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Editorial

Artificial Intelligence

Donald G. Perrin

Dr. Herbert A. Simon and Allen Newell of Carnegie Mellon University gained renown in the mid-1950s when they created the first "thinking machine" and launched the field of artificial intelligence. Both were central figures during the cognitive revolution in psychology in the 1960s as scientists began to use computer models to study human thought processes.

In 1962, as a research assistant to Dr. James D. Finn on the Technological Development Project of the National Education Association, I was sent to the California Technical Institute to hear and see Professor Simon demonstrate artificial intelligence using the computer. The crowded lecture room tingled with excitement. Dr. Simon explained Turing's test to determine whether the computer response could be differentiated from a response by a human being. He showed how the computer was able to make decisions and solve problems such as the following:

> Three missionaries and three cannibals must cross a river using a boat that can carry at most two people. For both banks, if there are missionaries present on the bank, they cannot be outnumbered by cannibals (if they were, the cannibals would eat the missionaries). The boat cannot cross the river with no people on board.

Dr. Simon also demonstrated intelligent robotics to detect and pick up an egg, and chess games where different computer algorithms were compared.

If the egg was detected and quickly removed, the machine went berserk in an un-programmed search for the egg. An electric shock restored the original program (was this analogous to shock treatment for a mental patient?).

The algorithms for chess compared a set of simple rules vs. alternative strategies for all of the possible next three moves. Simple rules worked better than analysis of millions of potential options.

The audience was intensely interested and excited by these demonstrations. At question time I asked how long it took to write the program for the missionaries and cannibals. The answer was "about six weeks, and two weeks to debug the program". It was not my intent to deflate an enthusiastic audience. It took some time to appreciate the tremendous step forward these experiments represented in development of artificial intelligence.

Fifty years later we find artificial intelligence, robotics, and automation augmenting productivity at home, at work, and in personal and business communications. Siri listens and provides answers faster than you can google them on a keyboard. And in 2012, IBM's Deep Blue won the chess championship from Garry Kasparov.

There are serious questions about what skillsets schools should teach in the future when ubiquitous mobile devices complement human intelligence and deliver customized training. Are we approaching a paradigm shift where "thinking machines" will play a dominant role in our daily lives and make irreversible change in the way we live?

Herbert A. Simon Obituary: http://old.post-gazette.com/obituaries/20010210simon2.asp

Allen Newell and Herbert A Simon. Computer simulation of human thinking. http://www.cogsci.ucsd.edu/~coulson/203/newell-simon.pdf

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Editor's Note: In this day and age when research shows renewed importance for curricula in arts related subjects and their value in stimulating creativity, it is heartening to see new technologies to enrich access, dialog and interpretation of art and culture. It is of particular importance because budget cuts have virtually eliminated the arts from many curricula in a day and age where cultural understanding and creative problem solving are in great demand.

The pedagogical functions of arts and cultural-heritage education with ICTs in museums – a case study of FINNA and Google Art Project

Pei Zhao, Sara Sintonen, Heikki Kynäslahti
Finland

Abstract

Digital museums and arts galleries have become popular in museum education and management. Museum and arts galleries website is one of the most effective and efficient ways. Google, a corporation specializing in Internet-related services and projects, not only puts high-resolution arts images online, but also uses augmented-reality in its digital art gallery. The Google Art Project, Google's production, provides users a platform for appreciating and learning arts. With the virtual reality, recently added to the Google Art Project, more and more countries released their own museum and art gallery websites, like British Painting in BBC, and FINNA in Finland. Pedagogical function in these websites is one of the most important functions. In this paper, we use Google Art Project and FINNA as the case studies to investigate what kinds of pedagogical functions exist in these websites. Finally, this paper will give the recommendation to digital museums and websites development, especially the pedagogical functions development, in the future.

Keywords: arts education, cultural-heritage education, education with ICTs, pedagogical functions.

Introduction

It is valuable for students and children to visit a museum or art galleries, because the learning environment is rich and dense, and more opportunities for fresh ways of thinking can occur in and out of the classroom. It enriches the school curriculum and learning experience after class, and provides an opportunity to work with an 'expert'. Therefore, it is necessary to promote teaching and learning arts in museums, even though it is always limited by space and time.

With the development of information communication technologies (ICTs), ICT environments have been challenging traditional pedagogy, and terms like *student-centered approach*, *interactive and collaborative learning*, and *construction of learning environment,* arise. The National Art Education Association (NAEA) 2009 stated that it is necessary to let learners increasingly combine technology with artistic knowledge and skills, and the nurture contemporary visual arts education. The pedagogical strategy from the Australian curriculum listed benefits that include enhancing achievement, creating new learning possibilities and extending interaction with local and global communities.

The ICTs in museum teaching encompass the internet, email, and digitization. Amanda Clarke, et al. (2002) stated that technologies in museums have video, interactive smart board, web, internet, etc.

Petrea Redmond (2011) illustrated the pedagogical transitions from face-to-face teaching to online teaching, based on a four-year observation that the traditional face-to-face classroom was not as effective as the online space and, in order to guarantee effective learning outcomes, more

activities and discussions with peers are needed. Pedagogical functions in online learning focus on reflective practices, like participant dialogues and feedback.

ICTs have been affecting all fields of education, including the arts and cultural-heritage education, as more and more software companies and arts educators have paid attention to arts and cultural education with ICTs. In 2011, Google Inc. released its product, Google Art Project, to users. In 2013, the BBC offered users its Painting project about online British paintings. In October 2013, FINNA was published online. It provides access to the collections and services of archives, libraries and museums in Finland. All of the above offer the possibility of digital arts and heritage to users. Besides this, such uses may also generate knowledge and communicate information about them.

In a word, pedagogy serves an important function in arts and culture education with ICTs, as in virtual museums. However, the research aim we will investigate is how to evaluate virtual museums so that they can meet the learning or pedagogical requirements. This study will use FINNA and Google Art Project in a case study to evaluate pedagogical functions in arts and culture-heritage education with ICTs. It will give recommendations for pedagogical functions in art and culture education with ICTs development, FINNA and Google Art Project, on how to improve the knowledge, learning objectives and virtual museums as a teaching and learning resource development.

Background

Pedagogical functions in the information age

The result of activities and their pedagogical function in online courses from the center for teaching & learning, Indiana University-Purdue University Indianapolis, shows that the pedagogical functions include experiential/authentic reflection, motivation, community building, problem solving, critical thinking, knowledge acquisition, prior knowledge/attitude, drill and practice. Thus, it is found that pedagogical functions in the information age lead to actions and affect of activities online from pedagogical views.

Pedagogical functions of social media have been the center of attention in media education research as well. Wen-Hua Teng from the University of Texas at Austin, based on the study of blogs for homework, the class blog, online forums, wiki and Facebook, stated pedagogical functions in social media include enhancing students' learning experiences, strengthening communication and fostering collaboration. The functions in social media provide users with valuable interaction and communication. Pedagogical functions in social media thus lead to interaction and communication related to pedagogy.

Pedagogical functions in the information age do not just involve the pedagogical function at school. It is a kind of online art teaching and learning resource, which refers to every part of learning and teaching, provides traditional teaching and learning resources, and supports self-oriented learning and peer-to-peer communication.

Arts & cultural-heritage education and arts & cultural-heritage education with ICTs

Arts and cultural-heritage education has been regarded as the key factors in development of the knowledge society and creative ability. Michela Ott and Francesca Pozzi (2008) point out that, in order to ensure the values of ICTs in cultural-heritage education, four learning approaches should be employed. They are: personalized, inquiry-based learning approaches; on-site and anywhere learning experiences; interdisciplinary learning approaches; and collaborative learning experiences. Qualified ICTs which support arts and cultural-heritage education should meet these learning approaches.

As for arts and cultural-heritage education, Gruber and Glahn (2009) provide a definition that emphasizes a communication process about the artwork, cultural artefacts, cultural values and symbolic systems; it is also an approach to stimulate the visitors' awareness of foreign ideas. Due to the advancement of information technology, arts and cultural education is radically modernized. In the context of globalization, it is more important to use the Internet to share and explain own arts and cultures.

Arts and cultural-heritage education plays an important role in primary, secondary and adult schools, and art and culture is an important part of the core curriculum for primary, secondary and adult education.

It has been shown that European countries have a high level of use of ICTs in arts education. For example, in 2009, the Education, Audiovisual and Culture Executive Agency published an important report on the art and cultural education at schools in Europe. It is said that two thirds of European countries have issued recommendations or launched initiatives specifically designed to encourage the use of ICTs in the arts curriculum. Recently, Asian countries have increasingly valued arts and cultural education for promotion of creativity. The report from UNESCO about Asian arts education in 2005 stated that the arts have the potential to play a distinct and unique role in bringing the ideals of quality education into practice.

Dunmill and Arslanagic (2006) found that research on the impact of ICTs in arts education is a new field, but internationally, growing evidence shows the benefits of creativity and ICTs. Even though virtual reality was introduced into arts and culture-heritage education in the 1990s, extensive research began to appear in the last ten years. Virtual museums have increased in numbers. For example, in Italy, Alessandra Antonaci, Michela Ott, and Francesca Pozzi (2013) studied independent technical implementations and found virtual museums are applications-oriented, knowledge raising and supportive of learning.

