present a better quality and variety of teaching methods and learning techniques that can be implemented when this cannot be achieved by other more "traditional ways."
- Open Sim should reduce the administrative burden of instructors and in this turn would allow them to use time or tasks more creatively and provide their feedback to students more easily.

3. Research Methodology

3.1. A rationale for the cybernetic treatment

The rationale behind the formation of a cybernetic model attempts to present an innovative model of the cybernetic management of the learning process in VWs. The pedagogical framework that discussed in previous sections can be applied today for a variety of e-learning environments that have different tools and architecture (Britain and Liber, 2004). The general objective of the study was to gain affordances from the current VWs that are not designed for educational purposes per se; however with the formulation of a theoretical cybernetic model perhaps it could better understand the technological infrastructure to support and use in e-learning processes. Specifically, it was wanted the exploration the current capabilities, issues and future directions of e-learning technologies in VWs, which should be linked with three axes:

1. The promotion of technological infrastructure needed to give a further value on the growth of the teaching process, and innovation in collaborative learning activities.
2. The management of tools (or artifacts) from the technological infrastructure that exists in VWs, especially for facilitating the adjustment of innovative instructional formats (blended or distance learning processes).
3. The illusion of students’ interactions management that occur during the learning process to better manage and maintain collaborative contacts developed from particular groups and as well as the feedback they receive from the instructor during the learning process.

From all the aforementioned axes it was tried to trace collaborative learning activities through students’ interactions in a VW in conjunction with the Jigsaw technique to better coordinate and manage the student groups in collaborative activities with various materials or artifacts during the learning process. Britain and Liber (1999) have shown a “simpler” cybernetic framework that naturally addressed to modern VLEs that were created for educational purposes and not for entertainment and social networking as it is currently be done in VWs. But it is imperative to investigate the potential benefits of VWs, as it seemed that more and more students participating in collaborative activities with others in different learning programs. If even the educational support do not have to delineate the contexts in which VWs are useful as alternative platforms for learning, it is particularly useful initially to ascertain the reasons of why may a university or an institution discouraging to use Web 2.0 sources or LMS and MOOCs for the development of teaching and learning process. Thus, these factors can be summarized as follows:

- The present systems are mainly oriented towards structuring the learning content and presentation - i.e. a one-way transmission model of learning
- The discussion and dialogue essentially could not be reflected especially in collaborative frameworks with modern forms as either diverted to a separate place for discussion, whether it was built or the most important guide users in the non-continuation of the effort of setting up the learning material, non-sequence content as many do not seem to fit easily into asynchronous forms of teaching.
- More emphasis should be given to the role of the instructor (without a facilitating role as for example to be a mentor may lead to unauthorized users’ activities in the environment) and
was not easily distinguishable by the use of tools from the administrator unlike those of the students.

- There was a distinct lack of organization on the part of students, lack of presentation tools or lack of presence of all users in one place.

   Many of these 3D virtual reality (VR) systems, it was already mentioned at the outset, were used for specific purposes, and as a result designers or scholars have yet spent enough money for their construction and maintenance. Over the time these regarded as prohibitive due to increased financial payment that should be given at regular intervals, but eventually until today we still not know if these environments can be permitted for all educational needs (e.g. different are the educational needs of students of the faculties of Science that required laboratories and other for students of the Social sciences).

   Although these environments have appeared with some defects according to their technological infrastructure and because of these they were created by certain predetermined purpose, it appears that the terminology of the term “adaptability” was bypassed. This of course does not apply in the case of VWs as most open source provide the user with a pre-constructed virtual ecosystem which can be transformed into multifunctional virtual spaces for a variety of activities and for different disciplines. Within these environments students can build their own tools or artists by utilizing the ease modifiable language Open Source Scripting Language (OSSL).

   Previous studies (Dillenbourg, 2002; Zhao and Kuh, 2004) have provided some meaningful results within communities or groups with collaborative learning processes. In this case it should be produced on the richness and intensity of members’ interactions that they should spend during their participation when they are getting involved in collaborative situations in specific organizational and teaching contexts. These interactions are still considered up today as the key for a successful collaborative learning and teaching process (Dillenbourg and Tchounikine, 2007; Lonchamp, 2006) even with the use of virtual environments (Daniel and Schwier, 2010; Wan et al., 2010).

