Interdisciplinary Research in eLearning-
Exploring New Knowledge Domains

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Abstract- On-line learning is emerging as a increasingly new option to traditional face-to-face (F2F) mode. The university apparatus which have been in place for the last few centuries is gradually being replaced by a new infrastructure called the Internet. New technologies are creating new knowledge domains for research in teaching and learning. Developments of new technology enabled knowledge domains require a shift in educational research. This paper provides insight into the new and emerging areas of interdisciplinary research in eLearning.

Keywords- Connectivity, Interdisciplinary Research, Internet, Knowledge Domains, LMS, Social Networks, Web 2.0

I. INTRODUCTION

For centuries research in education has been focused on F2F environment. In last few decades lot of research have been done on how students learn in a classroom. Research in traditional teaching-learning environment has largely focused on role of instructors, classroom dynamics, teaching methods, learning theories, learning styles, ethnicity, home environment, parenting and innumerable personal and social factors affecting learning. In the last 10 years the advent of the Internet and innovations such as Google has changed the way people learn. In the last decade lots of progress has also been achieved in on-line learning. Learning has moved out of the confines of a campus and a classroom.

Traditional face-to-face (F2F) learning as a process focuses on what happens when the learning takes place. Explanations of what happens within the confines of a classroom have become the basis of various learning theories. For more than a century learning theories were used as an attempt to describe how people and animals learn, thereby helping us understand the inherently complex process of teaching and learning [1]. According to Hill learning theories have two main objectives. The first objective is to provide us with vocabulary and a conceptual framework for interpreting the examples of learning that we observe. The other objective is to suggest us where to look for solutions to practical problems. However, these traditional theories do not give us any concrete solutions, but they do direct our attention to those variables that may be crucial in finding solutions [2].

There are three main categories or philosophical frameworks under which learning theories fall: behaviorism, cognitive, and constructivism. Behaviorism mainly focuses on the objectively observable aspects of learning. Cognitive theories look beyond behavior to explain brain-based learning. And constructivism views learning as a process in which the learner actively constructs or builds new ideas or concepts. These three main theories have been used to explain learning before the advent of computers, laptops, smart phones and the Internet. Today learning is largely enabled by technology.

As mentioned earlier, much of the traditional research in education has evolved
from these classical learning theories. For more than a century F2F interaction in a physical space, close proximity and personal or group encounters has been at the core of research in education. In the last two decades learning has gone beyond the walls of a classroom and has created vastly new opportunities for learning. Internet technologies such as Google and Wikipedia have given rise to new ways of accessing, using and sharing information. Now anybody can learn from anywhere, at any time. One only need two things- a device and a connection to the Internet.

New eLearning and eTraining programs are being setup for virtual learning environments (VLEs). Based on the current trends we can divide teaching and learning in four major categories. This prototypical classification is based on the Sloan Consortium papers and is depicted in Table-1 given below.

<table>
<thead>
<tr>
<th>Delivery Mode</th>
<th>Content on-line</th>
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<tbody>
<tr>
<td>Traditional (F2F)</td>
<td>0%</td>
</tr>
<tr>
<td>Web Facilitated</td>
<td>1% - 29%</td>
</tr>
<tr>
<td>Blended/Hybrid</td>
<td>30%-79%</td>
</tr>
<tr>
<td>Online</td>
<td>80% or more</td>
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</table>

In on-line learning 80% or more of the content is delivered on-line, whereas in F2F environment learning occurs within the confines of a classroom. As a result much of the research has focused on the regulated classroom learning environment.

In the last 10 years the Internet has become an integral part of education and training in terms of providing resources, sharing knowledge and communicating with other learners. Likewise, on-line courses are also becoming integral part of educational programs at all levels- schools, undergraduate, graduate and PhDs. However, doing research in on-line learning poses new challenges. It requires a better understanding of the on-line media as well as the content and technical expertise to properly guide research into these new fields. This paper is a small attempt in providing a better understanding of the new and emerging areas or domains of research in on-line learning.

