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# Telepresence Teaching: Implementation Issues in Universities and other Institutes of Higher Learning

Nonofo Losike - Sedimo  
*Lecturer: Education Psychology*  
*University of Botswana*  
*Botswana*

## Objectives

Describe features of E-learning that characterize telepresence teaching  
Illustrate how telepresence teaching can make learning more individualized and contribute to making conceptualization easier.

Discuss issues of implementation (Cost, benefits and disadvantages)  
Show link between theory and practice of telepresence and motivation in teaching

## 1. Introduction

Telepresence teaching is not a new concept. What is new is the improved technologies of e-learning. Advances in E-learning technologies have brought to the teaching process an exciting array of methods for motivating learners, reinforcing learning and automating student teacher interactions and instant feedback. One advantage of E-learning that I personally celebrate is the ability to monitor students' progress continuously to foster learning as compared to just assigning a grade. By aligning assessment precisely with the full range of students' classroom experiences as they occur. Learners' experiences have been at the center of educational research. For example, experiential learning and media studies revealed the importance of learners' technology usage patterns and the correlation between these patterns and the different technologies. The studies also delineate learning gains by describing how the learners's experience of technology related to achievement (Dillon & Gabbard, 1998). Research has demonstrated that telepresence teaching is mostly about student's experience. Telepresence teaching effectiveness relies on sound, visual, motion effects on message design.

Many learning theories call for experience-based instruction. For example, constructivism by Piaget (1963), social cognition by Bandura (1977), experiential learning by Kolb, (1984) and ecological theory by Bronfenbrenner (1979) demonstrate the importance of the learners'

experience in the creation of meaning as they interact with the learning environment. The theories also explain how the dynamic capacities for thought, feelings, and actions relate to the characteristics of the settings in which the learners are situated. The learners' background, prior knowledge, and experience influence the understanding of content (Gagne, 1985). One way of targeting students' experiences is by threading blue prints for specific experiential outcomes through the message design.

Telepresence teaching is one approach that describes message representations in terms of the learners experiences. The approach emphasizes how end users of a particular technology experience feelings of presence as they use the specific technology. Studies related to telepresence have shown that systems such as multimedia, hypermedia, television, and videoconferencing have the potential to present messages based on receivers' experiences in a way that course the receiver to feel present in the displayed message (Biocca, 1997; Broadbent, 2002; Windelborn, 2002). With a broad bandwidth internet, all the above mentioned media can be used to convey telepresence.

## 2. The concept of telepresence

Telepresence can simply be described as creating presence over distance and time. In a study conducted at the University of Botswana, the researcher defined telepresence as a simultaneous presence of both the communicator and the communicant created by variations in the depth and scope of the message in visuals and interactivity.

The message's visuals and interactivity was reported to cause the feelings of presence (Losike - Sedimo, 2003, 2006). Other researchers described telepresence as a method of telecommunicating, which has an inherent quality of organizing information in the receivers' head in special code systems that creates a twist in the perceived reality (Coyle, 1997). The stimuli in the mediated communication can be made more powerful or persuasive in order to overwhelm the stimuli in the physical environment. Symbols representing the message could be arranged in alignment with the receivers' prior knowledge and senses (Kim & Biocca, 1997). In addition, telepresence can be viewed as a perceptual process of how the learners perceive the message. The concept of telepresence is an important component of experiential learning (Kearsley, 1999; it is in fact manifested in most course deliveries without necessarily being called telepresence teaching (Windelborn, 2002). Most of e-learning activities involving communication tools and visuals as well as interactivity involve experiential learning that can be called telepresence teaching and learning.

Telepresence is an important component of understanding how people experience mediated communication. Most importantly, it expands the conceptualization of communication in virtual reality environments as it relates to the physical environments (Lombard & Ditton, 1997). Telepresence has also been reported to arouse motivation to learn (Rosenberg, 1994). By incorporating the features of telepresence into instructional design, an effective communication for different types of learners would be created. The effective communication for different types of learners could, in turn, make learning effective. When learning is effective, the lesson objectives are likely to be achieved (Smith & Ragan, 1999). Hence the use of E- learning design tools to create telepresence teaching would be of great benefit to both the teacher and the learner. In addition, if the teacher wants the learner, to

see, hear, taste or touch, all sorts objects, or create all sorts of interactions, telepresence teaching is the answer. As a concept, such teaching promises to bring a paradigm shift in pedagogy (Buxton, 1999). E-learning designers can make lessons more fun and more engaging, by creating meaningful experiences through use of telepresence approach in their instruction.