   According to the aforementioned, the present research needs to examine more carefully the design decisions (pedagogical strategies and appropriate activities) are very useful for the learning outcome (Petrakou, 2010). Moreover, it should also be explored and a number of factors which can influence collaborative learning, such as interactivity, fidelity representations in learning environments and media sources that offered in a 3D virtual environment (Dalgarno and Lee, 2010). In a research level it would be therefore useful to amplify reasons for the selection and use of a 3D VW (easily or configurable infrastructure depending on users’ needs and demands) to support a collaborative learning framework, which in turn will allow predominately the acquisition of knowledge through the interaction between its members.

   Therefore according to the literature review that mentioned above on educational 2D and 3D environments, there were raised several urgent needs for the formation and structure of an integrated and coherent framework for the design and the detailed description of learning activities in virtual communities which may has an impact not only on users’ interactions analysis, but also to engage students in courses that actually helps in better establishment, coordination and organization of action and team-based activities for a constructive and meaningful collaborative learning (Burgess et al., 2010; Zydney et al., 2012).

3.2. Organizing cognitive structures and interactions in “open-source” virtual worlds

   The term of the “knowledge management” in VWs has been identified in recent years, but now on it has received serious attraction for many researchers and scientists (Muller et al., 2012; Russell, 2010; Scarlat et al., 2013). They were keen to explore the scope of the knowledge’s acquisition in interactive virtual purposes. With the point of investigation, we should be able to recognize the research approach which defined some conceptual determinations that directly managed, as the “theory of knowledge” (Manovich, 2001;
Richards, 2005), and effective organization (Davenport and Prusak, 1998; Horwitch and Armacost, 2002). Thusly, more attention should be made to the organizational analysis of interactions that emerged each time to become clearer in their scope and impact on learning and subsequently the fragmentation of knowledge (Nonaka and Nishiguchi, 2001). Apparently, it be could said that knowledge management may have common goals, such the creation of databases or corporate knowledge bases; in order to be easily stored in the 3D system and reused on it for the future. It is clear to keep in mind that we can create "knowledge sources” in order to have information from a variety of different cognitive sources.

A piece of research that may be inseparably connected with the management of cognitive structures is the analysis of the learning experience of trainees, during their interaction in a digital learning environment. Different types of educational environments, such as LMS, and currently collaborative virtual environments, often kept evidence of interaction between learners and systems (Redfern and Naughton, 2002). These assets can be used in multiple ways in an educational environment in order to be advised/guided learners to adapt his/her behavior to the current situation at a time or as evidence of the evaluation of both “(the co-) presence” of the learner with others. Data from interactions generated by recording users’ actions in the virtual environment provided, setting objectives and the framework of the learning activity may include items from:

(i) The navigation and selection that the user’s environment made in (such as tools or educational materials chosen, the selection order, changes in shaping the learning environment).

(ii) The communication among learners with their instructors through the cooperation within a group.

The process of collecting, sorting, and processing of interactive lessons is quite complex and a large real sequence of actions based on the user’s needs to undergo for a proper treatment can be as useful and meaningful information to those who were getting addressed each time. Thus, a fundamental challenge is how to create a framework that can interpret in different aspects in an interactive environment that must also play a pivotal role. In other words it is imperative need to construct a framework that will allow users to observe and (self) assess in activities raised through a learning process and can be regulated according to their learning or progress status (Martinez-Monés et al., 2006).

The corollary of the above is to understand that an effective method of managing teaching and learning situations can become a key area for any educational system, because in this notion it can be determined necessary active mechanisms to move and carry the “backbone” for handling students’ complex interactions. Concurrently the development of creativity on teachers’ parts, the continuous improvement of human resources that meet users’ needs, the full and effective participation of all users for achieving an efficient, and thence an academic environment that develops virtual compose for future requirements must be abundantly unidentified (Britain and Liber, 2004; Elkjaer, 2003).

