VIRTUAL REALITY AND 3D TOURS AS A PEDAGOGICAL SUPPORT TO IMPROVE STUDENTS EXPERIENCES AT THE UNIVERSITY

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Abstract

This paper discusses the experiences of freshers and online learners who have embarked on a tertiary online course at the University of Mauritius. Online learning which is emerging as a promising market for the education industry is growing at a rapid pace in Mauritius, especially because it offers learners the opportunity in becoming highly independent and autonomous in their learning while at the same time promotes the earn while you learn concept. However, the difficulty lies in the fact that online learners are often off-campus and are not accustomed with the campus infrastructures and key areas for queries and information offices. They visit the campus as and when any ad-hoc face-to-face session has been convened or for administrative purposes like payments or module registration. Freshers who are also new to the university environment tend to feel lost or misguided through inaccurate information given to them during their one-day induction session. Similarly, sometimes in their effort to locate either any particular office for queries or even to obtain "just-in-time" information at any office, learners simply get confused. The development of a 3D model of the university will help learners to visualise and experience a sense of real-world environment and precisely locate themselves in order to know if they have landed at the right place. Virtual reality and the 3D tour will help learners to navigate and immerse in the university environment for better exploration. The rationale behind this development is to support online learners for a good integration in their higher studies especially since the difficulty to adjust with such social integration to the institution, tends to give rise to learner anxiety and frustration which directly impact on their higher education. McCraty (2007) and McCraty *et al.* (2000) have demonstrated that learners' anxiety and confused state has a detrimental effect on their overall academic performance. This paper reports the design and development process of a 3D Virtual Tour application for the University of Mauritius, to assist new students especially enrolled on DEOL programmes to better integrate the educational ecosystem of the University. We present the results of a first evaluation of the system done with a group of students through survey questionnaire and a focus-group discussion to gather feedback and perceived usefulness of such a system to enhance their educational experience on the campus.

Introduction

Beginning the student's life at the university is challenging, as it is the next step that students look forward, after their secondary schooling, to join for further studies. Starting the university means that the students will get exposed to new environment, as well as develop autonomy to plan their academic journey. A good transition to University life is therefore the first step to ensure that a student puts the maximum chances on his side to succeed in the endeavour. However, the campus environment is new to the newcomers and the online learners who are most of the time off-campus. Sometimes, they find it difficult to locate certain classes, buildings or offices on campus. Consequently, all these frustrations and difficulties influence the students' satisfaction and delay their adaptation process to campus life. Similarly, the issue that needs to be addressed in order to improve students' initial experiences on campus is a comprehensive induction program that introduces the University and its environment to the new students. According to researchers (Bozarth *et al.*, 2004; Levy, 2006; Scagnoli, 2001; Tomei *et al.*, 2009), it was reported that such initiatives have promoted students' confidence and enriched their experiences at the university. Moreover, another situation where the induction program will be specifically of major importance, is in the area of distance online programmes where students are studying off-campus or on a part-time mode. These students' physical presence is limited due to their courses modalities and their other social, personal and professional commitments. When such students come on campus for any payments or queries, they find it difficult to locate specific administrative or

information offices, and they lose time. Therefore, in this context, proper administrative support and pedagogical strategies are needed to enhance first year university students' transition to their higher education experiences. Hence, since the learning process starts from the day of induction itself, it is significant to enhance, improve and focus on devising the proper induction processes that will positively impact on students' educational experience at the University.

It is therefore in the interest of the students to get them accustomed to the campus infrastructures such as information offices and other key areas, which will promote a better student experience throughout their university life. This process is often called freshmen orientation, or university induction or other related terms depending on the universities. This study aimed to engage in a research & development activity to improve in the long term on the initial experience of the first year university students from induction to course registration process. It tried to explore the extent to which integration of the 3D modelling and Virtual Reality within an induction program can assist and facilitate the students' campus experience through the program. The focus of this research was students enrolled on online courses at the university, where the concept of face to face contact is minimal. The assumption was that the 3D virtual reality environment will facilitate the process that will allow the students to navigate through the virtual environment acting as a mirrored real environment.