FINNA and Google Art Project

FINNA is an interface which provides access to the collections and services of archives, libraries and museums in Finland. Expert organizations in FINNA guarantee the reliable content of the services. FINNA is a new emerging platform, and the first official version went public in October 2013. It will be developed and supplemented soon. Until now, FINNA not only provides materials and reliable information, it also shares the FINNA interface with partners. Its source code is freely available to all, so that users can enhance this source code and adapt it for their own learning platforms. (FINNA office website)

From its official definition, Google Art Project is an online compilation of high-resolution images of artworks from museums and galleries worldwide, as well as a virtual tour of the cultural institutions in which those works are housed. The first version of Google Art Project provided users with a virtual gallery tour, artwork view, and the ability to create an artwork collection. In 2012, Google Art Project was developed into its second-generation version. The new features include: explore and discover; video and audio content; and education. Pedagogical and educational features have been highlighted in the new-generation version.

Explore and discover, and video and audio content enrich the media and functions in Google Art Project. A Wikipedia article on Google Art Project indicates that educational tools and resources strengthen the pedagogical function of Google Art Project. This function derives from these three options:

- A multitude of educational videos;
- Two pages—"Look Like an Expert" and "DIY", which provides several activities for users similar to those found in art galleries;

- "What's Next", provides visitors a list of resources and links to various art history timelines, art toolkits, and comparative teaching resources.
  (Wikipedia, the free encyclopedia; paragraph on Education)

The pedagogical functions in arts and cultural heritage education with ICTs

Pedagogical functions in arts and cultural heritage education online community

Marion Gruber (2009) found that arts and cultural heritage education hold great potential for encouraging greater participation, innovation, and creativity in learning. The cultural institutions should provide services for communication and learning purposes.

Gordon Graham explained that in the online community, learning occurs in two ways—communication of information and knowledge gain. These two aspects support the pedagogical function in arts and cultural heritage education with ICTs. The aim is to introduce and evaluate information communication and knowledge gain in FINNA and Google Art Project in this study.

Graham also studied two kinds of groups for an online community—the subject interest group and the object interest group. The subject interest group consists of people who converse and are interested in the same things; the object interest group consists of the people who study it and have material interests in common. Different interest groups need different systems: if people are interested in the same things, like content, they need "MUDS" (Multi-users directional systems), for example, and if people are interested in materials, they need "MOOS" (Multi-Oriented Objective systems).

The pedagogical function in virtual museums

With development of information technology, many kinds of online museums and e-museum emerge. Online there are several types of virtual museums and virtual-museum definitions. In general, a virtual museum is

> "A collection of digitally recorded images, sound files, text documents, and other data of historical, scientific, or interest that are accessed through electronic media. A virtual museum does not house actual objects and therefore lacks the permanence and unique qualities of a museum in the institutional definition of the term"

In order to analyse the pedagogical function in virtual museums, the pedagogical function in real museums was first examined. Tran (2005) stated that a museum not only provides free-choice and a non-evaluative environment for visitors' learning, but also offers museum educators and staff a teaching environment. In this way, the museum has increasingly direct and intimate connections with learning. Bellamy, Burghes and Oppenheim (2009) concluded that the relationship between learning and the museum is that museums have learning potential, due primarily to the knowledge, expertise and collections they contain. Museums also play a special role in learning. In addition, they stated that museums now face two big challenges: the first – that museums will make learning a core priority for museum leadership, funding and structure; the second – that learning in museums should impact everyone, including children and young people living in poverty.

Information Communication Technologies are resolving these two challenges. Soren (2005) pointed out that learning institutions could enhance their exhibits to leverage the opportunities offered by ICTs tools.

Liu (2008) studied the educational role of virtual arts museums such that in the information age, virtual museums are reflected in the new philosophy of post-modern museums. For example, the educational role of virtual museums has been more focused on "communication"; whereas

constructivist museums have become the trend. In constructivist museums, the main topic is 'What is it that allows the learners to make a connection with what is to be learned?'

The pedagogical functions in the virtual-learning environment

Konlechner defined virtual-learning environments as a software solution that facilitates computerized learning. Dillenbourg (2000) stated that a virtual-learning environment should have several features: an information space; educational interaction; varying from text to 3D immersive worlds; students are actors; supports distance education and classroom activities; integrates heterogeneous technologies and multiple pedagogical approaches; and is a place where virtual environments overlap with physical environments.

In the technological and media-based rooms, pedagogical functions are the context of configured knowledge management, cognition and reflection, communication and action. Heiner, et al. (2001) stated that pedagogical functions in the virtual-learning environment include:

- Authoring and representation: orientation on content and process, creating learning arrangements, designing interactivity.
- Moderating and facilitating: allocating roles, facilitation of reading, writing, understanding, etc.
- Working with technical tools and cognitive tools: collaborative tools, presentation tools, annotation, and hyper-text, etc.
- Supporting learning strategies: personal adaptation of the interface, learner adaptation, and brainstorming.
- Evaluating, self-steering, control and self-control: feedback, tracking, self-controlling by portfolio.
- Orientating on learning communities: hypermedia-environments, changing roles and patterns.

Laura Alonso Diza and Florentino Blazquez Entonado (2009) studied the differences in functions of teachers in e-learning and face-to-face learning environments from theoretical content, activities, interaction and design of courses. Results showed there are no important differences. In these two learning environments, the facilitating of the teaching/learning process, combining the explanation of theoretical content and offering encouragement are positively-valued.

The pedagogical function in open educational resources

Cacheiro Gonzalez (2011) analysed the educational resources of ICTs from their typology as being information resources, collaboration resources and learning resources. Dr. Bartlett (2010) from EDUCAUSE Learning Initiative found that open educational resources (OER) are any resources available with little or no case study that can be used in teaching, learning and research. Generally, the term OER refers to digital resources and resources in online-learning environments.

Jude, L. Kajura, M. & Birevu M. (2014) investigated uses of OER. These were acclaimed as good practice because OER provides free study materials. They also found that 42% of respondents in their study had never used OERs because they had never heard of them.

Neil Butcher from UNESCO (2011) stated that there are two dimensions of OER: the pedagogical and the digital. In the pedagogical dimension, OER provides materials for distance learning and face-to-face education.

Cacheiro Gonzalez (2011) stated that ICTs for teaching facilitate the creation of multimedia content, collaborative environments and e-learning. Thus ICT educational resources can be

divided into three parts – information resource (e.g. Webgraphy and online databases), collaboration resource (e.g., mailing lists and blogs) and learning resources (e.g. repositories of educational resources and podcasts).

Based on the theoretical study of pedagogical functions in arts and culture-heritage education with ICTs, especially the virtual-museum learning environment, information communication and ways to gain knowledge are important pathways and interdisciplinary, collaborative, constructive learning are the main learning approaches. As education with ICTs is different from face-to-face teaching, theoretical content, activities, interaction and design of courses are totally different.

Case Studies

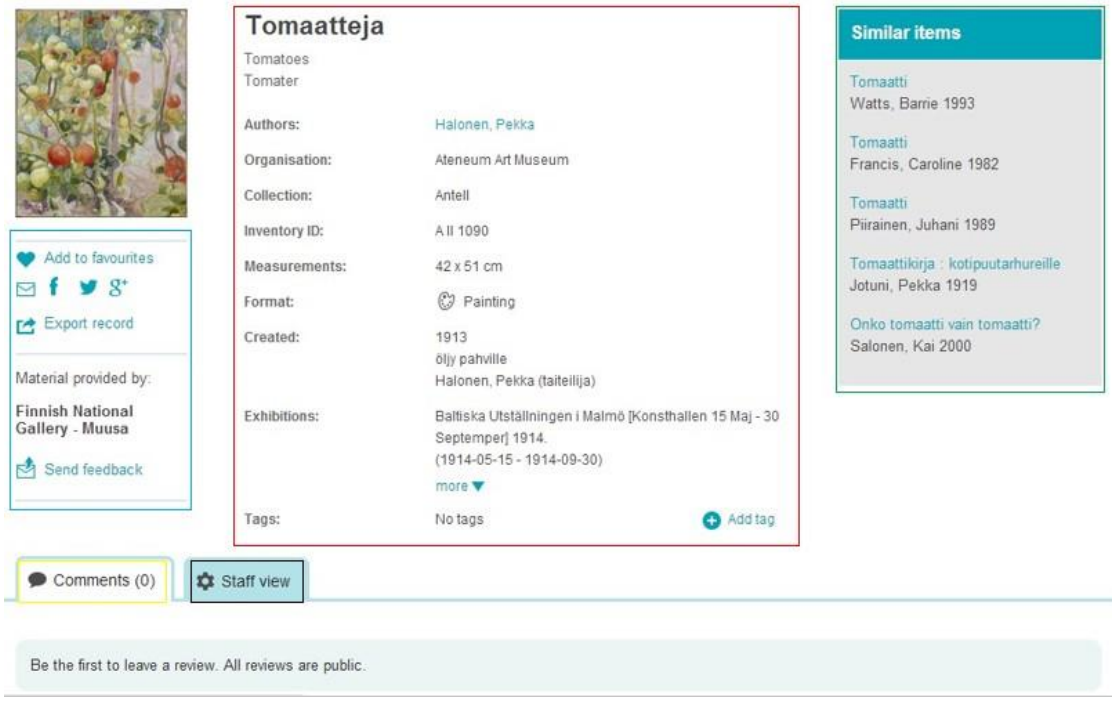
The pedagogical functions in FINNA

In FINNA, there are several basic pedagogical functions. This section of the paper will introduce them more in detail. Firstly, on the FINNA home page, there is a section termed 'highlights', which recommends several famous collections and contains a brief introduction to them. Users' interests have helped to improve the digital introductions.