3.3. Hierarchy of questions

The unexpected value of an educational activity may reflect positively or negatively on students’ motivation and interest as a result of their involvement in collaborative conditions. On the other hand, the adjustments to the teaching framework to decisively contributed to maintain the growing interest of students. The learning context supports all the adapted new circumstances, trying to answer the growing demand for advice, both pedagogical and the technical framework. In these circumstances questions that can be raised are as follows:

(a) How can be better determined the role of a cybernetic framework, in order to handle users’ interactions or needs in Open Sim?

(b) Can Open Sim become an “alternative” platform where users can utilize virtual artifacts according to the pedagogical principles that the Jigsaw teaching technique governs?
(c) How can the dynamic dimensions of the Jigsaw technique and the VSM be better determined as an innovative cybernetic framework with the mediation of Open Sim?

3.4. Towards a systematic approach for learning

The systemic thinking is based on the critical understanding of complex systems, which emphasizes on the entire “system,” i.e. to the sum of its parts. This thinking is particularly noteworthy in education, because it shifts in the focus and attention from things that processed from static to dynamic situations that presented (Maani, 2004). The system’s approach in the context of a sustainable/viable context can also be refined from what “how and why” someone learns. In a learning field, it can be recognized the sustainability issues which are multidimensional. Systemic approaches are promoting non-linear teaching models and learning approaches in which learning through the complexity of problems associated with a sustainable development. These types are dealing not only with an understanding of the components of a situation or an issue, but mainly are focused on linking learning to the broader context in which they occur. About on how someone learns the systemic thinking challenged the separation and the entrenchment of education and knowledge on individuals’ items with a structured and inflexible curriculum with alternative teaching methods, when the educational process occurred through informal learning processes (Gharajedaghi, 1999).

The technological revolution of the 20th century with the automation of machines or “cybernetics” (i.e. the science of control and communication between people with computers) has created theories that focused on educational approaches with technological means (Wiener, 1965). Indubitably, it is not different the content of the learning material that is used to be organized in a medium, but eventually instructor needs to think and know how students can digest it better. This theory interested on how this can be turned into the educational processes and become more efficient with some of these characteristics to be as follows (Shields, 1997; Misa, 1992): (a) the adoption of this terminology e.g. interaction, hypermedia, programming, (b) the shift of interest mainly with the teaching and instructional design, (c) the persistence of the data communication (feedback), (d) the widespread use of communication technologies, and (e) the determination in advance goals and expected humans’ behaviors.

Within these frameworks, two trends that developed are: (a) the “systemic” (or systems) theory, which dealt with the organization of digital elements of teaching and thus to design a teaching process and (b) the hypermedia environment for the use of media technology in teaching and the interaction of technological systems. This meaning refers to the classical view of the cybernetic theory that involves the thinking process of a human being, as a communication system that interacts and engages with the environment interface. This view is based on the classical analysis of Weaver and Shannon (1963) adopted in social science fields such as education, organizational analysis, and psychology.

Jantsch (1975) has also argued that "cognitive systems” evolved in real life situations as humans, through feedback, while learning and information which acquired from students during the learning process. Winter and Thurm (2005) on the other hand, considered that it is essential to train people in "cybernetic" thinking something that can help them to think in the context of "systems" instead the traditional concept of separation of the "whole" system into several small pieces for analysis. Today the example of “cybernetics” seems necessary for the improvement of humans’ thoughts (Velentzas and Broni, 2011).

3.5. The initial workflow of the Viable System Model

The Viable System Model (VSM) offers an alternative modeling agency, which can be used as a diagnostic tool for existing organizations and as a design tool for new organisms (Jackson, 2000). It was developed by Stafford Beer and based in the field of cybernetics organizational structure which focused on the effective management of organizations. The VSM differs from other organizational models and highlights those conditions that can create
and maintain a viable organization. As “viable” it is defined “a system that is capable of maintaining a separate existence” (Beer, 1985, p. 157). The model was focused on the interactions of the organism with the external environment and the effectiveness of the internal communication channels and information that can be produced. Therefore, issues of integration of the VSM in virtual learning environments (Britain and Liber, 1999) should involve the following processes:

(a) Negotiation: Firstly, the learning management unit (usually at a department level) needs to negotiate with the available resources and modules that primarily needed to be constructed. Typically this performed at the start of a learning program; but this may vary depending on the progress and needs from them as they unfold.