The Importance of Induction Process at the University

Distance learning has become the global emerging trend in higher education since the last decade as it gives adult learners, flexible learning opportunities in order to enhance their knowledge and skills pertaining to their job by reducing travel expenses and giving way to a flexible schedule. Moore and Kearsely (2005) reported that the majority of distance education students are adults from 25 to 50 age groups. The number of programs for adult learner, which are taught online in corporate setting as well as in higher education, has constantly increased over the past few years. However, despite the rise in online learning, there is an high rate of dropout that needs to be addressed and this have become a growing concern to many organisations and higher education institutions. As per Meister (2002), 70% of adult learners registered in a professional online program did not actually complete the course. According to the Corporate University Xchange (2000), one of the difficulties in online education is the ability to retain learners. (Hiltz, 1997; Phipps & Merisotis, 1999) have indicated that a higher percentage of students taking part in an online course tend to drop out in comparison to students in a face to face classroom.

Parker (1999) reported that students enrolled in e-learning courses, dropped out at a significantly elevated rate compared to their correspondent in on-campus courses. Dropout rates from e-learning courses were recorded around 25%-40% in comparison to 10%-20% in on-campus courses (Carter, 1996; Xenos, 2004). More substantial results were outlined for online training institutions where more than 50% of its learners dropped out in contrast to only 10% in the traditional on-site settings (Zielinski, 2000). Attrition rates are usually 10-20% higher for online course than for traditional, face-to-face classrooms. This is, according to Holder (2007) because one of the factors influencing online education is drop out and learners' drop out decision might occur due to their discouragement in pursuing the course or even their mismanagement of time to cope with the course. At some level, there are mature students who have constraints in attending face to face classes on campus due to personal and professional responsibilities (Kember, 1989).

Many studies revealed that students' satisfaction as a main reason that is linked to students' decision to drop out from distance learning courses. Chyung *et al*. (1998) noted that 42% of students who dropped out cited being dissatisfied with the learning environment. Levy (2003) carried out a study with more than 200 online students, based on the relationship of students' satisfaction and eLearning efficiency. He claimed that students' satisfaction with eLearning is a core element in analysing the effectiveness of e-

learning. Moreover, Sachs and Hale (2003) reported that universities that deliver e-learning courses should emphasize on students' satisfaction when evaluating the efficiency of such programs and students' ability to successfully finish the program.

Ko & Rossen (2010) postulated that information given to students usually emphasizes on improving their computer skills, demonstrations illustrating how to move around course management systems and message heavy lists of FAQs and other information. Levy (2006) deviates from that thought in the sense that he proposed, orientation should be part of a wider introduction and not be limited by learning space, as well as the information environment and pedagogical method to studying online. She reports that because students fails to undergo studies at an early stage often proves disadvantageous to them as this leads to a lack of awareness about resources offered to support them and their failure to fully engage to early discussion. Instead, they get diverted by the vastness of the learning atmosphere.

In recent years, Australian research have also demonstrated that although current students may have been involved in using technology from a tender age, they may not certainly grasp how to use technology for learning (Kennedy *et al*., 2008). Salmon (1998) pointed that there is a necessity for learners to be provided with opportunities to explore with technology and to make errors in a supported setting. Simultaneous investigations have also been designed to discern factors that lead to student satisfaction with online learning. (Chang & Tung, 2008; *Sun et al*., 2008) observed that the factors that have been pinpointed as having an influence over student satisfaction include easy of usage of online system, learner apprehension with the technology, perceived effectiveness of the material, instructor reactions, course format and flexibility.

Reports that explain orientation initiatives for online learners observe the attainment of increased student enjoyment and confidence (Bozarth *et al*., 2004; Levy, 2006; Scagnoli, 2001; Tomei *et al*., 2009). The 2010 release of the Student Induction to E-learning (SIEL) report acknowledged the requirement for the finest practice structure to guide student induction to e-learning (IMS Global Learning Consortium Inc, 2010; Krause & McEwen, 2009). This report generates a checklist and displays a best practice structure for encouraging post-secondary student retention linked with induction to e-learning. It proposes the need for a proactive methodology to orientation. According to Crosling & Heagney (2009) even though this guidance can undeniably add to enhanced practice, there remains a need to evaluate more closely the student knowledge of this critical phase which sets the base for this successful study in the forthcoming years.