Picture 1

Picture 2

In Picture 1, four collections have been highlighted. If the user places the cursor on one of them, a brief introduction is shown, as in Picture 2. If users like this collection, they can click and enter it.



Picture 3

When entering this collection (Picture 3), users can find information about this collection (red part) provided by the owners; leave comments and read others' comments (yellow part) to share ideas with others; find other related collections (green part) to help users compare it to others; and finally, users can send feedback to FINNA about this collection and share their likes in Facebook, Twitter and Google+ (blue part), which helps collaborative learning.

Apart from the pedagogical functions above, the black part in Picture 3, 'staff view', gives the codes and archive of this collection as shown in Picture 4 and Picture 5. This helps users to acquire open-source code and design other kinds of learning software. In addition, the archive of this collection offers objective and trusted information.

```
<?xml version="1.0"?>
<lidoWrap schemaLocation="http://www.lido-schema.org http://www.lido-schema.org/schema/v1.0/lido-v1.0.xsd">
 <lido>
  <lidoRecID pref="preferred" type="URI">urn:uuid:0AC744B9-02DE-478F-B221-A838B1B123A1</lidoRecID>
  <category>
   <conceptID type="URI">http://www.cidoc-crm.org/crm-concepts/#E22</conceptID>
   <term lang="en">Man-Made Object</term>
  </category>
  <descriptiveMetadata lang="fi">
   <objectClassificationWrap>
    <objectWorkTypeWrap>
     <objectWorkType type="p&#xE4;&#xE4;luokka" sortorder="1">
      <term>maalaus</term>
     </objectWorkType>
    </objectWorkTypeWrap>
    <classificationWrap>
     <classification type="p&#xE4;&#xE4;luokka">
      <term lang="fi">maalaus</term>
     </classification>
    </classificationWrap>
   </objectClassificationWrap>
   <objectIdentificationWrap>
    <titleWrap>
     <titleSet type="teosnimi">
      <appellationValue lang="fi" label="teosnimi">Tomaatteja</appellationValue>
     </titleSet>
     <titleSet type="teosnimi">
      <appellationValue lang="en" label="teosnimi">Tomatoes</appellationValue>
     </titleSet>
     <titleSet type="teosnimi">
      <appellationValue lang="sv" label="teosnimi">Tomater</appellationValue>
     </titleSet>
    </titleWrap>
```

Picture 4

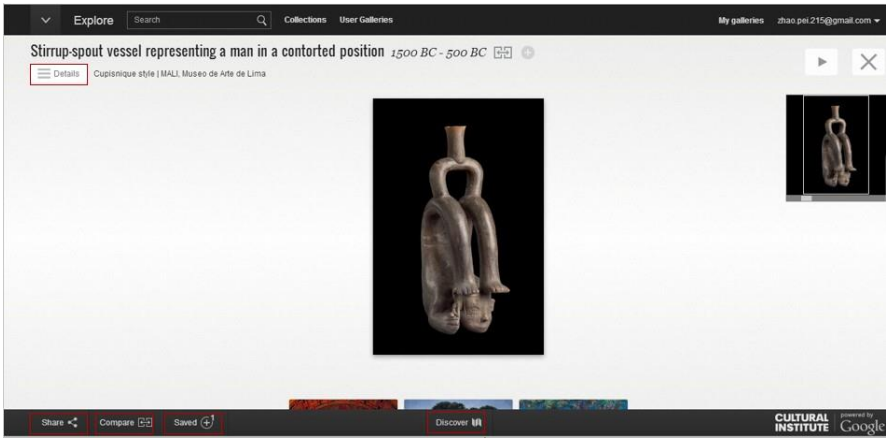
title_full	Tomaatteja
title_fullStr	Tomaatteja
title_full_unstemmed	Tomaatteja
title_short	Tomaatteja
title	Tomaatteja
spellingShingle	Tomaatteja Halonen, Pekka
title_alt	Tomatoes Tomater
title_sort	Tomaatteja
format	0/WorkOfArt/ 1/WorkOfArt/Painting/
institution	ateneum
author	Halonen, Pekka
author2Str	Halonen, Pekka
author-letter	Halonen, Pekka
material	pahvi öljy
measurements	42 x 51 cm
identifier	A II 1090
rights	Pakarinen, Hannu

Picture 5

The pedagogical functions in Google Art Project

As for Google Art Project, it upgraded to the second version in 2013. In the new version, there is a special education component in Google Art Project. Compared to the first version, the education part is more professional and advanced.

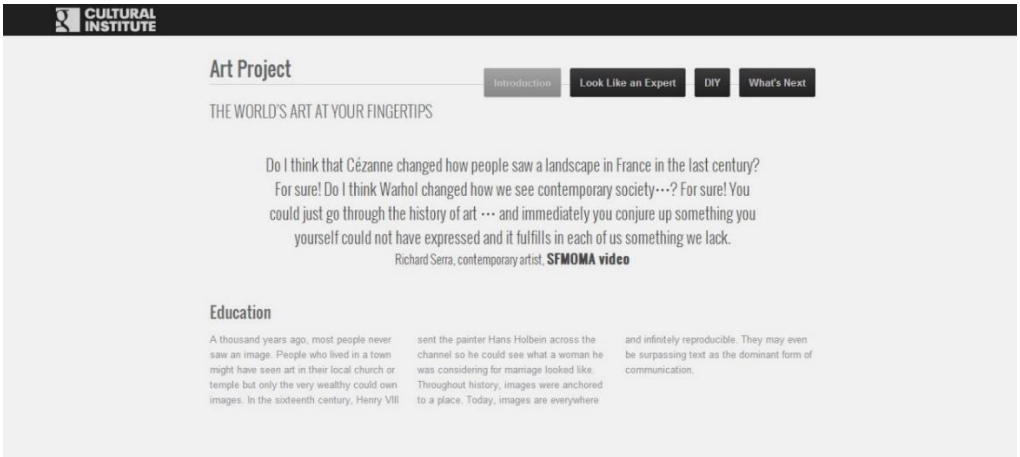
In the first version, the high-solution images and personal virtual museums are the best bright spots in Google Art Project. And, in the first version of Google Art Project, the explanation part of the collection include details of 'collection', 'share', 'compare', 'discovered' and 'saved' in my own gallery. (Five red boxes in the Picture 6)



Picture 6

- Details: description and archive details about the collection;
- Share: Share this collection and your ideas with your e-friends via social media (Facebook, Twitter, and Google +);
- Compare: Compare this collection with other;
- Saved: Save this collection in your own virtual museum;
- Discover: other information related to this collection.

These five pedagogical functions have existed in the Google Art Project since 2011, and meet the needs of basic users. Since 2012, the second version of Google Art Project added an 'Education' part. It helps users to understand how to learn art ('Look Like an Expert'), how to design art ('DIY') and how to learn other information about art online ('What's Next'). See the three black boxes in the top of Picture 7.



Picture 7

Behind the 'Look Like an Expert' button, there are nine steps to appreciate an art. They are 'subject matters', if 'the shoe fits', 'the shape of time', 'toward the ideal', 'reading between the folds', 'how was that made?', 'Signature strokes', 'hidden meanings' and 'the birth of the avant-garde'.

Behind the 'DIY' button, there are nine steps as well. They are 'yougallery', 'rebus', 'remix', 'wildlife photo expedition', 'the lens of now', 'material matter', 'inventing color', 'scavenger hunt', and 'a funny thing happened on the way to the museum'.

Behind the 'What's Next' button, Google Art Project advises users to 'learn art from Khan Academy's Smarthistory', 'Timeline of Art History', 'Artbabble', 'The Artist's Toolkit', and so on.

Results

FINNA and Google Art Project are the case studies in this paper. As a new online museum platform, they provide users a number of ways to communicate information and gain knowledge. In the theoretical study, we have found the pedagogical functions in the online museum platform should promote self-oriented learning, collaborative learning, constructivist methods and offer museum educators and staff a free-choice teaching environment.

FINNA and Google Art Project have both succeeded in building self-oriented and collaborative learning environments. At different stages of development, FINNA and Google Art Project have different pedagogical functions, which are shown below.

FINNA, as a new online interface with the Finnish museum, library and archives, provides a basic but effective means of information communication and knowledge pathway between the collection owners and users. Sharing ideas through social media and leaving messages enhances collaborative learning and also shares what is learned. Besides, sending messages to collection owners is an effective way to communicate information from peer to peer.

High-resolution images are provided in Google Art Project, which also offers users more self-oriented learning opportunities and a collaborative learning platform for users. Users can share their ideas, compare the collection with others, build their own art gallery, and discover other information by themselves. In order to know how to become familiar with these collections, Google Art Project provides an 'Education' part, a teaching environment, to understand the language of art. 'Look Like an Expert', 'DIY', and 'What's Next' tell users how to learn about art generally, and it is not a class that teaches what the information of this art is, but rather serves as a guideline or supporter for users learning about art. Google Art Project is a free-choice environment, and provides a pathway for constructive learning.