### **3. Individualizing learning with telepresence teaching**

Rogers (1969) distinguished two types of learning: (a) cognitive (meaningless), and (b) experiential (significant). The former corresponds to academic knowledge such as learning vocabulary or multiplication tables, and the latter refers to applied knowledge such as learning about engines in order to repair a car. Experiential learning allows the learner to discover knowledge, give it meaning, and relevance according to his needs and wants telepresence teaching causes this type of experiential learning. This individualises instruction according to the learners needs. In telepresence teaching the teacher avails resources while the learners take full control of their learning. Hence telepresence teaching facilitate experiential learning by well thought out message designs. The facilitation was stated to include (a) setting a positive climate for learning, (b) clarifying the purposes for the learners, (c) organizing and making learning resources available, (d) balancing intellectual and emotional components of learning, and (e) sharing feelings and thoughts with learners without dominating. According to Rogers, learning is facilitated when (a) the student participates completely in the learning process and has control over the learning's nature and direction.

Rogers also emphasized the importance of learning to learn and an openness to change. Instruction can be designed to follow his views of learning to create individualized telepresence teaching. Intrinsic to such designs would be merits and weaknesses inherent in the message design used. Telepresence instructional approach aims at learning which is continuous and is grounded in learners' experiences. The approach advocates special effects for a lesson delivery that gives different individuals a true to live unique experience. Technically, telepresence refers to a set of technologies that allow a person to feel as if they are present at a location other than their true location. This generally involves images of life-size participants with mirrored environments where participants feel as if they are in the same physical space. These technologies have facilitated the emergence and rapid growth of learning communities whose members interact from remote corners of the globe. When telepresence is used in E-learning students are able to personalise their involvement initiate learning activities, evaluate their learning and motivate themselves to complete the learning process.

## **4. Theoretical foundations of telepresence teaching**

### **4.1 Information Processing Theory Perspective**

In a classroom setting, perception of environmental stimuli may determine how students take in content and understand it. There is no single explanation about how students perceive and process information. One of the many explanations can be found in information processing theory. Information processing theory has been described by

Catalano (1999) as a theory of tracing the progression of information through a system from the initial stimuli up to and including the final response. It also has been presented as a linear model that metaphorically portrays the learner's brain as a computer (Atkinson & Shiffrin, 1968). The computer metaphor view suggests that the learner takes in information through the senses and sends it to the short-term memory. The brain then performs complex transformations on the sensory information as if it were a computer. From the short-term memory the information is sent to the long-term memory where it is stored. Finally, the transformations end by producing data representations or behavior (Samuels, 1998). Such an output can be retrieved and exhibited as data whenever needed from the long-term memory. If telepresence is to be perceived as a perception process of environmental stimuli, then telepresence can be understood from the information processing theory. Where a computer or other equipment is used to create a learner model of learning that produces committee representation of images portrayed in the instruction messages, this results in learners grasp of the automated perception.

Reeves and Reeves (1997) explained telepresence as a sense of being there, resulting from a combination of automated perceptual processes, mindful direction of attention, and the conscious act of interpreting the view as real. In other words, technology presents the environmental stimuli, which triggers attention, perception, coding and decoding, and the consequent complex transactions and cognitive processes that are operational as the informed person processes information. Coyle (1997) explained and defined telepresence as the mediated perception of an environment which is created by interactivity and vividness. The definition also included the perceptions of being there in the mediated world as a participant. In general terms, information processing theory purports that people's perceptions of their environment are governed by the information received by their senses; the underlying assumptions being that the sensory impressions accurately reflect the nature of the environment surrounding them. So, perception of environment is central to the process of taking in data and interpreting it; basically, that is what Coyle's definition is expressing.

Technological advances have made it possible to create different sensory impressions for the learner in telepresence teaching. These impressions may either be obtained from a remote source or artificially contrived. When sensory impressions are obtained from a remote source to create feelings of presence, the method is called telepresence, and when the impressions are artificially contrived, the method is called virtual reality (Griffin, 1991). Telepresence can, therefore, be perceived as a perceptual event associated with the whole activity of information processing in a virtual reality environment.

#### **4.2 Communications Theory Perspective**

As a term in communication, telepresence is used broadly to refer to Tele-operating and virtual environments (Draper, 1998). The idea of simultaneous presence of both the sender and the receiver of information in the communication process is emphasized. Buxton (1999) described telepresence as a social interaction between humans over distance and time, mediated by technology. An example of such an interaction could be an e-mail sent from professor to student or vice versa. Telepresence has also been defined differently by Steuer (1992) as the extent to which one feels present in the mediated environment rather than his or her immediate physical environment. For example, students could be watching a video



about their school football team and be immersed in the virtual environment (which is the projected or communicated message) to the extent of feeling like participants in that environment. Reeves and Reeves (1997) emphasized human interaction or experience, active participation by the receiver, and the strategies or manner in which this interaction takes place (conscious act of interpreting the view as real) as key factors of telepresence. In a nutshell, telepresence (in terms of the communication theory) refers to reactions of receivers as they experience the mediated messages as feelings of presence. In the context of teaching it is the reactions of learners to the mediated subject content as feelings of presence. (Losike-Sedimo 2008).

