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E-Learning through Virtual Reality Applications:
The Case of Career Counseling

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Abstract: VR can be defined as a three-dimensional space that provides a strong degree of interaction with the user, including real-time simulation and interactions through multiple channels/senses. It is not just a reproduction of conventional reality, but creates synthetic realities without precedent. It has been used in various fields, e.g., education, medicine, architecture, assistance to persons with disabilities, etc. VR leads to the development of new forms of counseling, e.g., via asynchronous learning platform, videoconferencing, social networking, etc. By using the three-dimensional virtual immersive learning environments of "Open Workshop on Information Literacy" of Patras' University Library, we organized and conducted three educational workshops about career consulting with 50 participants. The Open Workshop is an open and free blended learning initiative for providing flexible training services on academic & professional development to the university's academic community and beyond. In this paper, the results through practice of such an initiative are described, i.e., the prerequisites for its success, its capabilities/restrictions, the participants (and potential) and the way they participated, users' feedback (evaluation and outcomes) and the possibilities/limitations of Virtual Reality (VR) applications in Career Counseling and especially in providing educational and vocational information through already implemented actions.

Keywords: E-Learning, Career Counseling, Virtual Immersive Environments, Virtual Reality

Introduction

Virtual Reality (VR) consists one of the most important technological innovations of the past two decades and can be defined as a three-dimensional space that provides a strong degree of interaction with the user. VR uses computers to create real, or not, environments and the users have the illusion that they are surrounded by these environments and can move freely in them, while interacting with included objects, as they would be in the real world (Charitos 1999; Yasin, Darleena, and Mohd2012).

The VR is a high level technological application that includes real-time simulation and interactions through multiple channels/senses. Its promise is not located just in the reproduction of conventional reality, but also in the ability to create synthetic realities without precedent.

The term Virtual Reality has its origin to Jaron Lanier, who was also the founder of VPL Research in 1989. However, there are more terminologies referring to the subject of VR (Mikropoulos 1998), such as for example:

- Artificial Reality, which was introduced by Myron Krueger in the 1970s and is defined as an interactive environment with user’s participation via computers to events engaging many sensations and kinesthesia.
- Cyberspace, due to William Gibson in 1984, is a space in which humans’ nervous system and mechanical-electronic means of communication are associated with computer systems.
- Telepresence is the sense of presence in a remote natural space, with the possibility of handling objects and working with other people in this space.
- Most modern terminologies deal with Virtual Words and Virtual Environments.

VR systems have been grouped in four categories (Mikropoulos 1994):
- Desktop VR, which provide a window into the virtual world and rely on personal computers with the capability to support specialized peripheral navigation tools in 3D virtual space and use stereoscopic glasses or helmet.
- Dextrous VR, which screen virtual objects via mirror in front of the user who handles them, e.g. in the case of virtual surgeries.
- Immersive VR, where the user is cut out from reality by using peripheral devices, such as data gloves and stereoscopic helmets (HMD - Head Mounted Display) which display images of the synthetic environment.
- CAVE systems, which consist of a room that on the walls, floor and ceiling are depicted (projected) images that represent views of the virtual environment. The users have the ability to walk in this room and the sense of their presence in the virtual world.

VR systems have been also classified into three other categories according to the degree of users’ interaction with the application and the degree of their exposure to the systems (Burdea and Coiffet 1993):
- Defensive, where the user simply moves in a virtual world that surrounds him, with no control.
- Exploratory, in which full freedom of navigation is provided but not intervention in the events.
- Interactive, which provide the user the ability to interact with objects in the virtual environment.

**VR Applications and Education**

VR supports dominant cognitive theories, such as structural constructivism which argues that knowledge is an evolutionary process derived from persons’ experience in the world and the processes in which they participate. People develop a better understanding when they participate in activities for achieving personal goals and the existence of a genuine framework is pedagogically important (Papert and Harel 1991; Merchant et al. 2014).

In order the various VR systems to be effective, they are adapted to each user's age and learning experiences (Dimitriadis 2008; Dodd and Antonenko 2012). So, for children, applications’ main objective is the understanding of the image. Therefore, simplistic and non-photo-realistic graphics are used. For adolescents, the objective is the maintenance of interest, vigor and action. Therefore, intensely dynamic environments focusing on impression are used. For adults, key factors to VR programs design are reliability, information, familiarization with the represented environment and visualization with a focus on details.

VR has been used in many various areas such as e.g., education, medicine, architecture, entertainment, imaging information systems, handling machines and vehicles simulation, aid for persons with disabilities, military purposes, etc. VR technology can be used for the development of multi-dimensional audiovisual illustrations of complex information systems, in the form of interactive Virtual Environments (VEs), thus allowing the user to process these systems in the most natural, “instinctive”, manner that best suits the working method (Oikonomou 2006; Merchant et al. 2012).