Data and methods

A case study can give us a descriptive, exploratory and explanatory analysis of the case. This study aims to investigate the pedagogical functions in the second version of Google Art Project and FINNA. The research questions include:

- What are the pedagogical functions of FINNA and Google Art Project?
- What is the pathway of information communication in the pedagogical functions of FINNA and Google Art Project?
- What is the knowledge pathway in the pedagogical functions of FINNA and Google Art Project?
- How is users' pedagogical thinking supported by FINNA and Google Art Project?

This study analyses the pedagogical function in the online-teaching resource, virtual museum, virtual learning environment, and art and culture-learning community. It concludes by asking what kinds of pedagogical functions are needed. A case study about pedagogical function provides an exploratory result about pedagogical functions in art and culture education with ICTs.

Conclusion

With the coming of modern technology, ICTs have been applied in every aspect of education with significant impact. Arts and culture-heritage education have been speeded up with the arrival of ICTs. However, as a characterizer of art and culture heritage education, its pedagogical function is different. Analysis of the pedagogical function in arts and culture-heritage education in a virtual environment showed that collaborative learning, constructive learning, and personalized learning are the main parts of pedagogical functions in arts and culture-heritage education with ICTs. Information communication and knowledge gain are the main measures of pedagogical functions.

To summarize, studying FINNA and Google Art Project, we found that both of them provide a self-oriented, collaborative, and constructive learning platform. Google Art Project also has a teaching environment, 'Education', to support users in appreciating art and in designing their own arts. High-resolution images are provided in Google Art Project, which allows users to build their own virtual museum based on their favorite collections, which in turn helps users toward self-oriented learning.

Research in the future

In the future, the online museums platform will be more intelligent, as related to the collection in FINNA and discovery in Google Art Project could show a greater range and number of collections to users. Future research will focus on the new ICTs in museum websites to support online learning and informal learning; museums websites and digital museums in global arts education and intercultural education; and teachers' digital and media literacy in the online arts environment.

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Editor's Note: Augmented Reality uses technology to portray the real world in a technological form. It is an interactive learning tool using computers, laptops, smart-phones and tablets.

Augmented Reality

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Abstract

Augmented reality (AR) is a technology that is advancing at a rapid pace, and is being adopted in various applications in order to facilitate for improved learning efficiency. This study will focus on a new approach that is aimed at facilitating for the implementation of AR in an educational context. It will focus on the creation of a Chemistry Augmented Reality Learning System (CARLS). It will make use of a prevailing education curriculum, which will be combined with physical activity. The system focuses on combination of three forms of physical activity comprised of muscle strength, aerobic fitness, as well as flexibility fitness. The sample of 673 students came from five high schools, and they were divided into four groups. The first three groups were subjected to the CARLS learning system; the control group made use of a keyboard and mouse while operating a computer.

Changes in academic achievement were recorded, together with the learning attitudes towards science subjects, which then resulted to the implementation of CARLS. The study reveals that revealed that the students who made use of the three forms of physical activity were able to improve their performance significantly, while compared to those who were using a computer and a keyboard. Significant improvement was noted in the case of those students who made use of the component of science that does not demand for memorization. Additionally, those students the students that were in the AR group that targeted muscle strength activity portrayed a significant positive learning attitude change to science subject compared to those who were in the KMCAI group. A potential benefit in this learning process is that the students also managed to gain improved body fitness while engaging in the learning process.

Keywords: Academic Achievement, Learning Attitude, Information technology, Physical Activity, Augmented Reality

Introduction

Augmented Reality (AR) is a technology whereby the view of the real world is augmented with computer-generated objects. AR is linked to a form of mediated reality where reality is modified with the help of computer systems. Conversely, virtual reality replaces the real world scenario with a simulated reality. Augmented reality lies in between the real world and virtual world (Arthur, 2010). It is tied to specific locations or activities and enhanced by computer-generated objects. AR provides room for digital content to be overlaid in a seamless manner and then mixed into the perceptions that people have of the real world. Various digital assets such as video files, audio, olfactory, tactile and textual information are embedded into 2D and 3D objects, and hence influence people's perception regarding the real world (Rankohi & Waugh, 2012). These augmentations are useful in terms of allowing one to enhance his or her knowledge regarding the events that are unfolding in the surrounding regions. Instead of placing themselves as being out of place, the markups that are adopted in AR allow users to understand the real world better because of the assistance that is provided by the 'added data', and thus making it to seem as a seamless and single environment (Arthur, 2010).

In the past years, science fiction introduced the concept of AR, and in the recent years, many people are treating it as a feature that is linked to our distant future. In the modern times, people

are being noted to rise on the crest that is affiliated with massive technological advancement (Jethro, 2010). As a result, AR is anticipated to become a household term and an everyday part of life that is inseparable. This is because AR has been made possible for consumer devices. The advancing popularity of the popular mobile platform such as the iOS and Android, as well as Flash-based recognition algorithms, have opened the doors and made it possible for masses to access AR (Voogt & Knezek, 2009). The purpose of this paper is to discuss the concept of Augmented Reality, and the manner in which it can be applied into a learning environment.

A number of researchers laid emphasis on the learner-centered models. However, there are those who stipulate that human beings have a wide intelligence range, which they can deploy to various talents or forces to determine capabilities that are treated as intelligence. There are a number of areas that are treated as intelligence forces: the ability to write, read and communicate while making use of language and the capacity to reason and calculate. In addition, there is awareness to shape, color and spatial relations, sensitivity to tone, rhythm and sound, the study of posture, body position, facial expression, and movement in relation to communication. Furthermore, it involves the ability to socialize, corporate, and understand other people, introspective potential to reflect and manage behavior and feelings, and capacity to understand the world and how it works (Dias, 2009).

By considering the state-of-the-art technology of modern times, the dominance of lecture-based models has the potential to be an obstacle to adoption of effective educational systems (Schneider et al., 2011). However, most learning institutions are not adequately prepared to adopt new learning environments. Reasons for this include insufficient funding, a deficit of instructional, design skills, and lack of awareness of appropriate learning materials. In recent years, research that is directed to retrieval of information based on pure e-learning and blended learning have presented various success factors that are linked to technology enhanced learning (Wither, Tsai, & Azuma, 2011). Most of these come from creation and utilization of instructional media, as well as course maintenance based on results. The stability and nature of the content and the affordable maintenance and creation effort are vital tools to facilitate success of those concepts (Dias, 2009).

Augmented Reality (AR) is a field of computer science that is multidisciplinary in nature because it targets fields such as Human-Computer Interaction, 3D Computer graphics and Computer Vision. These handle combination of the real world with data that is generated by computers to create a virtual reality where computer graphic objects are integrated with real-time video footage. AR demands three major processes: combination of real and virtual environments; real-time interactivity; and the registration of 3D objects into real environments (Hsiao, 2010).

Advances have been witnessed in areas pertaining to medical displays, entertainment, sports, commercial applications and information fields. Medical imaging technology serves as an example of AR application. In the past decade, AR was attributed to providing physicians with a growing amount of patient functional and patient-specific data (Schneider et al., 2011). In tis study, AR is proposed as a paradigm with the potential to bring in new forms of visualizations as well as interactive solutions and perspectives. Recent research reveals that AR has the potential to facilitate surgical workflow and ways in which 3D user interfaces can reveal their power, especially in tasks where 2D would lead to the emergence of various problems (Hsiao, 2010).

Until now, AR applications for education have not been widely used. Various researchers have suggested incorporation of interactive media into learning. Computer-based learning systems have the potential to provide an interactive user with various controls to choose and combine images, texts, animations, audio and video in an integrated manner to facilitate effective learning. (Wither, Tsai, & Azuma, 2011). They also stipulate that media integrated with instructional design is a superior tool to meet learning objectives (Wither, Tsai, & Azuma, 2011). Audio, animation and video elements have the potential to offer informative and emotive aspects to

learning. For instance, the "MagicBook" has an interface where readers can enjoy the story while seeing it as a virtual model with the help of augmented reality displays. The interface of the MagicBook uses text and pictures on each page like normal books (Dias, 2009). These pictures are surrounded by thick black borders that serve as marks for the computer vision-based tracking systems.

In 2008, Bastos and Dias introduced a novel approach to facilitate real-time feature tracking as well as rotation. They solved a camera initialization, registration, and tracking problem to facilitate automation of AR procedures (Schneider et al., 2011). This literature review lays emphasis on the way in which Augmented Reality (AR) can be used to facilitate learning by making use of context-aware and mobile technologies that are adopted in smart-phones and tablets. This is because these technologies allow the participants to interact with the digital information that is embedded in the physical environment where they are located (Rankohi & Waugh, 2012).

The major forms of AR that are presently available to educators comprise vision-based and location-aware. Location-aware AR implies a technology that is capable of presenting digital media to those who are engaging in a learning activity as they move along a certain area while carrying with them a smart-phone that is GPS enabled or any other similar mobile device. The media is relayed in the form of 3D models, text, video, audio and graphics, thereby making it possible to augment a physical environment with navigation, narrative or academic information that is relevant to the location being subjected to studies. Conversely vision-based AR implies the representation of digital media to learners when they point the camera of their mobile device at a particular object such as a 2D target or a QR code (Jethro, 2010). An illustration of the two forms of AR is as follows.