#### **4.3 Motivation Theory Perspective**

Studies from mediated communication have portrayed virtual reality as a great motivator, as in the school team example cited above. Virtual reality causes the viewers to be immersed in the screen to the effect of behaving as though they are part of the mediated communication (Rosenberg, 1994). Telepresence has been defined as virtual reality with the capacity of captivating the viewers' attention and producing feelings of presence and vicarious participation. Interest and motivation are desired learner characteristics for instruction. The implementer of instruction wants the student to choose to attend and to choose to make the effort and apply himself or herself fully. For example, in a Web environment, intrinsic motivation is a must.

The learners must have the interest and inclination to turn the computer on and pay attention to the message stimuli. They have to deal with content in a given physical environment that has its own distractions and, above all, there must be an outcome at the end of the lesson. In addition to intrinsic motivation, there have to be coding, decoding, interpretations, rehearsals, and chunking of information to come up with concepts, output, and observed behavior. These are but a few examples of the cognitive processes involved in motivation. These cognitive processes of motivation overlap with elements of the telepresence approach to teaching. In telepresence, the coding, decoding, interpretations, rehearsals, and chunking of information result in the virtual world being perceived as a reality. It is this false reality that becomes the motivating force.

#### **5. Features of e - learning that characterizes telepresence teaching**

Meltzer, (2007) defined Telepresence as a human or machine system which uses advanced communication technologies such as a high speed internet, a high definition video and audio with large displays to produce a realistic interactive experience with other users or objects in a remote environment. Companies such as WebCT, Blackboard, and Desire2Learn have installed products at thousands of universities and colleges in order to facilitate e - learning. The new generations of e-learning receivers are motivated by images, speed of delivery and variety of activities to be covered in a short time. They enjoy the interactive experience which give them meaning, control and relevance to their needs and wants. The disinterested students have become the engaged students. This compares fairly with the demands/ characteristics of experiential learning.

E - learning clients deals with conversations with messages consisting not just text but images, video, multimedia and whatever they could get their hands on, integrated in a course. Design tools used in e - learning such as blogger, plone, and rupal makes

telepresence course creation incredibly easy. Moreover, using a collaborative writing tool like wiki, audio recording tool like Audacity, and pod casting make e-learning home pages phenomenal. Some educators have started broadcasting lessons on-line (World commerce review, 2009). The broadcasting of lessons is popular with the faculty of engineering in the University of Botswana because of the many simulations involved.

A more interesting development is that e-learning application has become very much like a telepresence teaching activity. Where one node in a web of content, connected to other nodes creates services used by many students. It becomes, not an institutional or corporate application, but a personal learning center, where content is reused and remixed according to the student's own needs and interests. It becomes, not a single application, but a collection of interoperating applications in an environment rather than a system. Such collections of interoperating application in an environment are characteristics of telepresence creating equipment (Telepresence world, 2009)

## **6. Current telepresence technologies and example of use**

### **6.1 Polycom interactive equipment**

Meltzer's (2007) definition of telepresens as a machine system can be applied to the current telepresence technologies. Many universities and corporations use such technologies with much success. Just to mention a few, Manhattan School of music as stated in their website, has a telepresence project that uses polycom interactive equipment. According to their report. MSM telepresence project started in 1996. Since then Manhattan School of Music (MSM) telepresence project suits this definition. It uses polycom interactive equipment. According to the story, (MSM) reported to have launched the first program to use visual communication for music performance education in 1996. Since then, some 1,700 students throughout the world engage annually with MSM to take advantage of master classes, workshops, clinics and one-on-one lessons in classical music, jazz, opera, musical theater and orchestral training. University described the use od of Polycom HD visual communication solutions (PolycomHDX800 ANDHDX 900, VSX800) as to connect world-renowned instructors and professional musicians with students who otherwise might never have access to top-flight performance talent. (Robert Sirota, 2009)

"Our use of visual communication has changed the way we do music instruction at this school in a very profound way," said Robert Sirota, the distinguished American composer, conductor and president of MSM.