(b) Coordination: Modules should be designed in order to help and operate independently each student because some of them are considered models as prerequisites or co-requisites of the entire learning activity.

(c) Monitoring: This phase is the regular observation of “recording” activities taking place in a project or a program. This significant procedure is for collecting information on all aspects of the project, and an easy way to check on how project activities are progressing. It is systematic and deliberates the observation phase which provides the feedback prompt on the progress of the project. The report allows the gathered information to be structured for improving the project’s performance and making valuable users’ decisions.

(d) Self-organization: In many institutions the instructors try to unfold users’ ideas about their teaching process, and learn from each other’s experience.

(e) Adaptation and balance of needs for the present and the future-driven trends: Any online learning program must be constantly examining its set of modules and considering whether and when new modules may be needed according to changes in the knowledge domain, the needs of society, and the new resource capabilities (specific funding sources). A further idiosyncratic situation refers that the enhanced technology must and does play a large part in this, but usually not integrated with the VW, where the needs for adaptation are expressed.

With the main focus on this idea, we believe that the construction of a cybernetic framework can be better showcased features of the Open Sim, and as well as contributing to a new way of managing interactions depending both on VWs and learners dimensions and interactions.

3.6. A cybernetic framework defined

It is pretty remarkable that each restorative system can be organized in a way as to meet the requirements of users’ “virtual” representations with other objects (virtual artifacts) in a radically changing virtual environment that characterized by the “adaptability.” The standard-mode of a VSM alleges the cybernetic description that applies to any organization that is a “system” and can provide autonomy (Beer, 1979). Eventually, the result of decryption and development of a theoretical “cybernetic” model with the “Jigsaw” technique can give the opportunity to describe in detail the procedures, investigating the cognitive skills and learning levels that trainees acquire through their adoption in a complex learning task (Pellas & Kazanidis, 2012).

Beyond the fact that many related works (De Lucia, 2009; Konstantinidis et al., 2010) investigate the pedagogical models and innovative teaching methods, which are based on learning techniques; there is not any research concept for developing a “theoretical framework” which combines the diversity of both “Jigsaw” and “cybernetic” model learning phases to achieve in a common platform their integration for handling the organizational complexity of users’ interactions. One of the most critical issues that we must take seriously into account for virtual worlds, such as Open Sim concerned about how allowing a group of learners (ranging from 10-30 students) to transfer an innovative knowledge field and how on manage it. Similarly noteworthy, is the fact that the present study focuses on Open Sim functional characteristic for presenting and creating as a supplement material an organizational method essential for planning and conducting complex organizational structures for the purposeful management of learning courses in VWs.
The creation of the cybernetic framework has the following characteristics (see Figure 2):

(a) The principles of the “Viable System Model” (VSM), which considered as an organizational structure model of each system was further recognized from the study of Britain and Liber (1999).

(b) The “Jigsaw” phases may provide as the best solution to promote collaborative work with common goals, assisting in skill development and mutual interaction of users with the VW (Villasclaras-Fernandez et al., 2011).

In Figure 2, a cybernetic framework was depicted from the conjunction between the VSM with Jigsaw’s phases (see also these phases from the Figure 1) in order to amplify and articulate the collaborative processes and interactions among users (students and instructor) in Open Sim.

Figure 2: The proposed cybernetic method

The key features of the VSM permit an effective action-based opportunity against the organizational complexity between natural and technical interactions that each system governs and makes it more practicable. The structural axes of the VSM can determine the key elements of the current framework and the corresponding effect on the development of “cybernetic administration” for teaching and learning components behind a virtual world. The basic concern in this case was on how to tackle the organizational complexity in Open Sim as a unique collaborative environment through a systemic approach that the VSM offers.