Location-aware AR can be presented when a science student who is in 7th grade passes close to an oak tree, and the smart-phone that he uses, and which is embedded with a GPS leveraging software starts to play a video that describes the different kinds of animals and habitats that are situated close to the tree. Vision-based AR is portrayed when a student is prompted to point the video camera of the phone to the base of the tree. This action triggers a 3D model, which illustrates the way in which the oak tree is structured anatomically (Arthur, 2010). The figure below is an illustration of students collecting data and then analyzing it while using their mobile devices.

Source: (Dede, 2010)

As a learning tool, AR has the ability to allow students see the environment that surrounds them in a new way with realistic issues to which students are already connected. The vision-based and location-aware forms of AR make use of the smartphone capabilities such as camera, GPS, tracking and object recognition. These features allow the smartphone to provide students with an immersive learning experience based on the information that they obtain from their physical environment. It provides educators with an effective, transformative and novel tool that allows

them to teach and learn effectively. Immersion refers to the subjective impression whereby one is perceived as participating in a realistic and comprehensive experience (Arthur, 2010). Today, interactive media provides room for various degrees of digital involvement. When a person is provided with a virtual immersive experience that targets design strategies such as combining symbolic, actionable, and sensory factors, one is subjected to greater suspension of disbelief that he is inside a setting that is digitally enhanced. Research reveals that being immersed in a digital environment has the potential to enhance education in not less than three ways (Clark, 2009). These include situated learning, allowing for multiple perspectives and transfer.

Additionally, the two forms of AR have the ability to leverage affordance based on sensitivity. This allows the mobile devices to understand where it is situated in the physical world, and hence present the participant with the information that is relevant to suit the needs of that particular location. The review will mostly focus on the location-aware form of AR that is practiced outdoors in a physical environment. Though vision-based AR shows sufficient potential for educators, there limited studies that are attributed to this form of AR. Research that is carried out on immersive media reveals that vision-based AR has the potential to emerge as a powerful tool. For instance, by making use of the sensory immersive virtual reality medium, Project Science Space was able to contrast the egocentric, as opposed to the exocentric frames that were adopted as points of reference (Dede, 2010). These two concepts differ in that egocentric frame of reference provides room to view space, object or a particular phenomenon from within, while exocentric provides such a view from the outside. These two perspectives were noted to offer differing strengths that were related to learning. This led to the adoption of the 'bicentric' perspective, which has the ability to alternate between exocentric and egocentric, and is, thus, treated as a much powerful tool (Dias, 2009).

AR theoretical foundations

The idea that AR has the potential to offer enhanced learning opportunities is based on two major theoretical frameworks. These comprise of the situated learning theory and the constructivist learning theory.

The situated learning theory stipulates that all forms of learning are based in a specific context that the quality of learning that is realized comes from the interactions that take place among places, people, culture, processes and objects that are within and relative to the specific context. Based on these contexts, learning is treated as being co-constructed, whereby it implies a participatory process whereby all learners get transformed as a result of the relations that they have with their world and the actions that they take. The situated learning theory is built upon and incorporates other learning theories such as the social development theory, and the social learning theory, which imply that the level of learning that one is subjected to depends on the quality of the social interactions that one encounters in the learning process (Dunleavy, 2010).

Situated learning, when it is subjected to immersive interfaces plays a crucial role because of the vital issue related to transfer. Here, transfer refers to the idea of applying knowledge that has been attained from one situation to another, and it is portrayed in case the instructions that are set on a particular learning task contribute to improved performance when a task is being transferred. This is especially the case with respect to the realization of skilled performance in the real-world scenario. Various researchers stipulate various differences that prevail between the two major ways that are adopted with respect to facilitating the measure of transfer. These comprise of appropriated problem solving as well as the preparations that are made to facilitate future learning (Jethro, 2010). The appropriated problem-solving mechanism focuses on the direct applications that are incapable of offering a chance to students that can allow them to utilize the resources available in their environment in an appropriate manner like they would in their real world setting. For instance, standardized tests are the ones that serve as an example in this case

(Rankohi & Waugh, 2012). By providing students with presentational instructions that have the potential to demonstrate standard ways to solve problems, then testing the ability of the students on ways to solve problems comprises of near transfer. This implies applying the knowledge learnt in a particular situation to a related context, but incorporating unique surface features.

In an event where evaluation is based on successes associated with a particular learning process to help prepare for a future learning process, research embarks on measuring transfer. It lays emphasis on lengthy performances whereby the students can be able to learn in an environment that is rich in resources, and then allow them to solve the problems that are related to real-world scenarios (Dede, 2010).

In the case of conventional instruction as well as problem solving, far-transfer is needed in order to provide the students with a mechanism that can allow them to prepare for future learning. This involves the application of knowledge attained to a different context whose fundamental semantics are related, but unique. One of the major criticisms that are directed towards instruction is that presentational instruction generates far-transfer at a low rate. Even those students who manage to excel in their studies find it challenging to apply the concepts that they have learned to a real-world setting (Rankohi & Waugh, 2012).

The potential benefit that is attributed to immersive interfaces that are linked to situated learning is that simulations that they embark on regarding the real-world are problematic, and that students should only attain neat-transfer so that they can prepare themselves adequately for future learning initiatives. For instance, surgical and flight simulators portray near-transfer related to psychomotor skills from simulations that are carried put in a digital environment to the real-world scenario. Therefore, research to which AR can manage to foster transfer to the field is crucial (Rankohi & Waugh, 2012).

The constructivist learning theories assume that an individual is the one who imposes the meaning to a certain situation as opposed to existing independently in the world. Here, people are able to construct new understanding and knowledge based on their beliefs and what they know. Therefore, these are shaped by the prior experiences, developmental level as well as the socio-cultural context and background. Knowledge it set in the context through which it is used, and thus an implication that learning comprises mastering those tasks that are authentic in reality and meaningful settings (Voogt & Knezek, 2009). Learners manage to develop their own unique interpretations regarding reality based on their unique experiences and interactions they have with others. This allows them to create situation specific forms of understanding. Approaches related to instructional design that are linked to constructivist theories are comprised of case-based learning, anchored instruction, cognitive flexibility theory, mind tools, simulations and micro-worlds, collaborative learning, and situated learning in the communities whereby the learning practices are carried out (Jethro, 2010).

Directives can foster learning by providing rich, loosely structured experiences, supervision and guidance that promote meaning making without imposing a permanent set of knowledge and skills. Constructivist learning theory states five circumstances most likely to enhance learning, embed learning with relevant environments, make social learning integral to the learning environment, provide multiple perspectives and multiple models of representation, provide self-directed and active learning prospects and support and facilitate metacognitive strategies within the experience (Dede, 2010).

As a cerebral tool or educational approach, AR aligns well with situated and constructivist learning theory. It positions the learner with a real world physical and social context, while guiding, scaffolding, and facilitating participatory and metacognitive learning processes such as active observation, authentic enquiry, reciprocal teaching, peer coaching and legitimate peripheral participation with multiple nodes of representation (Dede, 2010).

AR learning research experiences and teams

Despite AR gaining popular attention over the past years, relatively few researchers and development teams are actively exploring how mobile, context aware AR could be used to promote K-20 teaching and learning. The majority of the findings presented in this review are from four research groups: the MIT Schaller Teacher Education Program, the Augmented Reality and Interactive storytelling (ARIS) group, the immersive learning group at the Harvard Graduate School of education, and the Radford Outdoor Augmented Reality (ROAR) project at Radford University. The majority of these findings are drawn from these four labs. Nevertheless, European teams are making significant contributions the field and their research is also incorporated in this review (Dias, 2009). These research and development teams have developed and presented substantial data on at least seventeen distinct AR experiences and simulations.

All these AR developments are used some form of design based research approach to the feasibility and practicality of using AR in the K-24 environment for teaching and learning. Design base research is a mixed methods approach that tests and refines educational strategies based on theoretical principles derived from past research. As applied to AR development, this formative research uses an approach of progressive refinement. AR designs that have been informed by learning theory frameworks, as well as video game design principles, are field tested in the real world context with typical users to determine which design elements work well in practice and which elements need to be debugged and retested (Dunleavy, 2010). Thus, iterative research and development process is similar to the rapid retyping methods used in software engineering. Although design-based research is puzzling to conduct, it is the most appropriate approach to determine the design principles that leverage the affordances of this emergent and nascent pedagogical and technological tool, as well as insights about theory and heuristics about practical usage (Rankohi & Waugh, 2012).

K-20 augmented reality

With respect to design-based research approach, the majority of the findings resulting from AR research and evaluation presented in this view pertain to the actual design of the units and how these designs are aligned with both theoretical constructs and unique AR affordances. Although the majority of findings focus on design, the review is started with unique affordances and limitations AR currently presents to tutors, as well as the most frequently reported affordances and learner results found in the literature at this stage in AR's development (Voogt & Knezek, 2009).

Affordances

The most reported affordances attributed to AR comprise the ability to present to a group of learners multiple incomplete, yet complementary perspectives on a problem situated within a physical space. This affordance is a direct result of the one to one device to student ratio provided within most AR learning environments, in which every learner is interacting with a GPS enabled device to participate in the activity. This unique affordance enables tutors to incorporate collaborative pedagogical techniques, experience design approaches such as jigsaw, and differentiated role-play, which led them to enquiry based activities requiring argumentation (Voogt & Knezek, 2009).

