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The Impact of e-Learning and e-Teaching

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***Abstract*—**With the exponential progress of technological development comes a strong sense that events are moving too quickly for our schools and that teachers may be losing control of them in the process. This paper examines the impact of e-learning and e-teaching in universities, from both the student and teacher perspective. In particular, it is shown that e-teachers should focus not only on the technical capacities and functions of IT materials and activities, but must attempt to more fully understand how their e-learners perceive the learning environment. From the e-learner perspective, this paper indicates that simply having IT tools available does not automatically translate into all students becoming effective learners. More evidence-based evaluative research is needed to allow e-learning and e-teaching to reach full potential.

***Keywords*—**e-learning, e-teaching, distance learning, education

I. Introduction

WITH the increasing trend to desire greater accessibility in the classroom, hastened by rapid technological improvements, has come a new paradigm, one that emphasizes learning over teaching—both traditional learning and teaching as well as e-learning and e-teaching. In addition, lifelong learning is becoming the focus in the field of education rather than formalized schooling that ends with adulthood, and customized learning which looks at the needs, interests and desires of each individual is now more desirable.

However, with the exponential progress of technological development comes a strong sense that events are moving too quickly for our schools and that teachers may be losing control of them in the process [1], [2]. A fundamental concern for the educational environment is whether the relentless technological development of our society is somehow inevitable or whether institutional leaders can play a much stronger role in steering and controlling it. This paper examines the impact of e-learning and e-teaching in universities, from both the student and teacher perspective.

II. Literature Review

A. Defining E-Learning and E-Teaching

E-learning—and, by extension, e-teaching—can be defined "as the use of ICT in higher education, which aims mainly the independent use of technology by students" [3]. Unfortunately, a consensus definition of good e-teaching is lacking in the literature, seemingly the result of the subjectivity and context-dependence of the terms good 'e-teaching' and 'effective student e-learning'.

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Certainly e-learning and e-teaching in higher education cover multiple possibilities, including the interactions between the learner, teacher and a growing range of technologies available today [4].

B. The Need for E-Learning and E-Teaching

Despite opinions to the contrary [5], [6], current decision-makers—at both the student and the academic level—draw conclusions and make assessments based, in large part, on the use of information and communication technology (ICT) that was not available to previous generations [7]. As a result, they will play an instrumental role in the way these technologies are used going forward, both for the business world as well as the education system. It is already apparent that employers today are looking for individuals that possess different skill sets than their predecessors, and that those skill sets are greatly enhanced through the use of ICT [8]. Therefore, it is up to current educators to be at the forefront of the process of preparing students to enter the workforce under the existing circumstances. Of course, parents as well as the students themselves must be aware of the current environment and be willing to accept the fact that ICT is here to stay and it will be extremely instrumental in the future of both business and education [7].

The current level of development of new technology in the field of learning and education offers opportunities for collaborative engagement, access to information, interaction with content, and individual empowerment [8]. In our time, swift changes in ICT permit teachers to progress from traditional face-to-face classroom activities to online classrooms, or online activities in the traditional classrooms that enable e-learning and e-teaching.

The influence of ICT on e-learning and e-teaching in the classroom is having a corresponding influence on the working, occupational, and business worlds as they create and generate new occupations and professions, and strengthen other ways of dealing with continuing education [9]. Indeed, concepts that have long been accepted in the business world—such as adaptability, flexibility, cooperation, and overcoming barriers—are also concepts at the heart of e-learning and e-teaching [9]. As a result of technology, it is now possible to become active participants in a teaching and learning community in a virtual environment, and can subsequently improve the course after each edition in a constant pursuit of quality. This benefits both teacher and learner.

As acknowledged by [10] there is little question that a properly constructed e-learning curriculum is typically more challenging than the equivalent traditional campus classes. Nevertheless, the intrinsic flexibility of the paradigm appeals

to people with busy life styles and numerous family demands. The study conducted by [10], based at Victoria University, investigated online curricula that can be used at the undergraduate level—a subject that lacks extensive research. One of the most critical issues addressed was the changing demographics of the student population, emphasizing the need for the University to investigate more flexible options [10].

C. E-Learning versus Traditional Learning

The empirical literature contains considerable debate regarding whether e-learning (or online education) is as effective as traditional face-to-face (campus) classes—and this was the motivation for [10]'s original study as he compared online versus classroom courses. Several studies have found e-learning is as effective as, or better, than traditional university class structure [12], [13], [14], [10]. Alternatively, meta-analysis studies of e-learning versus classroom effectiveness are unconvincing about the '(no) significant difference' assertion [15], [16].