The main concept of this research is focused on how effectively (at least on a theoretical level) the adoption of the VSM can be considered for the requirements and pedagogical principles that every “open” virtual learning environment governs. Through this process the construction of a theoretical “cybernetic” framework is a tedious task and should be taken seriously into account the introduction of students to a virtual environment, whilst it analyses (theoretically) the cybernetic principles of students’ interactions from a cooperative group of learning rather than mechanistic “encoding”information processes that are “absorbed” by the ordinary phenomenological exploration of a virtual space. Thus, a variety of educational issues such as interactivity, adaptability, interaction and collaborative learning are defined as crucial. The attempt to build a framework for evaluation of Open Sim pedagogical value should take into account:
(a) The organizational context of a model according to Beer’s “Viable System Model” that includes the "cybernetic management" of every system.

(b) The "adaptability" of this environment for various learning activities and principles, including the theoretical phases of the “Jigsaw” technique development.

Through this process, it must be provided the pedagogical value of Open Simulator. The contribution of our research can give a common basis (a “methodological cybernetic framework”) in which it is proposed the main access to the potential value of other VWs with an emphasis on integrating innovative teaching techniques. The basic concern was to prevent in considerable detail the mode of virtual users (teachers and students) and their contribution to the Open Sim grid. Foremost reasons of imposing visual presence in plausible behavioral and educational strategies, avatars can have a veritable promise for the motivation and effectiveness of education. One of the most appealing features offered by these developments is the ability to create visually-rich 3D environments for the implementation of team-based approaches which consisted in lifelike animated with these virtual anthropomorphic idols.

In order to describe the present framework in Open Sim and understand its pedagogical value it should be taken into account the following:

(a) The descriptions of possible knowledge management practices, such as the new management practices relating to the systematic and collective creation, dissemination and use of new knowledge, to improve organizational efficiency, improve learning competitiveness and innovation (see 1st column of the table).

(b) The organizational context of Britain and Liber (1999) model (VSM) includes the "cybernetic management" of an e-learning system between users and “medium” (Open Sim) (see 2nd column of the table).

(c) The structure pedagogical processes. In this case, Jigsaw technique it can determine students’ procedures that are weighty and necessary for the successful integration of technological tools (Nonaka et al., 2001) (see 3rd column of the table).

Obviously, there is no doubt that all these methods are remarkable, but in any online learning platform, especially in virtual enterprises, it needs more from just a single systemic methodology. Within the present paper, we proposed a new method, which essentially combines these systemic methodologies. In order to achieve the best results for our problem, we developed a cybernetic knowledge management method for distance courses that can be held in virtual environments. Finally, we have chosen the VSM to represent the complex phases of the previous steps and identify the strategic flow of knowledge between members of the virtual enterprise.

Through this process, it can be tried and assessed the provided pedagogical value of the Open Sim. Thus, the core of the “cybernetic” framework may include the following procedure:

<table>
<thead>
<tr>
<th>A methodological framework for organizing the “knowledge field”</th>
<th>Adopting the VSM functions in Open Simulator</th>
<th>Descriptions for managing an innovative knowledge field through the “Jigsaw” technique</th>
</tr>
</thead>
</table>
| Considering that knowledge is constructed by using tools and artifacts that are available for the community, the instructor should encourage students to be engaged more with interactive activities in the VW. This process may help students to (re-) think a solution of a problem in order to be encouraged the social construction of knowledge and the negotiation of new ideas that may produce novel meanings. With these tools, students in the learning process can | **The phase of “Negotiation”:** Includes all processes that concern to the negotiation of knowledge resources among students and teacher. With this dialogue, students may understand the value of using Open Sim and when they are beginning to adapt in a 3D system then the reflection of subjects’ choice must | 1) “Formulation and reflection” of the division can include:
(a) The objective of this phase is to highlight the need for planning educational materials in a virtual form. A deepening recognition can be based on a “knowledge base” organization, dealing with issues, such as handling of personal and collective goals and identify students’ needs. |
help the way of thinking, the social construction of knowledge and negotiation of meaning.