Applications of Virtual Reality

VR represents a means for the replication and stimulation of an environment that can be navigated through and interacted with by a person (Ausburn and Ausburn, 2004). Stone (1995) postulated that VR is a technology which states to give the perfect interaction between individuals and computerized applications based on real-time and three dimensional graphical worlds. 3D environment was used by researchers in few studies that allowed users to explore virtual places. Harris *et al.* (2005) designed an environment at the University of Nevada Reno for the orientation of students, staffs members, workers and visitors called VCampus. It offered different possibilities and advantages to users to explore within the environment.

Education has shifted to the usage of interactive technologies so as to aid in acquiring knowledge and understanding as an option to traditional educational tools such as books, pencils and pens (Aoki *et al.*, 2008). Crosier *et al.*, (2002) have uncovered that VR is very valuable to education. Abulrub *et al.* (2013) described VR as the scientific branch which targets to unite users with virtual data. A study was made to assess the utilization of 3D models to enhance the learning procedure of human anatomy students, and it was demonstrated that utilizing such technology positively affects the students (Nicholson *et al.*, 2006).

According to Slater (2004) another major merit of virtual reality is the sense of presence (the psychological perception of "being there"), individuals can encounter in an immersive virtual reality environment. Rizzo and Kim (2005) postulated that virtual reality allows the manipulation of the setting and can be used to control the environment stimulators that extract anguish in people suffering from mental health illnesses, enabling them to grasp how to handle their difficulties.

Dickey (2003) portrayed 3D virtual situations as interconnected desktop virtual reality situations, while Maher *et al.* (1999) depicted them as situations that allow users to explore and perform activities in a virtual setting and convey among themselves in the meantime. Despite the fact that a larger part of the underlying 3D environment research concentrated on extremely costly immersive situations worn as a headset instead of the desktop situations with standard computer equipment, Robertson *et al.* (1993) believed that the utilization of desktop 3D virtual situations is very less difficult than these immersive situations since individuals are more adapted to them. Tüzün *et al.* (2009) postulated that the affordances of investigation, communication, and concentration in 3D multi-user virtual environment (3D MUVEs) can give rich chances to learn about the theoretical and spatial attributes of a place. These affordances in MUVEs may be utilized to plan a virtual setting for freshman orientations. To make the students keen to take part in orientations, they ought to be given in a more impressive way. Lately, a few institutions have started to orientate their students while inspiring them at the same time, rather than having them quietly driven around the campus. Performing online inductions utilizing MUVEs may give them the possibility of being at a specific time in a physical environment and allowing them to roam around different places virtually. MUVEs bring students in a virtual environment giving the sense of immersing a real situation. Considering all these reasons, Tüzün & Özdinç (2015) stated that MUVEs might be a decent option for student inductions.