Countless universities, businesses and teachers have dedicated websites for the courses they teach. For example, in the United States, in the last six years, online enrolments have been growing substantially faster than overall higher education enrolments [17]. Specifically, over 6 million students took at least one online course during 2009, a plus of 30 percent increase over the number reported in 2007 [17]. In reality, however, many systems are not adapted to the requirements of e-learners, so they must spend significant time and effort finding the needed resources. With 73% of college students indicating they use the Internet more than the on-campus library [18], the path to an acceptable and well designed education for e-learners is full of promises as well as hazards.

One of the most important issues facing academic institutions is cost effectiveness, since the implementation of the electronic technologies, particularly at multi-campus universities and distance teaching providers is no small (or inexpensive) matter [19]. Of course, economies-of-scale provided by the large distance teaching universities—operating on the basis of the industrial model—also convinced many that studying through ICT should be cost effective.

D. Learning Theories

In defining the term educational technology, [20] focused on two aspects that are most applicable to this discussion—1) computer systems (educational computing); and 2) media and audio-visual (AV) communication. Later in that same publication, [20] listed a variety of learning theories and how they apply to the expanded use of technology in the classroom. For example, five of the most relevant theories are: 1) behaviorist theory—developed by B.F. Skinner—which posits learning as a stimulus-response. Behaviorism is a worldview that assumes a learner is essentially passive, responding to environmental stimuli [21]; 2) information-processing theory (Atkinson and Shiffrin) which suggests that the mind is a computer that registers sensory stimulus; 3) cognitive-behaviorist theory (Robert Gagne) which holds specific events of instruction as key for providing the conditions for learning; 4) social activism theory (John Dewey), which advocates learning as a social experience—and from which comes Constructivism; and 5) scaffolding theory (Lev Vygotsky), which conceives learning as a cognitive building process [20].

III. Results Of Selected Studies

The experiences and results detailed by [22], in a study based in China, indicate that the issue of curriculum and course designs are indispensable for e-learning and e-teaching, especially in the context of distance learning. On campus, the face-to-face communication could guarantee the clear understanding between instructors and students, and the students could benefit from this direct style. On the other hand, such communication is typically unavailable for distance learners. Indeed, students lacked the ability to contact professors or instructors directly, despite living near a university [22].

Additionally, from the teachers' perspective, the need for modification of the course syllabus and contents were revealed, leading to development of a new textbook [22]. Not only have more explanations about the details of preliminary information (which is suitable for students with different background) been provided, but also some practical techniques, such as those for image acquisition in different forms, have been included [22].

The results of [23] indicated that software can support students in constructing their ideas through features such as scaffolds in the form of cues, online notebooks, and visualizations. As students collaborate, they contribute to the collective work of the e-learning community in many ways, by proposing theories, advancing initial hypotheses, and summarizing what needs to be understood in order to progress on a problem solution.

In order to fully develop the potential of the concept of an online learning community, [23] revealed that e-learners need suitable pedagogical models, as well as tools that fit their needs and the social processes that learning entails. In addition, for professional learning and reflection to occur, there is a need for informal networking and "learning on demand," while simultaneously, community members must have access to supportive, flexible, and individualized learning tools and options.

A study conducted in Australia by [10] mentioned earlier revealed the value of utilizing a balanced scorecard approach in e-learning and e-teaching. The first best-practice recommendation in that case study was that education practitioners should consider utilizing the Australian education balanced scorecard model and survey for use in the course delivery evaluation.

Secondly, it was recommended [10] that education practitioners consider adapting and implementing the balanced scorecard model at the institution level, which could easily incorporate the Australian education balanced scorecard for all course level assessments, thus providing the measures needed

for higher-level e-learning and e-teaching aggregation—in this way these ideas compliment one another.

Finally, although the case study [10] did not discuss any distinction between using scorecards for classroom versus online or e-learning classes, the recommendation was that the same methodology be used in both types of educational delivery since the learning objectives and goals ought to be identical for both.

[24] indicated that, at the Polytechnic University of Valencia, promoting and encouraging the application of New Technologies in the teaching systems on the educational community is a primary focus. However, it was also noted that the teacher must have a positive inclination towards new technologies in order to ensure the effectiveness of e-learning and e-teaching. Quite often, lack of understanding regarding the e-learning platform prompts a lower use of it and an insufficient exploitation of its possibilities, resulting in a linear and passive course interactivity. This can develop into a negative attitude towards e-learning as well as e-teaching, mainly spawned by a lack of command of the means through with the training is offered [24].

The ODISEAME project (Open Distance Inter-University Synergies between Europe, Africa, and Middle East) [25] revealed that e-learning can actually remove frontiers in education, allowing the exchange of students and promoting the equality of opportunities. This is the result of those who cannot travel for economic or other reasons being able to attend courses given by foreign institutions without moving from their countries. Moreover, [25] proved that higher education students are interested in e-learning, since it provides them with flexibility from both a spatial and time standpoint. While Internet penetration in a country is influential when it comes to attracting students to the online courses, it is not the sole determinant. Highly motivated students are able to go to the computer rooms of their universities or to Internet cafés to participate in the online courses.