<table>
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<tr>
<th>The recognition of students’ ideas is depending on the environment’s adoption where they can construct their knowledge field. Whereas each class period organized by:</th>
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<tbody>
<tr>
<td>a) a plan of teaching phases,</td>
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<tr>
<td>b) using more than devices or media sources to attract students’ attention,</td>
</tr>
<tr>
<td>c) a detailed course directions of teaching activities (with questions, evolution and ultimate conclusions as to skillfully students led to speculation and to find the desired knowledge)</td>
</tr>
<tr>
<td>d) an evaluation sheet.</td>
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</tbody>
</table>

**Using Open Sim tools:** Voice call, IM, chat text, Secondary Inventory, note cards.

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<th>The phase of “Coordination”:</th>
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<tr>
<td>Includes processes of coordination, teamwork, learning activities and sharing ideas (“brainstorming”) with all available tools that Open Sim provides.</td>
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<td>(a) Students now initially must be organized in (heterogeneous) groups in order to explore and enrich their knowledge field, based on operating characteristics they have to finish work collectively. This apparently starts with the assignment of each student’s role; individually now everyone can participate in an activity. Here, it should be mentioned the instructor’s needs to exploit the individuality of the learning process, because only students must be able to become “experts” (by creating heterogeneous groups).</td>
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<td>(b) The pre-Analysis phase:</td>
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<td>(b) Construction:</td>
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In this case it can be underlined that the crucial role of instructor’s participation in the implementation and evaluation of innovation must be revealed. Zhao & Kuh (2004) argued that studies of an innovative educational phase are essential in engaging all teachers in the planning, implementation and evaluation of this process. Alexander, Murphy and Woods, (1996) had shown that the introduction of innovations failed dramatically when the instructors had the opportunity to participate actively in all stages of innovation.

**Application of knowledge management strategies:** The strategic knowledge management is being achieved when the required procedures can be integrated into existing learning processes. The successful implementation of strategies ultimately determines which changes should be made. It can motivate the capable staff so that the same desire and support for these changes. It is noteworthy that elements with the environment’s characteristics (functional, aesthetic, etc.) that can be connected to the final distribution and binding material.

4th) **Action-experts bodies,** in specific subject areas and implementation of data, in this phase should be implemented through innovative features, such as: a) the design and content creation of learning material, b) the development of applications, and c) the initial evaluation of the material that is given.

(a) **Composition:** The composition of elements is a key feature in achieving the desired objectives, and performed all these acts that demonstrate the ongoing work of each group.

(b) **Planning:** The concept of “programming” must be identified with the concept of action.

5th) **Experts’ collaboration and organizational development activity:** Teams need to draw the experts’ processes. Experts then need to return to their original teams and receive their initial observations and comments from other classmates. This issue describes the collective behavior of structural elements as a result of interaction between them. Self-organization is a process of development, where environmental impact is minimal, i.e. where the development of new, complex structures takes place mainly in and the system itself. As it was mentioned before in the section on evolutionary theory, self-organization can be understood by using the same variation and natural selection and other environmentally driven processes of evolution.

6th) The system must store students’ creations. If this attempt can be successful, then the virtual environment of OpenSim can be reused for future-driven learning activities (feedback from the system). In this way the procedure is considered not as a function of the same virtual world, but as “transformation” that occurred through the dynamic relations between objects, artifacts or social

**The phase of “Personalization”:** The system should be enabling and permitting students to seek either databases or other sources, i.e. “learn by doing” (J. Dewey).

**The phase of “Self-organization”:** The “architectural” structure of the virtual environment should allow students to organize activities and interact with the system in a simulated VW. This can be achieved through visual tools for organizing and managing various information channels.

**The phase of “adoption”:** The “adaptive quantity” of the system depends on teacher’s requirements and learners’ criteria for creating learning programs. The components of “adaptation” that constitute the educational context of the activity.
students need to corroborate in the experiment. Finally students from achieving a formal knowledge management program are to maintain the following processes:

- Create a position of knowledge manager.
- Create a climate of transmitting knowledge.
- Encourage the learning process.
- Understand the technology infrastructure to support the program, according to their specific educational needs.