Especially in education, the information circulated in the form of experience (direct experience, making use of various senses, unlike reading that are purely visual-mental process), maintains and cultivates interrelations. This is one of the reasons why multimedia applications trainers manage to convey to their users more qualitative information, as proven through practice (Bricken 1990; Ştefan 2012). VR technology is considered to be a powerful educational tool for the support of teaching, mainly due to the following features (Mikropoulos 1998; Mikropoulos, Pidelas and Chalikidis 2002):
• Exploration of existing objects and spaces in which there is no access by students.
• Implementation and handling of abstract representations.
• Study of real objects which are impossible to be otherwise understood because of their size, position or properties.
• Creation of environments and objects that have different from the known properties.
• Interaction with real people in distant physical locations or imaginary places with real, or not, ways.

Moreover, virtual immersive environments have been used successfully by librarians around the world to provide solutions and enhanced access to knowledge and cultural resources (Hill and Mystakidis 2012). Due to these abilities of VR, the use of VR systems in educational applications get the users even more in the learning process, by offering them various options to explore knowledge areas, which leads to more effective-efficient educational process. VR solutions can be used to engage the learners in the zone of proximal flow and accelerate the pace of learning (Lampropoulos and Mystakidis 2012; Shaev 2013). Educational applications that make use of VR have been tested on:

• Simulation of workshops and laboratories for teaching.
• Simulation of navigation in environments which is otherwise impossible to be achieved, either due to distance, or because they belong to the past (e.g. ancient monuments and sites).

However, essential factor for the design, development and evaluation of educational virtual environments, is their multidisciplinary approach. That means the collaboration of various fields’ scientists, such as specialists in the fields of concern, Information Technology specialists, pedagogues and psychologists.

**VR Applications and Counseling**

Career Counseling is not left unaffected by technological effects and social expectations as a result of the widespread acceptance of the VR programs. Already, the rapid development and use of Internet and Information Technology in providing information and fostering communication, has resulted in the creation of new forms of counseling, such as counseling via asynchronous learning platform, videoconferencing, social networking, etc.

VR has been successfully applied particularly in treating phobias (Rahayu 2003). The use of VR offers a different method. It allows the exposure of the patient to a virtual environment that is more secure, less embarrassed, and with less cost, than to present real situations of stress.

Besides, situations that are difficult to be found in daily life can be developed. These situations are reproduced in plausible and three-dimensional way. Some experiments that have been already undertaken prove that the use of VR in the field of phobias treatment has significant results, particularly to fear of heights, arachnophobia, agoraphobia, claustrophobia, and phobias related to traveling by air.

In career counseling, despite the expansion of VR applications, the examples, both in Greece and abroad, are minimal and limited to the following actions (Haberstroh, Rowe and Cisneros 2009):

• Virtual Career Days-Fairs. The interested employers and (potential) employees are met in virtual spaces, e.g. companies’ stands. This virtual meeting is achieved either through avatar (digital representation of the user), or via remote communication applications. In that way, companies inform for their purposes and actions, and recruitment interviews are being undertaken.
Virtual educational and professional exhibitions. The various exhibitors participate in virtual exhibition centers where they present their services and operations and respond to the questions of virtual visitors.

Career Counseling through VR applications: The Case of Open Workshop

From November 2011 till June 2012, in the Library & Information Center of University of Patras (Greece), designed and implemented the “Open Workshop on Information Literacy”. This is an open blended learning program that combines educational activities in classroom but mainly from distance. The term “workshop” refers to the emphasis on active learning, i.e. learning through practice on new concepts and skills.

The Open Workshop is the first open, free user-guided e-learning academic development program in Greece (Mystakidis and Tsakonas 2012). It is worth mentioning that the “Open Workshop on Information Literacy” was selected among 91 proposals and awarded the “Seal of Good Teaching Practice” for the innovative use of Web Tools in the Education & Lifelong Learning, within the framework of action “Learning 2.0+” of the University of Athens (http://mathisi20.gr).

Once this program identified and analyzed the educational needs of graduate students and Ph.D. candidates, it was designed based on two fundamental objectives: (a) to encourage participants to acquire useful knowledge and skills for their academic evolution and professional career, and (b) to provide an enjoyable and effective learning experience through the use of the latest e-learning technologies.