Another case [26] described the Virtual Learning Center of the University of Granada in Spain. Specifically, the creation of a specific service structure to manage the promotion of the use of ICT and e-learning in the educational processes of a large, traditional, 500 year old university was discussed. With just the base of a few previous pilot experiences, this Center, created in February 2001, had to address the training of the teaching staff of the University in ICT competences and the creation of both graduate and post-graduate virtual courses.

After just four years of operation, the Center had achieved all the proposed goals and, currently, the University of Granada has more than 4,000 virtual students and more than one third of its academic staff (around 1,200 teachers) have proper e-learning skills, with some of them being able to create their own digital materials for face-to-face teaching support and blended learning [26].

Additional interesting studies involving research on the e-learning literature were conducted by [27] and [28]. Both studies established three broad areas of research: macro, meso and micro levels. In general, the *macro level* refers to broad conceptual frameworks of e-learning theories and systems. The *meso level* relates to management, organization and technology of learning at the institutional level; and the *micro level* is focused mainly on the specific e-teaching and e-learning processes.

Significantly, [27] and [28] revealed a strong imbalance in the representation of the three research levels. Research on distance education is mainly dominated by issues that refer to the micro perspective. Over half of all examined papers dealt with the top three issues: interaction and communication in learning communities (17.6%), instructional design (17.4%), and learner characteristics (16.3%). Research works on issues at the meso and macro level are the minority and tended to be very descriptive.

Emerging policy recommendations as to how it is possible to cut the high costs associated with e-learning is another critical topic. For instance, researchers of an Organisation for Economic Co-operation and Development (OECD) study on the applications of technology at the tertiary level in 13 different countries [29] suggested that e-learning could become a less expensive model compared to conventional face-to-face or distance education using a number of different strategies. These included: substituting some online provision for on-campus teaching (rather than duplicating it); facilitating increased peer/automated learning; use of standard/pre-existing software, drawing on the open standards and learning objects model to increase material re-use and sharing; avoidance of duplication of effort; and greater course standardization. Without question, presenting cost-effective models of utilizing the digital technologies constitutes a most urgent task for researchers, policy makers and practitioners in e-teaching and e-learning.

Various studies on the applications of technology for pedagogical purposes have difficulty following the rapid change and long-term educational consequences. In many cases, the main goal of research in this field is based on the effectiveness of ICTs in a limited and restricted situation. As mentioned, few rigorous research studies on the effectiveness of online learning have been published [30], [31].

A number of researchers in the field of e-learning are convinced of the need for a robust data collection approach to develop a catalogue of lessons learned, from past successes as well as failures [32], [33] and [34]. Critical variables in the implementation process of e-learning and e-teaching should be identified that are less sensitive to the speed of the development of innovative and complex new technologies.

IV. Analysis And Discussion

The main goal of educational technology is learning, and the main question of educational technology is how can technology best enhance meaningful learning? Thinking mediates learning—learning results from thinking. The role of technology in learning is indirect. It can stimulate and support activities that engage learners in thinking, which may result in learning, but learners do not learn directly from the technology. Learners learn from thinking about what they are doing, and technology can foster and support learning.

Therefore, instead of learning from technology, students must learn with technology.

Constructivist perspectives generally favor more open-ended learning environments over instruction-directed environments, yet the research consistently points to the need to give students some structure. The question of whether the teacher should coach, counsel, or teach will likely remain contentious for some time.

Educators and administrators need to make informed decision regarding the extent to which computer-based technology should be part of the teaching and learning process. This involves much more than simply knowing how to use a particular type of technology. Rather, much more critical is developing an understanding of the psychological and cultural nature of students, as well as the philosophy of learning and teaching that a teacher chooses to espouse. In effect, an educator has to determine how technology will be used in the classroom, and, once it is, how it will impact student learning. A significant element in such decision is based on the teacher's understanding of how their students learn, based on theories that have been presented.

While current studies indicate multiple benefits resulting from the use of IT in e-learning and e-teaching, it is still very naïve to simply assume that the mere presence of such IT tools is the sole prerequisite for developing self-directed and autonomous learners. Indeed, the majority of learners, even digital natives born with a mouse hand, are unable and unwilling to completely control (or even largely control) their own studies. Thus, e-teachers can not be viewed merely as occasional guides standing on the sidelines of the e-learning process. Rather, there role is vitally important in implementing the wide range of possibilities enabled by the new technologies. Nevertheless, their roles are not always self-evident.