(activity-centered approach), is a mea\_d as well as an important reason for choosing Open Sim as a learning platform.

Knowledge fairs (reports): Knowledge "reports" are like internal evaluation reports of the collective effort that are made by students for the pursuit of knowledge in the virtual environment. In more relaxed atmosphere students in "kiosks of knowing" where "expose" the successful results and share best practices. These reports help the spontaneous knowledge exchange among teammates that would not have the opportunity to come into contact in their daily work. The reports bring the "knowledge-action" in groups to be closer, without specifying who should talk to whom, giving students the opportunity to exchange ideas or promote their work collaboratively.

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The evaluation factors of learning strategies must be compared with the objective criteria and targets set by measuring the students' body ability to achieve its objectives. Of course, the evaluation should have the appropriate feedback by defining strategies. Some practical points for implementing a knowledge management program in a university area:

- The cooperation of the management knowledge with the parts to be gradual at first. The implementation of projects may create momentum may help the student body to accept the knowledge management.
- The knowledge management requires a change in school culture. This requires time and investment in knowledge’s management something that is slow in the initial investment. We need an appropriate vision and significant reserves of patience and perseverance.

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7th) This field must focus on students’ assessment of the present learning material that they finally construct. More specific they have to choose the organizational structure of the material to understand in which part of the project that they need to be specialized. As for the collective reflection and evaluation activities, the aim here must reflect on the action research, about what students did or did not do well, what omissions or errors are being occurred.

The review of the learning process expected to afford overall conclusions and discuss the possibilities of diffusion in the educational community or even in public institutions implementing learning programs.

4. Discussion

The knowledge management according to the cybernetic settings that a VSM can provide is also associated with the technological infrastructure of a learning environment. Based on previous studies (Birnbaum, 1991; Britain & Liber, 1999; Rios, 2010; Zamenopoulos & Alexiou, 2007) the cybernetic treatment depended on the VSM structure should be considered according to the following processes: (a) the management of interactive relationships created among users with visual learning materials, (b) the setting and the purpose in which communication channels are available, (c) the organization and managerial responsibilities that each team must have. Therefore, it is obvious to consider the VSM as the
most appropriate organizational structure for creating a teaching framework in a virtual environment, providing an easier management of the users’ interactions complexity and communication channels, while keeping the peculiar behavior of each user as important, as it would be in the real life.

The necessity of using new teaching methods to understand the organizational complexity in 3D innovative learning environments is imperative today (Bell & Kozlowski, 2002). Although there is not a common one model that can be used thoroughly academics, while it becomes increasingly necessary to present new methods to systematize the teaching and learning process through the pillars of human and computer interaction (HCI) to design an appropriate learning environment that meets the users’ needs and requirements.

In this case the dynamic vision of the 3D VR can provide a new interactive relationship between individuals and computers, but due to the technical characteristics of the 3D VR technology, it seems that sometimes can distract or confuse students. In these circumstances it must be looked the VW as a whole “eco-system” which is not only another medium of communication among users, but it allows the interaction between users in real time and can also help them to better understand the knowledge. The co-manipulation of tools that offered as "scaffolding artifacts" (i.e. conceptual cognitive models or constructs created from the same users and can help them to understand something in better circumstances).

The purpose in which the construction of a cybernetic framework can be used in these perspectives are fundamental in order: (i) to provide best practices that will enhance the quality and variety of teaching and learning methods that could be applied to a virtual environment based on simulation-based learning activities, (ii) to reduce the administrative burden which previously existed only on the instructor and less students and it does not become so visible the collaborative activities among users, and (iii) to understand users the added value of a 3D technologically-advanced environment, and of course the main purposes of the promotion and integration of innovative teaching methods in a multi-user virtual environment.