II. DIGITAL-DEVICES AND LEARNING

In the last decade F2F learning has been changed. It is gradually being supplanted by on-line learning with a variety of delivery methods and means [3]. Today one can use any device to connect to the Internet and access any information or dive into a knowledge repository residing in the web. The “e” in eLearning signifies access to electronic or digit content with any device ranging from a PC, laptop, a notebook and a mobile phone. Besides a device, another thing that is needed is connectivity. A device can provide a user interface (UI) ranging from a small size screen of a smart phone (e.g. iPhone, Samsung Galaxy) or a larger display in a PC or a laptop. Portable devices and multimedia appliances connected to the Internet are becoming integral part of our daily lives. Hence new technologies also have tremendous capability to reform traditional research methodologies The most relevant feature of eLearning is that it brings engagement through technology. eLearning can bring information and data in various formats for a wide variety of devices and can be easily interpreted with a click of a mouse. In addition, new growth in Web 2.0 technologies, cloud computing and expansion of smart devices combined with increased connectivity has added new dimensions to traditional research in teaching and learning. And just like the technologies these new research dimensions are also changing at a very fast pace.
III. INTERDISCIPLINARY RESEARCH IN ELEARNING- NEW POSSIBILITIES

In consideration of the technological trajectory, learning has evolved from textbooks to television to computers, and now to the Internet using portable and smart mobile digital devices, in a relatively very short period of time. According to two researchers Brill and Park working at Virginia Tech, USA the application of a variety of technologies for learning and teaching is being influenced by two significant forces: the realm of technological innovation (especially, today, in regard to hardware, software and new Internet technologies and the realm of learning theory [4]. In the last five years the realm of technology has evolved at a very fast pace. These two researchers mention that in respect to this technology trajectory, expansions in ontological and pedagogy have provoked a broadening of learning paradigms (e.g., behavioral, cognitivism, and constructivism) suggesting moves toward more self-directed, contextualized, and interactive personal learning environments (PLEs). Developments in ways of knowing and ways of learning have evolved against a backdrop of society’s evolution from an Industrial and Information Age to the current “Always connected to the Internet Age.” Such a shift also requires a new focus on educational research.

Therefore eLearning requires system design that can support learning through a variety of devices that connect to the Internet. It is essential and important to understand that eLearning is not just complimentary or a stand alone solution. It addresses learning through any device used by a student. eLearning in higher education is bringing high levels of interactivity and engage students in an active learning process suited to their needs and abilities, hence, giving them an immersive learning experience. If eLearning components are properly designed and the content is also properly delivered they can enable students to develop high order thinking skills and prepare them for lifelong learning. Success of products as iPad from Apple is a good example of a versatile product design conducive for on-line learning.

Henrik Bresman in “External Learning Activities and Team Performance: A Multimethod Field Study” found that learning through multiple methods can bring about integration of more flexible, comprehensive and dynamic communication technology (2-D/3D) for education purposes [5]. A good example of a successful multi-user, multimode environment is Second life (SL), an open-source online virtual world that was introduced in 2003. The opportunities created by platforms like Second Life (SL) and tools such as Google Documents, Maps, Skymap, Blogs, Sites and New Google Earth adds a completely new dimension to learning and gaining and sharing knowledge [6].

Evolution of social networks and PLEs has given rise to two distinct models of online learning. The first model treats all new media such as blogs, discussions, file sharing chat, social networks as learning resources. In other words, every technology that is in use today is a type of learning resource [7]. The second model treats each and every technology as a distinct resource including social networks. Formal learning for the purposes of attaining a certificate or a degree in F2F or in a VLE is also a part of the community of resources. The second model is depicted in Figure-2. The community of resources model emphasizes the role of each technology in relation to its purpose. In this model formal learning has a very distinct purpose than an on-line forum, file sharing or chat. Interplay of these new methods and their role in enhancing learning requires further research. In this new model learning is encouraged to come from the bottom-up and not from the top-down. This means that the learning is initiated from the learners, with learners deciding how to investigate their interests and how to
approach these interests. Learners, not teachers or instructors, dictate the topics for learning. These learners form learning communities in order to pursue their topics and interests.

In context of learning communities new research domains such as social networking should be explored. Social networking sites such as Facebook, MySpace, Linkedin, Twitter, Joomla, You- Tube, Wikipedia and host of such similar services are becoming primary source for information and knowledge sharing [8]. They are also becoming an integral part of (PLEs). These web services have transformed the way we share and consume information. Apple products such as iPhone, iPad and iTune-U are also changing the channels of distribution of learning resources for formal and informal education.