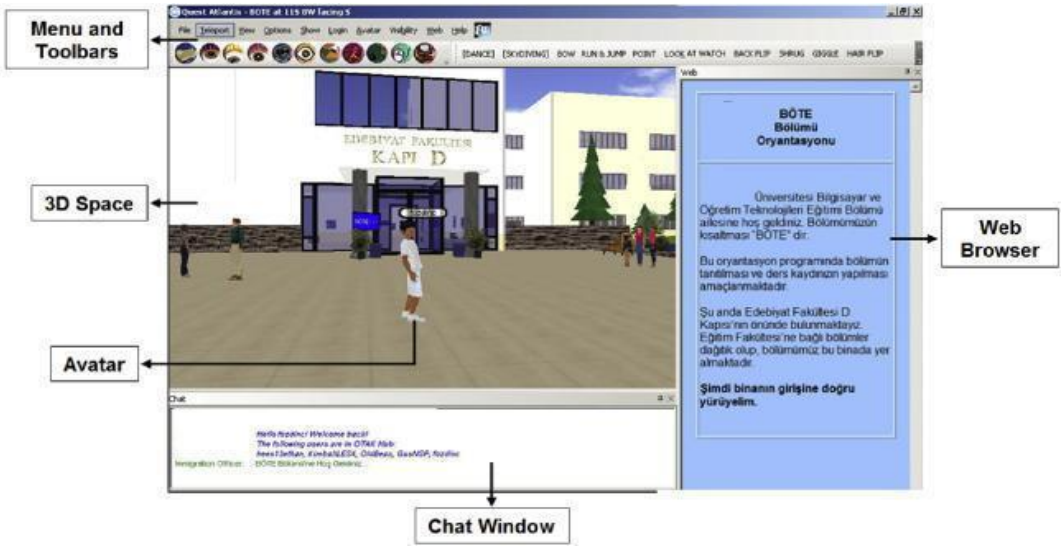

Figure 1: Active world interface

Methodology

The research was based on a mixed method approach, whereby both qualitative and quantitative strategies were used, since the objective was to analyze and measure the students' responses with respect to their experiences. Such approach has helped to gain an understanding of online learners' experiences with respect to induction program, using 3D tours and virtual reality as an educational support. The qualitative analysis which gives an overall picture of the research being conducted, has demonstrated results from the learners' perceptions, retrieved from surveys carried out. On the other hand, the quantitative analysis has emphasized on the statistical elements, used for data collection and analysis. In this way, the mixed

approach then has combined both the qualitative and quantitative methodologies together and provided meaningful insight and workable results that helped to draw constructive conclusions.

The subject of the study has been focused on BSc in Web and Multimedia Development Year 1 students of the University of Mauritius. A pre-survey has been carried out with a sample cohort of 100 students enrolled especially on the online programme at the university. The purpose of the pre-study was to determine students' perception on the induction processes at the university. The researcher ensured the students that the survey data would remain anonymous and confidential. The pre-study was also expected to shed the lights on the students' concerns and expectations of the induction program, especially since they are first year online learners with respect to the induction program they actually received. It helped to analyze the gap between the learners' perception and their expectations with respect to induction program.

The pre-study took the form of a survey comprising of a series of 10 questions. This survey gave the students a range of choice to express their concerns and expectations, while joining an online course at the university, for which they would not visit the campus that often. Accordingly, based on the pre-survey test carried out, we developed a set of specifications needed for processes to be modelled.

A post study was then carried out to determine whether the pedagogical model proposed has been helpful as a support to enhance online students' experiences on campus. Their reflective responses was analyzed to determine whether their expectations and needs were met and what are their perceptions of the new system.

Design approach of the system

The system was designed based on the pre-study feedback received from the university newcomers. These students clearly mentioned that they had difficulties locating the university buildings on registration day, and the induction process did not meet their expectation, which made them feel misguided. Consequently, taking into consideration good visual design elements and Mayer's principles (2005), the 3D system has been made up of the necessary features that will allow students to navigate virtually through the university environment. Interestingly, it provides dropdown menus which when clicked can display a list of the different buildings in the university. To get started, the user needs to choose his or her current location, that is the starting point and then choose the place he or she wants to go. The application will then show the shortest route using a 3D video, the user can take to reach his or her destination. The figures below gives an idea of the significance of the system and how it can help learners to navigate virtually through the university campus.

If the user clicks on the *Bus stop to Cash Office* button, a video is played which shows the pathway from the Reduit bus top to the SBM (Reduit Branch)

Findings

The evaluation of the first attempt at developing this application was done by categorizing elements to be assessed into two main sections, namely, Navigation and Procedures. In order to further understand student perception of the model as an aid to induction and pedagogical support, student views of the overall application was also considered. On the whole, results obtained proved that student perception was mostly positive. More precisely, students showed agreement with the majority of the elements that were assessed. Details of student views of the specific elements are provided below.

Five elements were assessed for the 'Navigation' option. The only element that evoked strong disagreement from participants (12%) was with the fact that the brightness of the videos did not cause visual fatigue. Altogether, 76% of participants did not have any issue with the brightness of the video in terms of visual fatigue. In other words, 24% of students acknowledged that the brightness of the videos causes visual fatigue.