Another lesson on telepresence projects can be learned from examples from University of Botswana, George town university and a corporation in the United States Polycom Telepresence helped Georgetown University create global classroom. By providing symmetrical telepresence class rooms in Washington, DC, and Doha, Qatar campuses that feature high definition video, voice and content-sharing capabilities, students separated by more than 7,000 miles of ocean and land are able to interact and collaborate with each other and faculty as if they were in the same room. (Telepresence world, 2008). At the university of Botswana students in Educational psychology classes, sports psychology, and guidance counseling have received instruction from experts in United States of America using the polycom video conferencing system. Other parts of Africa such as central eastern, and southern Africa have running telepresence centers sponsored by UNECO, to cater for specific individuals and vulnerable groups.

## **7. 0 and Interactive HD Telepresence Equipment**

Telris telepresence solutions are the world's most natural, immersive virtual meeting environments combining an intimate experience with innovative collaborative tools that allow one to feel and act like he or she is in the same room whether across the city or the globe. A product by Telris, VirtuaLive modular was used to facilitate communication between Chipmaker Qualcomm headquarters in San Diego and its research facilities located in Campbell California and Bridgewater in New Jersey (World commerce review, 2009; telepresence world, 2008)

Many research case studies from Europe, Asia and Africa illustrate with case studies how telepresence teaching have been used to individualize learning and promote concept formation or knowledge accessibility and motivation.

## **8. Implementation issues and sustainable development**

Implementation issues relate to sustainable development. The cost of telepresence equipment, maintenance schedule training personnel and keeping them up to date, have a bearing on whether a university can sustain the telepresence projects or programs. In developing countries this is complicated by the resistance to the use of technology by faculty members. So an implementer has to deal with both economic and human factors. The conventional definition of sustainable development is derived from the 1987 Bruntland Report to UNESCO. This report states that sustainable development is a process which meets the needs of the present without compromising the ability of future generations to meet their own needs" Education and technology are seen as drivers of development. (Higgit, Haigh and Chalkley, 2005)

## **9. Technology, education and development**

Technology has always been in the centre of the development process. Since the 1950s governments have focused development policies on development geared to foster national independence and self reliance through a process of sustainable economic growth. And development was perceived in stages. The stage of high mass consumption indicated or was deemed a highest form of development. Mass communication was seen as playing an instrumental role in economic and social development within this framework. Television in particular was seen as offering the potential to inform, persuade and educate and thereby facilitate development (Dordick and Wing, 1993). Developing countries were to be encouraged to invest in communication infrastructure and extend mass media with the aim of altering people's expectations and to reorientate them towards entrepreneurship which would benefit economic development. Since then technology has been a major tool for development. As history has shown, this view of technology essentially subscribed to the thinking that technology was to provide a quick fix for complex societal problems including education ones. On the other hand, development is to be conceived as a multidimensional process involving major changes in social structures, popular attitudes, national institutions, as well as the acceleration of economic growth, the reduction of inequality and the eradication of absolute poverty (Todaro, 1989). If this kind of development is to be achieved



with technology and Education driving it, the national budget must allocate very high percentages of funds for Education and Technology.

The reality is that educational technology suffers from lack of funds, to buy state of the art equipment and maintain it. At the University of Botswana where I work, the current equipment for the smart classroom and telecommunication were purchased in 2002. There is no money to update or carry out regular maintenance works. In a way the university has never positioned itself for the sustainable development of educational technology. Sustainability of telepresence teaching and Education for Development will be very hard to Achieve. Telepresence teaching is a good method of motivating students and promoting easy conceptualization. But money constraints restrict its practice. The instruction design of this kind of teaching must be knowledgeable, motivated and creative. For him or her to keep abreast with new developments in technology, he or she must be constantly upgraded through comprehensive training. But because of financial constraints, this is not happening. In my environment there is a significant number of faculties who resist technology. The telepresence equipment is also old and needs updating, this makes sustainability in this case a dream that may never be realised.

## 10. Study questions:

1. What is telepresence teaching? How can it benefit both learners and teachers?
2. Discuss issues of implementing telepresence teaching in poor or developing counties.
3. Illustrate with an example how you would shop for telepresence equipment and explain your choice.

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Since many decades Education Science and Technology has an achieved tremendous recognition and has been applied to variety of disciplines, mainly Curriculum development, methodology to develop e-learning systems and education management. Many efforts have been taken to improve knowledge of students, researchers, educationists in the field of computer science and engineering. Still many problems to increase their knowledge on daily basis so this book provides newly innovations and ideas in the field of computer science and engineering to face the new challenges of current and future centuries. Basically this book open platform for creative discussion for future and current technologies to adapt new challenges in education sector at different levels which are essential to understand for the students, researchers, academic personals and industry related people to enhance their capabilities to capture new ideas and provides valuable contribution to an international community.

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Phone: +86-21-62489820  
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