Therefore, the curriculum was designed focusing on the following knowledge areas:

1. Information Literacy
2. Academic Evolution
3. Lifelong Learning
4. Professional Career Development

More specific, in the Professional Career Development area the training needs that defined the learning objectives of the Open Workshop were the following:

- Creation of customization of resumes (curriculum vitae) for professional and academic purposes according to the Europasstemplate.
- Authoring of cover letters.
- Job seeking strategies in European Union countries and beyond.
- Effective preparation and techniques for job interviews.
Figure 1: Mindmap of the training needs addressed by Open Workshop across four knowledge areas

In particular, from April to May 2012, the Career Office of the University of Patras (Greece), for the first time in Greece took an active role in the courses of “Open Workshop on Information Literacy” in the 4th of the above mentioned subjects concerning Professional Career Development, by implementing an open workshop for Career Counseling. Specifically, three sessions (1 hour each) carried out on the following topics:

1. CV and Cover Letter: Creation and customization of professional and academic resumes.
2. Recruitment Interviews: Effective preparation, good practices and common mistakes during face-to-face recruitment interviews.

The open workshop was held in a virtual medieval amphitheater. Each session was attended by an average of 17 graduate students and Ph.D. candidates. The workshop was implemented through the 3D virtual immersive environment platform “Second Life” (http://secondlife.com/), and for the asynchronous learning and support of the participants it was used a collaborative learning environment “wiki” (openworkshop.pbworks.com). A relevant blog (openworkshop.wordpress.com) and a Facebook page (facebook.com/UpatrasOpenWorkshop) served as means for announcements and communication with the participants.
The workshop’s pedagogical methodology during each session featured a short series (5-10 minutes) of individual and group learning activities to engage participants. The activities were based on prepared questions of comprehension of the educational material as well as short case studies. During sessions participants had the capability of multiple communication channels: a) live chatting, instant messaging), b) voice (via microphones and headphones or speakers) and c) virtual kinesthetic communication (avatar movement, gestures etc.) The sessions were also broadcasted simultaneously live over the web using streaming technologies and recorded.

Each session’s educational material along with the video recording and additional resources were posted in the Open Workshop’s wiki. In order to complete successfully the Open Workshop each participant had to complete one assignment directly related with the learning objectives of each session. Each assignment required an individual effort of approximately 20 to 30 minutes. The assignments were posted openly in the wiki. Participants were encouraged to comment on their peers’ assignment, post relative questions and share interesting resources.

Students’ Evaluation of Career Counseling Open Workshop Sessions

Next, we evaluated the conduct of career counseling in a blended e-learning environment by researching student perceptions and experiences. After the completion of the open workshop (June 2012), participants were invited to evaluate in detail individual teaching and learning quality parameters both for the overall Open Workshop programs as well as for each session.

The questionnaire included the following questions:

- What is your degree of agreement with the following statement: “I acquired new knowledge”?
- What is your degree of satisfaction with the following aspect of Open Workshop: “Asynchronous E-learning (wiki)”?
- How do you assess the overall quality of the educational material?
- What is the degree of interest in the knowledge area Professional Development?
- How do you assess the instruction by workshop facilitators?
• What was the degree of your overall satisfaction in the session on Job Search?
• How do you assess the teaching skills of the workshop session facilitators (names follow)?
• What is the degree of your interest in the knowledge area of Professional development for future Open Workshop sessions?

The responses were organized using the five-level Likert scale according to the following format: 1-Very poor, 2-Poor, 3-Fair, 4-Very Good, 5-Excellent. The questionnaire included in total 56 question items and was offered using an online survey tool. The data was imported and processed in IBM SPSS software.

**Evaluation Results**

The questionnaire was completed by N=21 participants. The evaluation results from the sessions on career counseling were very encouraging, scoring high on learners’ satisfaction, above the average of the total Open Workshop’s sessions. The evaluation results for the three Professional Career Development sessions are characterized by a strong interest and a high degree of satisfaction.

Overall learning session satisfaction: The average score for all 19 sessions of Open Workshop was 4.03±0.79 while the satisfaction with the overall program was 4.31±0.63. The Career Counseling sessions were the top three rated sessions in the whole program.

<table>
<thead>
<tr>
<th>Session</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Workshop (Overall)</td>
<td>4.31</td>
<td>0.63</td>
</tr>
<tr>
<td>Open Workshop Sessions (Average)</td>
<td>4.03</td>
<td>0.79</td>
</tr>
<tr>
<td>Session #1: CV &amp; Cover Letter</td>
<td>4.36</td>
<td>0.74</td>
</tr>
<tr>
<td>Session #2: Recruitment Interviews</td>
<td>4.36</td>
<td>0.74</td>
</tr>
<tr>
<td>Session #3: Job Search</td>
<td>4.46</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Teaching skills: The facilitators of the Career Counseling sessions were also rated high than average in teaching quality scoring 4.43±0.51 while the Open Workshop average was 4.36±0.67.