By inserting those multiple insights, within a situation and contextualizing them within a problem-based description, AR provides educators with the capacity to leverage prevailing physical space, which then serves as an additional layer of content that students can observe and analyze as well as manipulate. This means that augmentation of the physical environment by making use of the available digital information has the potential to transform the environment so it emerges as a venue characterized by a large number of learning possibilities (Dede, 2010).

The potential to access a variety of outside resources, such as the internet, as well as additional software on the mobile devices in order to address a given problem in an effective manner, serves as another trait that makes it necessary to make use of AR. This is especially the case since most of the devices have the ability to use Wi-Fi or other data services. Moreover, students are able to leverage the wide range of technologies that are availed by handhelds in a manner that is unanticipated, yet in ways that are superior to ways in which the designer anticipated. This is especially the case with respect to the ability to record videos, and thus make it possible to make video notes instead of writing notes (Jethro, 2010).

Lastly, a number of studies reveal that implementation of AR has the potential to motivate students. For instance, research reveals that teachers and students report higher rates of engagement when they use the handheld devices. This is because the devices provide them with an opportunity to adopt roles, solve authentic problems, make inquiry-based narratives, negotiate meanings as well as exercise physically (Dunleavy, 2010).

Limitations

The student cognitive overload serves as the common reported limitation in the prevailing state. A large number of researchers stipulate that many students get overwhelmed based on the large number of activities that they engage in while undertaking scientific inquiries, navigation, or making particular decisions as a team. Managing complexity levels is a crucial instructional issue, and the designers who have experience with AR have embarked on initiatives aimed at bringing down the level of cognitive load (Voogt & Knezek, 2009). They do this by designing an experience structure that is simplified and by boosting complexity as they gain more experience. The experience they gain is scaffolded in an explicit manner based on every step that they go through to achieve the desired learning behavior. This includes limiting the items and characters that students encounter and substituting text with audio that has subtitles (Clark, 2009).

The challenge that is involved with respect to managing and integrating the entire AR experience from both the teachers' and designers' perspective is another limitation to implementation of Augmented Reality (Dias, 2009). For instance, the context of school systems and the efficiency culture driven by standards are not effectively aligned with AR. This leads to inefficiency in inquiry and exploratory based activities. It also leads to more time consumption, makes it difficult to manage as opposed to facilitating instructional presentations that lay emphasis on learning initiatives and thus fail to transfer to a level of test achievement. Such challenges are comparable to the classroom difficulties that teachers encounter while undertaking field trips.

The managerial aspect is also crucial in an organization. During this level of achievement, the integration of AR makes it necessary to incorporate two or three facilitators to ensure that implementation is carried out without technical issues. Moreover, in order for AR to be implemented successfully, it should be dependent on the skills of a teacher to introduce major points related to experience.

Lastly, various limitations are attributed to state-of-the-art in mobile locations that are regarded as being location-aware. Most technical issues that are encountered while implementing AR are the result of errors revolving around GPS. As GPS technology continues to advance as a rapid pace, it puts limitations on the implementation of AR. Though it is possible to overcome cognitive load by facilitating better design, advances in technology have the potential to eliminate prevailing technical challenges, managerial and integration limitations, and obstacles to AR scalability. These can be compared to challenges that classroom teachers encounter, especially during field trips (Dunleavy & Simmons, 2011).

Conclusion

From this paper, Augmented Reality has been fostered by advancements in mobile devices such as smartphones or tablets, as well as transformations that have been made in operating systems such as iOS and Android. A number of advances have been witnessed in areas pertaining to medical displays, entertainment, sports, commercial applications and information technologies. Medical imaging technology serves as an example of AR application. In the past decade, AR was attributed to providing physicians with a growing amount of patient-specific functional data. AR is proposed as a paradigm with potential to bring in new forms of visualizations, interactive solutions and perspectives. Today, the concept of AR has received widespread attention in the learning environment by providing opportunities for both teachers and students to make learning more effective and relevant. However, most learning institutions have not been able to keep up with this technology because of insufficient funding and lack of resources to hire new designers. Over time, with increasing affordability of AR, it is expected that this technology will become widely available and allow people to develop a new perspectives in the way they view the world.

Prospectus template

A large number of researchers reveal that physical activity is crucial for physical and mental health. It is also crucial for learning and cognitive development. Physical activity has been found to correlate with academic performance of students. Recent studies carried out on fourth to eighth grade students reveal that test scores in mathematics and English improved significantly when scores on the fitness tests rose. Additionally, aerobic fitness significantly improved academic achievement in mathematics and reading. However, body mass index (BMI) of students was associated with student performance in a negative manner (Anneta et al., 2012). Therefore, by promoting fitness through providing opportunities attributed to physical education, the academic achievement of the students can improve significantly.

Methodology

The participants of this study were 687 students in the 7th and 8th grades. Their ages were between 13 and 14 years. They came from 22 classes in 5 high schools situated in Northern Taiwan during the spring term in 2009. Half of the participants in the study were male; the rest were female. Valid data that was collected 673 students divided into four groups: Group AR-Jump; Group AR-Stretch; Group AR-Box; and Group KMCAI. Three groups were subjected to the AR learning system. Group AR-Jump (aerobic fitness), Group AR-Stretch (flexibility fitness), and Group AR-Box (muscle strength). Group KMCAI served as the reference or control group and it used a keyboard to operate a computer. Initially, student performance data was only made available to parents and tutors because the Information Protection Act stipulates that personal information belongs to the student.

Instruments

To document student performance in science subjects, pre-test and post-test and pencil, examinations were developed for this study. There were approximately 8 items that pertained to the memorized type and 7 objects that pertained to the non-memorized type. Out of the 15 items, 8 of the items were the same for both pre-test and post-test examinations. However, the remaining 7 items differed, though they were directed to the same difficulty levels. Four subject-matter teachers from the four high schools identified the examination items (Kuei-Fang, 2010).

Additionally, the scale that was used to help in measuring the attitude that the students directed towards the learning of science were revised based on previous studies. Based on a factor analysis, 13 items were selected from the revised scale. A five-point Likert-type scale was used for measuring all items. Measurements ranged from 1 (strongly disagree) to 5 (strongly agree).

With respect to the validity of the content, a pilot study was undertaken to refine the questionnaire. Four subject-matter teachers were invited to offer comments and facilitate revision. The reliability coefficient that was used in the scale was 0.925 (Kuei-Fang, 2010).

From the study, all the teachers who were making use of the AR learning system were given 50 minute training sessions so that they could develop familiarity with CARLS and the ways in which it operates. During the week that students were subjected to training, students were assigned to the 3 AR groups and the control group. They were subjected to a 20 minute pre-test session and 15 minute pre-attitude test regarding the learning of science. Next, students from all groups were given a 50-minute lesson regarding conventional instruction while making use of CIA materials and text books. They were also offered another 50-minute training session where they were supposed to use the four different kinds of approaches in the three weeks that followed. After the students completed the Elements of Compounds unit, all students from the four groups were required to spend approximately 20 minutes for the pre-test and a 15 minute post-test based on their learning initiatives on science subjects. In order to assess the learning retention, the post-test and post attitude tests were applied one week after the students completed all of the AR activities. Therefore, after the four-week intervention among the students, the fifth week was used to facilitate exams and the filling in of the questionnaires (Kuei-Fang, 2010).

In order to minimize incidences associated with teacher and parent resistance and anxiety regarding new AR technology, the schools authorized the four-week intervention to facilitate the use of AR technology, and one week that would be used for exams and questionnaires. Based on the time of intervention in the study, various realistic as well as practical problems were noted when experiment was being initialized. These were as follows: AR was treated as a relatively new concept in most schools in Taiwan, and this led to great resistance and doubts towards the new technology. The study comprised of a large number of students (n=673) who came from 22 classes in five high schools.

In order to bring down the level of uncertainty with respect to the academic results that the students attained, most of the schools refrained from allowing the tests to be carried out on their students on a long-term basis, especially in the case of the exploratory or pioneer study. In order to examine the differences that prevailed among the students based on academic achievement,, both for non-memorized and memorized types, together with the attitude of the students to changes made regarding learning, a series of statistical analyses were carried out among the five groups. The means of the groups differed a great deal in pre-test and post-test, learning attitude and academic achievement. A covariance statistical analysis was performed and a variety of observations and interviews were undertaken in the study (Kuei-Fang, 2010).

Results

While examining the prevailing differences among the students achievement in academics in the case of memorized and non-memorized forms of learning together with the attitude of the students in terms of their learning attitude, the ANCOVA test was incorporated. Tables 1, 2 and 3 portray the estimated marginal means as well as the standard errors for memorized and non-memorized science knowledge, as well as the learning attitude changes towards science based on the four groups. With respect to the non-memorized form of academic achievement, students in the 3 AR groups had means as follows: AR-Jump (3.697); AR-Stretch (3.726); and AR-Box (3.649). These groups had higher average scores compared to the control group KMCAI (3.246). Based on memorized knowledge attributed to science, the mean of the control group KMCAI (4.121) realized higher scores compared to those who were in the AR-Box (3.504), AR-Stretch (3.887) and AR-Jump(3.515) groups. With respect to changes in learning attitudes towards sciences, the students found in the AR-Box group realized the highest score in the relevance scale (mean= 3.432). This is an indication that they have the highest positive learning attitude changes

regarding science subjects. The following table is an illustration of the descriptive data of the non-memorized, memorized science knowledge as well as learning attitude towards changes in science for the four groups (Kuei-Fang, 2010).