The only instance where students indicated total agreement with the application was that the navigation page was simple to use (Strongly agree – 44%; Agree – 56%). Almost all, that is, 24 out of the 25 students in the sample (96%), viewed the speed at which video contents are displayed as appropriate as

well as videos being clear replicas of the campus. A slightly lower percentage (88%) of students viewed the videos as covering all essential elements needed to locate desired destinations.

Four elements were assessed for the 'Procedures' option. None of the elements evoked strong disagreement from participants. The element that was only agreed upon was that the procedures listed cover essential elements to solve students' major on-campus issues (Strongly agree – 28%; Agree – 72%).

Slight disagreement was reported for the element of interactivity, more precisely, 96% of students acknowledged that the interactivity of the videos makes their use easy. 88% of participants indicated their agreement with the fact that the contents of the video are clear and that including audio elements in the videos can improve understanding of the specific procedures (Strongly agree – 44%; Agree – 44% for both).

Four elements were assessed for the overall application. None of the elements evoked strong disagreement from participants. The only instance where there was disagreement, and that too by only one participant, was that the application simplifies current students' daily on-campus activities. In this case, 60% of participants indicated agreement and 36% indicated strong agreement with this element.

The elements that were only agreed upon were that the application is user-friendly (Strongly agree – 48%; Agree – 52%), the videos are helpful (Strongly agree – 52%; Agree – 48%), and the application is appropriate for first-time on-campus visits (Strongly agree – 40%; Agree – 60%). A number of improvements were highlighted by students for the Navigation option and the Procedures option. For the Navigation option, student responses were categorized in terms of audio, video, camera angle, direction, and layout. For the Procedures option, student responses were categorized in terms of audio, video, and direction. Student suggestions are detailed below.

Discussion

The aim of this project was three-fold. The first element was to investigate into any issue that freshmen at the University would experience that could hinder their smooth transition to University life, with particular interest to those who embark on online and blended courses. While the current practices at the University of Mauritius establish that the overall induction model that is in place is perceived to be satisfactory, there are ways that the University could improve the experience of students. The University of Mauritius uses an e-Kit as main source of information to freshman, in addition to the induction day that is conducted on campus. The e-kit is a complementary pack to the induction process as there are often students who are not present for induction or who join the course as late applicants after one or a maximum of two weeks into the semester. As we have seen, the majority of the respondents in the pre-survey found that the e-kit was of some help to them, while only a few found it to be very informative. Therefore, providing the right information in a more instructive way was an important element towards improving the student experience. Another issue that was reported was the lack of clear instructions how to proceed with course related processes and procedures (e.g. course registration, application for bus pass and even how to use the e-Kit provided). On Lecture day, even finding the right classroom was considered a stressful activity by many newcomers. Considering these issues, we could figure out the extent of the problem that students who visit the campus occasionally would face, given that their courses were on non-conventional mode (online, Distance Education and commissioned programs). Furthermore the fact that a high number of students claimed difficulties to locate key buildings provided us with the necessary elements to look into the possibility of using new technologies like Virtual Reality, and 3D modeling to address this issue. These factors, and based on the respondents' proposition including the different cases as highlighted in the research literature, the project on the use of virtual reality and 3D model of the University facilities was undertaken. This was precisely the second aim of the project, which was in fact to modernize the current offering of the University through modern technological infrastructures and to align to 21st Century practices of a modern university. In this research, due to the time and resources constraint, the focus was on the development of the environment and the modeling of

some key building and processes, that could be tested with a first group of volunteers to decide on the acceptance level and any amendments or adjustments of strategy to be made in the development of a full fledge model of University building and processes.

New technologies such as Virtual Reality and 3D modeling are becoming more widespread and accessible through web and mobile services that could be accessed in real-time providing just-in-time information to users depending on their contextual needs. Such technologies coupled with universal services known as 'common good' such as GPS and location based facilities can add value to the experience of the student not only throughout the transition period to University but throughout his or her studentship. GPS coupling with the system, and its conception for mobile compatibility are essential elements to be taken into account in future phases.