**The Diffusion of Career Counseling Open Workshop Educational Resources**

The openness of the workshop led to the production of open educational resources (OER) within the framework of the program. The high quality of the digital content and its free access resulted in remarkable dissemination and popularity on the internet, beyond the boundaries of the University of Patras and of the period of the program. More specific, the presentations alone of the program attracted more visits than the total students’ population of the University of Patras (25,000). In less than six months, the three presentations of the Career Office had a total of 3,573 visits, i.e. an average of 7.5 visits per day, since their day of publication.
Figure 3: Detailed statistics of the online accessible presentations of “Open Workshop on Information Literacy” for the academic year 2011-2012

Users’ Interest in Upcoming Open Workshop Educational Programs

Consequently, according to learners’ feedback it was decided the 2012-2013 “Open Workshop on Information Literacy” to include an autonomous educational program of four sessions for professional career development, which was a popular choice of many participants who registered early.

Figure 4: Users’ registration (November 2012) for the upcoming educational programs of the “Open Workshop on Information Literacy” for the academic year 2012-2013
Prerequisites Emerged for the Success of Career Counseling Open Workshop

The implementation of the sessions on career counseling aimed mainly at building practical job-related skills, and also as a mean to encourage students for subsequent face-to-face individual counseling by visiting the Career Office. However, prerequisites for the success of the workshop were:

- User familiarity with VR applications,
- the adaptation of information material in virtual learning environment,
- the application of an effective instructional strategy suitable for 3D virtual immersive environments,
- the proper preparation of the questions,
- the prior detection of users attitudes and opinions based on their personal experiences, and
- the subsequent adjustment of the counsel based exactly on the above mentioned experiences of the counselees.

Capabilities of the Use of VR in Counseling and Education

Career counseling can and must make use of VR systems as they offer a great potential for supporting teaching-learning and information diffusion. The key point is the proper utilization of the capabilities and special features provided by virtual environments, with a view to practicing the basic principles and concepts of modern theories about learning and career counseling. More specifically, VR could be used in the following actions concerning counseling in particular, and education in general:

- Universities’, or other educational institutions’, exhibitions,
- Virtual career days-fairs,
- Distance courses (e.g. seminars, etc.),
- Virtual laboratories,
- Providing information and professionalmonographs,
- Visits to virtual universities, research laboratories and workplaces,
- Establishment and development of virtual enterprises,
- Personal counseling and emotions’ simulation (cyber emotions).

The Benefits of Using VR Systems in E-learning as Resulted by Career Counseling Open Workshop

The benefits of using VR systems can be summarized in the following points:

- Sense of live (experiential) presence in the three-dimensional environment.
- New generation’s familiarity with the average spreading of VR applications through entertainment.
- Development of special skills, such as for example, getting informed, job and academic evolution searching, synthetic and constructionism skills, managing tools, cooperative skills, teamwork, use of new technologies, etc.
- Simultaneous use of multiple teaching visual aids.
- Associative and active learning.
- Distance study of a vocational or educational process or communication with specialists.
• Possibility of multisensory interaction and of direct personalized finding (direct and
dynamic information, discovery, rewarding).
• Information on free and open time and personalization of searching material.
• Usability from social vulnerable groups.
• Exploration of not reachable and accessible environments (e.g. microcosm, outer
space, distant fields, past environments, etc.).
• Effective resource management and low cost of large events.
• Familiarization of the user with career counseling and pursuing a face-to-face
meeting with the counselor.
• Maintaining anonymity.

Final Conclusions

Computers have entered the field of career counseling as an important technological tool since
the 1960s. These systems have offered a number of capabilities, such as evaluation through
Internet, search databases, extensive databases for jobs and education, keeping personal files and
tele-counseling applications.

It should be noted, however, that VR applications complement the counseling process, they
do not replace it. Also, it is required a proper planning based on a sound instructional
methodology and preparation of the relative material, depending on user’s age, educational level
and cultural background. In addition, the user (counselor or counselee) of such applications
should take into account the following points-weaknesses:

• Ensure very good users’ knowledge and familiarity with new technologies,
otherwise the applications are hard to use.
• Need for continuous updating of information and material.
• Regular examination and evaluation of applications and enrichment of the scientific
literature.
• Users’ difficulty or even inability to understand the non-verbal communication
through Avatar, despite the diffusion of digital representation of feelings (cyber-
emotions), etc.
• Possibility of falsification information by counselees due to their anonymity and the
non-physical contact and communication.
• Possibility the users to considering VR applications as a game and make superficial
use.
• Increase of addiction and social isolation phenomena and confusion of virtual with
the physical (true) reality.
• High cost of application development.

However, research has shown that the most effective counseling is the combination of
consultants’ personal supporting and the use of technology. Even the most complete and
impressive system is less effective if used without the support of an experienced career
consultant. Respectively, VR applications design, implementation and evaluation in career
counseling must take into account the knowledge and expertise of career counselors in order to
be useful tools for counseling.
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