5. Conclusion

The construction of a well-defined model for developing an organizational framework and its implementation in VWs was the main contribution of this research. The idea of using collaborative learning techniques, such as the “Jigsaw” with its intermediates in “open source” virtual environments basically on design principles and the creation of learning scenarios, it is today imperative. As for the contribution from the utilization of the Jigsaw it was finally identified that:

(a) Supported and highlighted cyber entities’ (i.e. students and teachers) learning process in order to expand the interactive action through their search for other information sources beyond to the real, escaping from the traditional weakness created by the lack of an organizational framework for teaching process to address on the configuration of more complex interactions.

(b) Applied to an open-ended environment that allows designing different learning approaches with Open Sim which until now had not been treated as an educational tool in university-level courses.

With the evolving field of technological innovation for educators or students it provides learning opportunities that contribute to the knowledge management. Meanwhile, it changes on how people adapt to a complex technologically-advanced environment, learn new tasks and acquire new e-skills and access to educational resources on a global scale, leading to new strategies for learning, beyond statutory and formal contexts. The utilization of knowledge resources, if there are properly well-organized, and can improve students’ performances in virtual environments. In this case, of course, if it wants to decipher the factors of success in these projects that must meet certain conditions, such as:

(i) The connection of a collective goal of working for the needs of real life
(ii) The ease utilization of learning tools for a proper technical and organizational infrastructure of the system
(iii) The formation of multiple communication channels for knowledge transfer and students’ motivation.

The overall conclusion for (a) question showed that the adoption of innovative environments for “knowledge management” can produce basic design principles of a digital environment, which should be adapted in collaborative learning principles, the facilitation of the knowledge’s co-construction as a collective process, and even more of the collective sharing knowledge configuring among the members of each group. Regarding to the role of virtual environments in this multi-level shape of collective interactions, it is truly understandable that the technical capabilities of the environment that facilitated by the construction of shared meanings and artifacts which cyber entities have to use in these grids, it was confidently a simulation of the individual collective work. Furthermore, it is worth noting that participation in a group does not mean that individual representatives identified easier with collaborative activities.

As regards the (b) question, the original findings of a strategic framework for further development as a “participatory cybernetic framework” in conjunction with the “Jigsaw” that constructed an organizational plan in conjunction with the Jigsaw technique that seemed at least initially can be responding effectively on:

- Making useful the management of the learning process and increasing the mobility of interaction between students.
- Improving the quality and effectiveness of education and training.
- Promoting equity, social cohesion and active citizenship.
- Fostering innovation and creativity and the entrepreneurship at all levels of education and training sessions.

To sum up the reasons for (c) question showed that the dynamics of cooperation from such an action framework could bring up a new dimension among the facts of cyber entities with the “Jigsaw” technique and the “cybernetics mechanisms” of a “viable” learning process, improving the quality and effectiveness of the e-Education status quo and training process (among others) emplacing on:

(a) Participating users in the development of the training workshop where they employed.
(b) Generating new knowledge and its innovation through students’ involvement in Open Sim.
(c) Evacuating students “intrinsic cognitive overload” as students become autonomous leaders in their professional development throughout their careers.

In this study we proposed briefly a “cybernetic” improvement research framework for the e-Education, but it occurred that needs to develop or provided more instructional affordances through for the process of lifelong learning and continuing education.

6. Future Work

Future works may illustrate on this educational cybernetic practice some evaluation fragments (with formative or summative evaluation form) to ensure the high quality of this “cybernetic” framework and to provide the initial groundwork for Higher Education courses in a more systemic way. These establishments currently can enforce the continuous professional development of teachers and trainers, making the teaching plan as an attractive choice transmitting students’ transversal skills/abilities. It is an optimization limm problem, which falls within the area of operations management of financial resources for educational research. In particular, this problem concerns the production of goods and services and involves the responsibility of ensuring that educational activities are effective, both in terms of the minimum use of resources required and the complete satisfaction of students’ needs.

Although some of the problems associated with the field of operations research are:
• How can instructors plan a cybernetic framework in order to enhance students’ preparation in online collaborative courses and in this vein to be minimized the cost of this program?
• How can the “manpower planning” with a cybernetic framework (i.e. setting the number of people needed per shift to operate smoothly for a procedure) and the assignment of staff’s responsibilities becomes more effective through VWs?

References


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