Finally the third aim was to investigate the acceptance of the proposed system (from a usability, usefulness and users' perception) and approach to support learners throughout their university life in terms through the concept of virtual reality and 3D modeling for a decision to continue or discontinue research and development activities in this area. Overall the students who participated in the post survey and the focus group discussion welcomed the tool and perceived it to be a useful one to improve students' awareness of campus life and procedures. However, on the usability side there are a number of issues to be sorted out, such as the inclusion of audio, improvement of navigation and use of stop-go buttons (within videos) supplemented with in-video instructional aids. There is also a need to look at the realism of the buildings and the instructional sequences when explaining procedures. However we can reasonably say that we have achieved our preliminary objectives, which was to investigate whether the proposed approach and VR-based framework could potentially form part of the next generation of student support framework to improve the overall students' experience of the university. We can further say, that immersive technologies could also be introduced so that distance learners can even feel the 'real' experience of campus life through virtual reality applications and 3D devices such as oculus rift to have a completely near-real experience to interact with agents in the virtual university environment.

Conclusion

Nowadays, we are all inclined to using technological gadgets in almost every sphere of our lives. New technologies such as Virtual Reality and 3D modeling are becoming more widespread and accessible through web and mobile services that could be accessed in real-time providing just-in-time information to users depending on their contextual needs.

The idea of conducting an induction virtually is something which has warmly been welcomed and embraced by the students who took part in the experiment. The way the video depicts the campus in 3D in the application is in complete synchronization with the real one. This is innovative to them and they believe that newcomers would easily be able to get accustomed to the real campus via this application because it is sufficiently close to the real time making it possible to relate instantly. Distance learners can even feel the 'real' experience of campus life through it and they are free to access it at any time suitable to them sparing them the pain to go on spot for a visit.

References

- Abulrub, A. H. G., Budabuss, K., Mayer, P., & Williams, M. A. (2013). The 3D Immersive Virtual Reality Technology Use for Spatial Planning and Public Acceptance. Procedia-Social and Behavioral Sciences, 75, 328-337

- Aoki, H., Oman, C. M., Buckland, D. A., & Natapoff, A. (2008). Desktop-VR system for preflight 3D navigation training. Acta astronautica, 63(7), 841-847

- Ausburn, L. J., & Ausburn, F. B. (2004). Desktop virtual reality: A powerful new technology for teaching and research in industrial teacher education.

- Bozarth, J., Chapman, D. D., & LaMonica, L. (2004). Preparing for Distance Learning: Designing An Online Student Orientation Course. Educational Technology & Society, 7(1), 87-106.

- Chang, S. C., & Tung, F. C. (2008). An empirical investigation of students' behavioural intentions to use the online learning course websites. British Journal of Educational Technology, 39(1), 71-83.

- Chyung, Y., Winiecki, D. J., & Fenner, J. A. (1998). A Case Study: Increase Enrollment by Reducing Dropout Rates in Adult Distance Education.

- Corporate University Xchange (2000). Learning in the dot.com world: E-learners speak out. New York, NY: Corporate University Xchange.

- Crosling, G., Heagney, M., & Thomas, L. (2009). Improving student retention in higher education: Improving teaching and learning. Australian Universities' Review, 51(2), 9-18.

- Crosier, J. K., Cobb, S., & Wilson, J. R. (2002). Key lessons for the design and integration of virtual environments in secondary science. Computers & Education, 38(1), 77-94.

- Dickey, M. D. (2003). Teaching in 3D: Pedagogical affordances and constraints of 3D virtual worlds for synchronous distance learning. Distance education, 24(1), 105-121.

- Hiltz, S. R. (1997). Impacts of college-level courses via asynchronous learning networks: Some preliminary results. Journal of Asynchronous Learning Networks, 1(2), 1-19.

- Holder, B. (2007). An investigation of hope, academics, environment, and motivation as predictors of persistence in higher education online programs. The Internet and higher education, 10(4), 245-260.

- IMS Global Learning Consortium Inc. (2010). IMS GLC Student Induction to E-Learning: A best practices framework for promoting post-secondary student retention associated with induction to elearning. http://www.imsglobal.org/siel/index.html

- Kember, D. (1989). A longitudinal-process model of drop-out from distance education. The Journal of Higher Education, 278-301.

- Kennedy, G. E., Judd, T. S., Churchward, A., Gray, K., & Krause, K. L. (2008). First year students' experiences with technology: Are they really digital natives. Australasian journal of educational technology, 24(1), 108-122.