Table 1
Non-memorized

	Mean	SE	n
Group AR Jump	3.697	0.114	139
Group AR stretch	3.726	0.113	141
Group AR Box	3.649	0.114	139
Group KMCAI	3.246	0.096	197

The covariates that appear in the model are based on the following value: pre-test= 3.10

Table 2
Memorized

	Mean	SE	n
Group AR Jump	3.504	0.144	139
Group AR stretch	3.887	0.143	141
Group AR Box	3.519	0.144	139
Group KMCAI	4.121	0.121	197

The covariates that appear on the table are evaluated at the following value: pre-test = 3.48

Table 3
Learning Attitude changes

	Mean	SE	n
Group AR Jump	3.391	0.058	97
Group AR stretch	3.277	0.059	93
Group AR Box	3.432	0.06	90
Group KMCAI	3.248	0.048	144

The covariates that appear in the model are evaluated based on the following value: pre-test= 3.11

Discussion

The study employed the AR learning system, CARLS in order to help students to learn about science by putting into consideration the three forms of physical activities. These include aerobic fitness, flexibility fitness as well as muscle strength. Additionally, the level of academic achievement in scienc3e, which comprise both non-memorized and memorized forms of knowledge as well as learning attitudes changes towards science among the four groups have been compared. While compared to the previous research, which stipulated that aerobic fitness is positively related to overall academic achievement that comprises of both mathematics and reading. The findings from this study reveal that those students who combine the three forms of

physical activity in CARLS realized significantly higher scores regarding non-memorized forms of knowledge of science while compared to the control group KMCAI (Kuei-Fang, 2010). These findings rhyme with those found in previous studies, which revealed no negative link existed between the distraction that occurs between physical exercise, as well as the performance of cognitive activities.

Conclusion

The paper reveals a new approach that can increase the physical activity of the students without diminishing the academic performance of the students, since a large number of schools have embarked on initiatives aimed at decreasing physical education programs based on their own reasons. In addition to improved academic performance, the non-memorized knowledge based on science subjects as well as a positive attitude towards learning issues related to science was promoted while using CARLS. Therefore, the study has revealed that CARLS is an appropriate mechanism that one can use in order to improve the academic performance of the students, especially in the case of non-memorized knowledge attributed to science, especially when the students are allowed to engage in fitness exercises while undertaking their studies

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Editor's Note: The global impact of e-learning is changing pedagogy and making learning more widely accessible. Academic institutions have to sort through the research and publications to determine what aspects of distance learning will best serve their needs and develop plans for implementation and teacher training. This is a very detailed study with an extensive bibliography.

The role of e-learning, advantages and disadvantages of its adoption in higher education.

Valentina Arkorful and Nelly Abaidoo
Ghana

Abstract

This study investigates the effectiveness of using e-learning in teaching in tertiary institutions. In institutions of higher education, the issue of utilizing modern information and communication technologies for teaching and learning is very important. This study reviews literature and gives a scholarly background to the study by reviewing some contributions made by various researchers and institutions on the concept of e-learning, particularly its usage in teaching and learning in higher educational institutions. It unveils some views that people and institutions have shared globally on the adoption and integration of e-learning technologies in education through surveys and other observations.

It looks at the meaning or definitions of e-learning as given by different researchers and the role that e-learning plays in higher educational institutions in relation to teaching and learning processes, and the advantages and disadvantages of its adoption and implementation.

Keywords: elearning, information and communication technologies, higher education.

The concept and definition of e-learning

The Internet has become one of the vital ways to make available resources for research and learning for both teachers and students to share and acquire information (Richard and Haya 2009). Technology-based e-learning encompasses the use of the internet and other important technologies to produce materials for learning, teach learners, and also regulate courses in an organization (Fry, 2001). There has been extensive debate about a common definition of the term e-learning. Existing definitions according to Dublin (2003) tend to reveal the specialization and interest of the researchers. E-learning as a concept covers a range of applications, learning methods and processes (Rossi, 2009). It is therefore difficult to find a commonly accepted definition for the term e-learning, and according to Oblinger and Hawkins (2005) and Dublin (2003), there is even no common definition for the term. Holmes and Gardner (2006) also made a comment on these inconsistencies by saying that there may be as many definitions of the term e-learning as there are academic papers on the subject Dublin (2003) in trying to find a common meaning of the term e-learning went on to ask the following questions: Is e-learning an on-line coursework for students at a distance? Does it mean using a virtual learning environment to support the provision of campus-based education? Does it refer to an on-line tool to enrich, extend and enhance collaboration? OR is it a totally on-line learning or part of blended learning? (Dublin, 2005). Some of the definitions of the term e-learning as given by different researchers and institutions are reviewed below.

In some definitions e-Learning encompasses more than just the offering of wholly on-line courses. For instance Oblinger and Hawkins (2005) noted that e-Learning has transformed from a fully-online course to using technology to deliver part or all of a course independent of permanent time and place. Also the European Commission (2001) describes, e-Learning as the use of new multimedia technologies and the Internet to increase learning quality by easing access to facilities

and services as well as distant exchanges and collaboration. The following are also different definitions of e-learning.

E-learning refers to the use of information and communication technologies to enable the access to online learning/teaching resources. In its broadest sense, Abbad et al (2009), defined E-learning to mean any learning that is enabled electronically. They however narrowed this definition down to mean learning that is empowered by the use of digital technologies. This definition is further narrowed by some researchers as any learning that is internet-enabled or web-based (LaRose et al, 1998; Keller and Cernerud, 2002).

According to Maltz et al (2005), the term 'e-learning' is applied in different perspectives, including distributed learning, online-distance learning, as well as hybrid learning. E-learning, according to OECD (2005) is defined as the use of information and communication technologies in diverse processes of education to support and enhance learning in institutions of higher education, and includes the usage of information and communication technology as a complement to traditional classrooms, online learning or mixing the two modes. Also according to Wentling et al (2000) the term e-learning refers to the attainment and use of knowledge that are predominantly facilitated and distributed by electronic means. To them, the e-learning depends on computers and networks, but it is likely it will progress into systems comprising of a variety of channels such as wireless and satellite, and technologies such as cellular phones (Wentling et al., 2000). In their literature review on definitions for e-learning, Liu and Wang (2009) found that the features of e-learning process are chiefly centered on the internet; global sharing and learning resources; information broadcasts and knowledge flow by way of network courses, and lastly flexibility of learning as computer-generated environment for learning is created to overcome issues of distance and time (Liu and Wang, 2009). Gotschall (2000) argues that the concept of e-learning is proposed based on distance learning, thus a transmission of lectures to distant locations by way of video presentations. Liu and Wang (2009) however claims that the progression of communications technologies, particularly the internet, did transform distance learning into e-learning.

Other researchers also defined e-learning as a revolutionary approach (Jennex, 2005; Twigg, 2002) to enable a workforce with the knowledge and skills needed to turn change into benefit (Jennex, 2005). For instance Twigg (2002) described the e-learning approach as centered on the learner as well as its design as involving a system that is interactive, repetitious, self-paced, and customizable. Welsh et al. (2003) also referred to the term as the use of computer network technology, principally through the internet, to provide information and instruction to individuals.

Liaw and Huang (2003) defined e-learning based on the summaries of its characteristics. In the first place, they propose a multimedia environment. Secondly, they incorporate several kinds of information. Thirdly e-learning systems support collaborative communication, whereby users have total control over their own situations of learning. In the fourth place, e-learning support networks for accessing information. And fifth, e-learning allows for the systems to be implemented freely on various kinds of computer operating systems.

According to Tao et al (2006), this new environment for learning that is centered on electronic networks has allowed learners in universities to receive individualized support and also to have learning schedules that is more suitable to them as well as separate from other learners. This facilitates a high interaction and collaboration level between instructors or teachers and peers than traditional environment for learning. E-learning in academics which is characterized by the use of multimedia constructs made the process of learning more active, interesting and enjoyable (Liaw et al, 2007). The main constructs that have made e-learning the most promising educational technology according to Hammer and Champy (2001) and Liaw et al (2007) include service, cost, quality, and speed. It is apparent that e-learning can empower students at higher educational

levels to acquire their education in while at the same time perusing their personal objectives as well as maintaining their own careers, with no need to attend be subjected to rigid schedule (Borstorff and Lowe. 2007). Kartha (2006) in support of this thought reported that the number of courses online has vividly increased as a result of the attained benefits for both learners and universities.

Algahtani (2011) in his evaluation of the effectiveness of the e-learning experience in Saudi Arabia categorized the definitions of e-learning from three different perspectives: the distance learning perspective (Perraton, 2002; Alarifi, 2003; Holmes and Gardner, 2006), the technological perspective (Wentling et al. 2000; Nichols, 2003) and also from the perspective of e-learning as pedagogy (Khan, 2005; Schank, 2000).