For the sake of differentiation few emerging research domains are listed in Table-1. This list is not very exhaustive but just an attempt to give an idea of what kinds of interdisciplinary research can be conducted. This author would like to emphasize that the 12 areas listed in the table is an attempt to roughly categorize the research domains so that a researcher can focus on his/her personal interests. Almost all of these domains are interrelated. These 12 major domains are based on current technologies and trends in on-line education and training. In edition to eLearning, there are many other areas such as eBusiness, eGovernance, eHealth and eAgriculture that is attracting a new breed of researchers.

As an example, large numbers of organizations using an LMS for on-line learning are frustrated because other areas of software and technology seem to have progressed at a much more rapid pace in terms of usability and flexibility. There may be a future for the LMS, but only for the vendors who are able to see the changes on the horizon and adapt before it’s too late. Usability of LMSs has been cited as the main drawback of these systems. It refers to the ease with which a User Interface (UI) can be used by its intended audience to achieve defined goals. Usability incorporates many factors such as design, functionality, structure, information architecture, and more. Therefore research in LMSs is very essential for keeping them viable and useful for teaching and learning.

### TABLE 2

<table>
<thead>
<tr>
<th>Top 12- New Research Domains</th>
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<tbody>
<tr>
<td>Learning Management System (LMS)</td>
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<tr>
<td>Content Creation Tools &amp; Technologies</td>
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<tr>
<td>Content Delivery Systems</td>
</tr>
<tr>
<td>Virtual Learning Environments (VLEs)</td>
</tr>
<tr>
<td>Cloud Computing &amp; Learning</td>
</tr>
<tr>
<td>Social Networks and Learning</td>
</tr>
<tr>
<td>eLearning and various subject domains</td>
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<tr>
<td>Mobile Learning</td>
</tr>
<tr>
<td>Standards for Quality Assurance (QA)</td>
</tr>
<tr>
<td>eCampus Technologies &amp; Services</td>
</tr>
<tr>
<td>Accessibility and Special needs</td>
</tr>
<tr>
<td>Life Long Learning (LLL)</td>
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IV. RESEARCH IN MOBILE LEARNING (MLEARNING)

The past five years has seen a substantial increase in mobile learning (mLearning) initiatives and certainly there is on-going talk of its potential in education. But is the potential of mLearning hype or a reality? Despite the many successes mLearning is experiencing in USA and Europe, Japan and Korea and Taiwan more research is needed to understand how this ubiquitous technology can be used to provide educational resources to those most in need, along with the development of a sustainable and robust business environment. This is one of the new and emerging areas for research which needs to explored and exploited.

The realm of learning theory for today’s students using laptops, iPhones, iPads and smart phones also needs a revision. Good digital content is essential for making on-line learning experience better. Not much research has been done in this key area. Lots of work is needed to making sure that the main objectives for distributing content on mobile phones are successfully achieved. Research in this area should also focus on a wide range of social and economic issues in different part of the world.

![Portable Devices for mLearning](image1)

Current landscape of mLearning in the developing world is not very clear as it lacks data about the role of mobile network operators (MNOs), technology vendors, foundations and the academic community. It also lacks an exhaustive evaluation of the global mLearning market. However there are many mLearning projects currently taking place globally, the vast majority of them are on a small scale are not well documented. It is also a fact that wide spread usage of mobile content is occurring in the developed world, especially the US and the UK, where mobile technology is more prevalent and advanced, and where research funding does not present as great a barrier.

However, with 95% of the world’s illiterate or semiliterate population residing in developing countries, where access to schools and resource materials is at a minimum, such regions present the greatest areas of need. These markets therefore represent the greatest opportunities for research in mLearning programs, products and services.

There is a big void in providing digital content to people with special needs. People with extreme medical conditions are left out of the on-line learning. Mobile technology has improved to include this vast disfranchised group of users. But accessibility of to digital content to enhance quality of life needs further research. This is where the some of the standards created by ISO and SCORM also become critical for quality assurance (QA). Quality and portability issues related to digital content are not very well understood. This new area of research requires further exploration [9].

V. CONCLUSION

eLearning requires harnessing the power of range of technologies including the Internet. Thoughtful and realistic system design is essential for successful on-line learning. Research in new technologies solutions such as cloud computing, mLearning and Social Networks can not only enhance learning but also provide new opportunities for the development of new products and services. A general recommendation would be to explore the
new areas of interdisciplinary research focusing on digital content for eLearning including the delivery modes, QA and social networks. Fast pace of technology development depends on high quality of research. Interdisciplinary research in eLearning is still in a budding state. The researchers can begin with choosing a theme from 12 knowledge domains to carry out their work successfully.

REFERENCES