- Ko, S., & Rossen, S. (2010). Teaching online: A practical guide. Routledge..

- Krause, K., & McEwen, C. (2009). Student induction to e-learning: A progress report. University of Southern Queensland report by Link Affiliates Team within the Australian Digital Futures Institute, available on-line at http://www. linkaffiliates. net. au/Publications/SIeL_Mar09_Report. html (accessed December 2009).

- Levy, P. (2006). 'Living'theory: a pedagogical framework for process support in networked learning. Research in Learning Technology, 14(3).

- Levy, Y. (2003). A study of learners' perceived value and satisfaction for implied effectiveness of online learning systems.

- Mayer, R. (2005). Introduction to Multimedia Learning. The Cambridge Handbook of Multimedia Learning (pp. 1-16). New York: Cambridge University Press.

- McCraty, R. (2007). When anxiety causes your brain to jam, use your heart. Institute of Heart Math. HeartMath Research Center, Institute of HeartMath, Boulder Creek, CA.

- McCraty, R., Tomasino, D., Atkinson, M., Aasen, P., & Thurik, S. J. (2000). Improving test-taking skills and academic performance in high school students using HeartMath learning enhancement tools. Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath, Publication No. 00-010.

- Meister, J. (2002). Pillars of e-learning success. New York: Corporate University Exchange.

- Moore, M. G., & Kearsley, G. (2005). Distance education: A systems view (2nd ed.). Belmont, CA: Wadsworth Publishing Company.

- Nicholson, D. T., Chalk, C., Funnell, W. R. J., & Daniel, S. J. (2006). Can virtual reality improve anatomy education? A randomised controlled study of a computer-generated three-dimensional anatomical ear model. Medical education, 40(11), 1081-1087.

- Parker, A. (1999). A study of variables that predict dropout from distance education. International journal of educational technology, 1(2), 1-10.

- Phipps, R., & Merisotis, J. (1999). What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education.

- Rizzo, G.J. Kim A SWOT analysis of the field of virtual reality rehabilitation and therapy Presence, Teleperators and Virtual Environments, 14 (2005), pp. 119–146

- Robertson, G. G., Card, S. K., & Mackinlay, J. D. (1993). Three views of virtual reality: nonimmersive virtual reality. Computer, 26(2), 81.

- Sachs, D., & Hale, N. (2003). Pace university's focus on student satisfaction with student services in online education. Journal of Asynchronous Learning Networks, 7(2), 36-42.

- Salmon, G. (1998). Student induction and study preparation online. In Telematics in Education Seminar, Joensuu, Finland.

- Scagnoli, N. I. (2001). Student orientations for online programs. Journal of Research on Technology in Education, 34(1), 19-27.

- Stone, R.J., 1995. The reality of virtual reality. World class design to manufacture, 2(4), pp.11-17.

- Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y. & Yeh, D. (2008). What drives a successful elearning? An empirical investigation of the critical factors influencing learner satisfaction. Computers & Education, 50(4), 1183-1202. http://dx.doi.org/10.1016/j.compedu.2006.11.007

- Tomei, L., Hagel, H., Rineer, A., Mastandrea, L. A. & Scolon, J. (2009). Do orientation materials help students successfully complete online courses? International Journal of Information and Communication Technology Education, 5(2), 73-89. http://www.igi-global.com/article/orientation-materials-help-students-successfully/2375

- Tüzün, H., Yılmaz-Soylu, M., Karakuş, T., İnal, Y., & Kızılkaya, G. (2009). The effects of computer games on primary school students' achievement and motivation in geography learning. Computers & Education, 52(1), 68-77.

- Tüzün, H. & Özdinç, F., 2015. The effects of 3D multi-user virtual environments on freshmen university students' conceptual and spatial learning and presence in departmental orientation. Computers & Education, 94, pp.228–240. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0360131515300956.

- Xenos, M. (2004). Prediction and assessment of student behaviour in open and distance education in computers using Bayesian networks. Computers & Education, 43(4), 345-359.

- Zielinski, D. (2000). The lie of online learning. Training, 37(2), 38–40.