Materializing the potential of the technologies in e-learning/e-teaching setting does not mean just transplanting the practices of traditional classroom encounters to the technological environment. Both students and teachers need to be trained to become proficient computer literates, and support systems should be provided on an ongoing basis throughout the study process. Unquestionably, these constitute challenging tasks which necessitate investment of money, time and appropriate expertise.

Both the research and practice of e-learning are embedded with inherent challenges that should be tackled by all participants. Technologies develop at an accelerated rate making it difficult to reflect on their impact retrospectively. Critical variables in the implementation process should be identified that are less sensitive to the development of new technologies.

In reality, the benefits of using technologies should be weighed in direct relation to their cost or added value. If they provide a distinct added value in various learning/teaching practices, their implementation might be justified, even if they are more expensive as compared to existing technologies and practices but if the findings of studies point to a "zero sum effect" compared to traditional practices, then their applications are justified only if they provide economies-of-scale. Very few studies exist currently on the costs of applying the new technologies. Technologies should not be implemented by any means just because they are considered to be innovative in nature. They should be implemented only if they prove to be better or cheaper.

Finally, developers of new technologies should be aware of the impact of innovative technologies on the narrowing or the widening of the digital gap between rich and poor and between developed and developing countries. Mobile technologies today have the potential to decrease the digital divide, while some other innovative technologies are increasing the gap. Bridging over the digital divide constitutes a legitimate need in the global and interconnected world in which we live.

V. Conclusions And Future Directions

As [35] noted, technologies are also processes that affect how we can make sense of the world and communicate our views of others about it, and this impacts on knowledge building in new and dynamic ways. This view places the learner as active and constructive in doing things that have an effect on outcomes (i.e., knowledge creation), rather than just a user or consumer of technology. Thus, the student is in control of the computer instead of the computer controlling the student.

Complex communication and social skills require processing and interpreting information and selection of appropriate words and images, to build a shared understanding. Terms such as social perceptiveness, persuasion, negotiation, and instructing convey the essence of these skills.

Because learning does not occur by way of passive absorption, the learning resources reviewed in this paper promote active learning. Students are involved in more than listening and reading. They are developing skills, analyzing and evaluating evidence, experiencing and discussing, and talking to their peers about their own understanding. Students work collaboratively with others to solve problems and plan investigations. Many students find that they learn better when they work with others in a collaborative environment than when they work alone in a competitive environment. When active, collaborative learning is directed toward scientific inquiry, students succeed in making their own discoveries.

They ask questions, observe, analyze, explain, draw conclusions, and ask new questions. These inquiry-based experiences include both those that involve students in direct experimentation and those in which students develop explanations through critical and logical thinking.

Academic faculty need to assume new responsibilities and to develop a range of new skills. Universities will have to deliberate on how to prepare new generations of academic faculty to operate in a world where blended courses and online teaching constitute an integral part of academic teaching responsibilities.

The paper proposes that teachers in e-learning contexts need to focus not only on the technical capacities and functions of on-line materials and activities, but must also attempt to

understand their students' perceptions of this part of the learning environment, and how successfully that part is in supporting (or, in some cases, hindering) student learning across a whole course. This suggests that if e-teachers want students (e-learners0 to truly benefit from learning on-line, even in blended contexts, then teaching strategies that clarify the value of moderation of student postings, and the value of interaction between the students online, are likely to improve both the students' perceptions and their grades. Focusing on the (relatively) objective usability of a course website, for example, runs the risk of failing to understand how students understand the role of the site for learning at large.

Doubtless, new terms will enter the conversation on technologies in e-learning/e-teaching processes as new technologies and new technological applications continue to develop. However, it is recommended that all stakeholders in the e-learning field explain clearly the exact roles of the technology, which they are referring to in their discussion and/or research, to specify whether the implementation takes place in campus-based, distance teaching or blended learning environments, and to relate the extent to which the technology augments or replaces traditional practices. Such a clarification might assist greatly in consolidating the multiple pieces of current research findings into a more coherent framework and in conducting an intelligible discussion.

Admittedly, research on e-learning contains large gaps, particularly at the institutional and system-wide levels. There are currently thousands of scattered studies at the micro level of teaching and learning in classroom settings, whether virtual or real. These studies yield contradictory results, suffer from various biases, and mostly do not yield robust conclusions that allow policy makers to use them in an comprehensible way.

More evidence-based evaluative research is needed that provides some indication of how the on-line part of the whole blended experience of student learning is contributing to the quality of student learning in higher education. Significant effort should be invested by institutions as well as governments to plan wide-scope studies, to improve the quality of existing studies on the applications of technologies in various settings, and to consolidate the many findings into a comprehensive framework that might serve policy makers, practitioners, and researchers at different levels.

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