It can therefore be concluded from the above that it is difficult to identify a common definition for e-learning. Some of the authors refer to e-learning as providing complete on-line courses only whereas comprise web-supplemented and web-dependent services for the provision of educational and support processes

Types of e-learning

There are diverse ways of classifying the types of e-learning. According to Algahtani (2011), there have been some classifications based on the extent of their engagement in education. Some classifications are also based on the timing of interaction. Algahtani (2011) divided e-learning into two basic types, consisting of computer-based and the internet based e-learning.

According to Algahtani (2011), the computer-based learning comprises the use of a full range of hardware and software generally that are available for the use of Information and Communication Technology and also each component can be used in either of two ways: computer-managed instruction and computer-assisted-learning. In computer assisted- learning, to him, computers are used instead of the traditional methods by providing interactive software as a support tool within the class or as a tool for self-learning outside the class. In the computer-managed-instruction, however, computers are employed for the purpose of storing and retrieving information to aid in the management of education.

The internet-based learning according to Almosa (2001) is a further improvement of the computer-based learning, and it makes the content available on the internet, with the readiness of links to related knowledge sources, for examples e-mail services and references which could be used by learners at any time and place as well as the availability or absence of teachers or instructors (Almosa, 2001). Zeitoun (2008) classified this by the extent of such features use in education, mixed or blended more, assistant mode, and completely online mode. The assistant mode supplements the traditional method as needed. Mixed or blended mode offers a short-term degree for a partly traditional method. The completely online mode, which is the most complete improvement, involves the exclusive use of the network for learning (Zeitoun, 2008).

Algahtani (2011) described the completely online mode as “synchronous” or “asynchronous” by the application of applying optional timing of interaction. The synchronous timing comprises alternate on-line access between teachers or instructors and learners, or between leaners, and the asynchronous, to him allows all participants to post communications to any other participant over the internet (Algahtani, 2011; Almosa and Almubarak, 2005). The synchronous type allows learners to discuss with the instructors and also among themselves via the internet at the same time with the use of tools such as the videoconference and chat rooms. This type according to Almosa and Almubarak (2005) offers the advantage of instantaneous feedback. The asynchronous mode also allows learners to discuss with the instructors or teachers as well as among themselves over the internet at different times. It is therefore not interaction at the same moment but later, with the use of tools such as thread discussion and emails (Almosa and Almubarak, 2005;

Algahtani, 2011), with an advantage that learners are able to learn at a time that suits them whilst a disadvantage is that the learners will not be able to receive instant feedback from instructors as well as their colleague learners (Almosa and Almubarak, 2005).

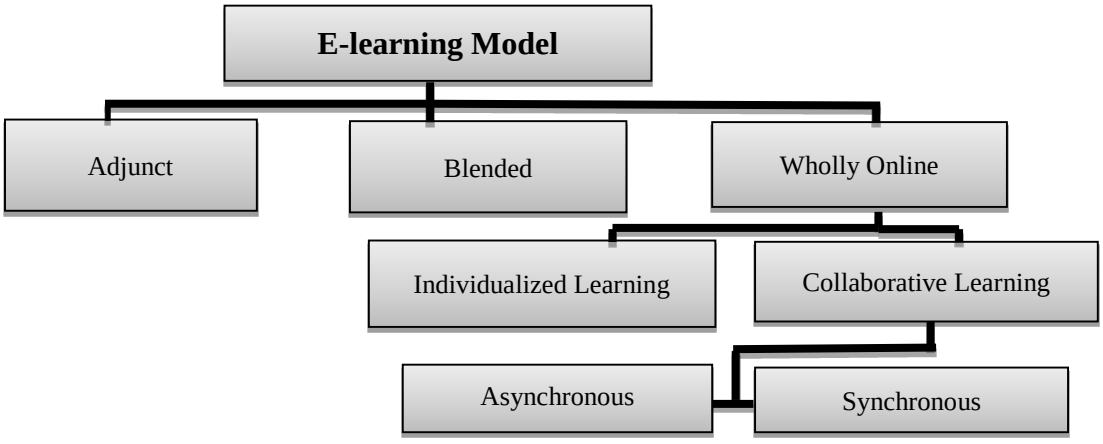
The use of e-learning in education

The development of multimedia and information technologies, as well as the use internet as a new technique of teaching, has made radical changes in the traditional process of teaching (Wang et al. 2007). Development in information technology, According to Yang and Arjomand (1999), has generated more choices for today's education. Agendas of schools and educational institutions have recognized e-Learning as having the prospect to transform people, knowledge, skills and performance (Henry, 2001). Also according to Love and Fry (2006), colleges, universities, and other institutions of higher learning race to advance online course capability in a speedily developing cyber education market. E-learning, has come to be more and more important in institutions of higher education. The introduction and expansion of a range of e-Learning tools has been initiating several changes in higher education institutions, particularly when it comes to their educational delivery and support processes (Dublin, 2003).

Just as there are different types of e- Learning, there are also different ways of employing the technique in education. Algahtani, (2011), in his evaluation of E-learning effectiveness and experience in Saudi Arabia, discovered three distinct models of using e-learning in education including the "adjunct, blended e-Learning and online". The three ways of using e-Learning technologies as discovered by Algahtani (2011) are described below.

The "adjunct e-Learning is the situation which e-Learning is employed as an assistant in the traditional classroom providing relative independence to the learners or students (Algahtani, 2011). In the blended e-Learning, Algahtani (2011) and Zeitoun (2008) explained that, in this way of using e-Learning, the delivery of course materials and explanations is shared between traditional learning method and e-learning method in the classroom setting. The third one which is the online is devoid of the traditional learning participation or classroom participation. In this form of usage, the e-Learning is total so that there is maximum independence of the learners or students (Algahtani, 2011; Zeitoun, 2008). Zeitoun (2008) has gone further to explain that the online model is divided into the individual and collaborative learning, where the collaborative learning also consist of the synchronous and asynchronous learning (Zeitoun, 2008).

A model for using e-learning in education



Adapted from Algahtani (2011)

Advantages and disadvantages of adopting e-learning in higher education

Advantages or benefits of e-learning

The adoption of e-learning in education, especially for higher educational institutions has several benefits, and given its several advantages and benefits, e-learning is considered among the best methods of education. Several studies and authors have provided benefits and advantages derived from the adoption of e-learning technologies into schools (Klein and Ware, 2003; Algahtani, 2011; Hameed et al, 2008; Marc, 2002; Wentling et al. 2000; Nichols, 2003).

Some studies give advantage of e-learning as its ability to focus on the needs of individual learners. For example Marc (2000) in his book review on e-learning strategies for delivering knowledge in digital age noted that one of the advantages of e-learning in education is its focus on the needs of individual learners as an important factor in the process of education (rather than on the instructors' or educational institutions' needs). These are some advantages of adoption of e-learning in education obtained from review of literature:

1. It is flexible when issues of time and place are taken into consideration. Every student has the luxury of choosing the place and time that suits him/her. According to Smedley (2010), the adoption of e-learning provides the institutions as well as their students or learners the much flexibility of time and place of delivery or receipt of according to learning information.
2. E-learning enhances the efficacy of knowledge and qualifications via ease of access to a huge amount of information.
3. It is able to provide opportunities for relations between learners by the use of discussion forums. Through this, e-learning helps eliminate barriers that have the potential of hindering participation including the fear of talking to other learners. E-learning motivates students to interact with other, as well as exchange and respect different point of views. E-learning eases communication and also improves the relationships that sustain learning. Wagner et al (2008) note that e-Learning makes available extra prospects for interactivity between students and teachers during content delivery.
4. E-learning is cost effective in the sense that there is no need for the students or learners to travel. It is also cost effective in the sense that it offers opportunities for learning for maximum number of learners with no need for many buildings.
5. E-learning always takes into consideration the individual learners differences. Some learners, for instance prefer to concentrate on certain parts of the course, while others are prepared to review the entire course.
6. E-learning helps compensate for scarcities of academic staff, including instructors or teachers as well as facilitators, lab technicians etc.
7. The use of e-Learning allows self-pacing. For instance the asynchronous way permits each student to study at his or her own pace and speed whether slow or quick. It therefore increases satisfaction and decreases stress (Codone, 2001; Amer, 2007; Urdan and Weggen, 2000; Algahtani, 2011; Marc, 2002; Klein and Ware, 2003)

The above-mentioned advantages of e-learning were summed up by Holmes and Gardner (2006) by noting that the ability of e-learning to assess the students and their learning as they learn, and at the same time enhance their educational experiences interactivity through collaborative learning, cultural diversity, globalization, and eradicating boundaries of place and time. The most vital characteristic, as well as the advantage of e-learning in education, is that it centers on students or learners (Holmes and Gardner, 2006).

Through e-learning, according to Raba (2005), objectives can be accomplished in the shortest time with least amount of effort. Both learners and instructors are able to accomplish and keep up

with development as they obtain experience provided by numerous specialists in the various fields of knowledge. According to Khan (2005), the impact of e-learning on educational ethics are ensured. This is because environments for e-learning are tolerant, with good ways of offering equal access to information irrespective of the locations of the users, their ages, ethnic origins, and races (Khan, 2005). The environment for e-learning also encourages learners to depend on themselves for the reason that instructors are no longer the solitary source of knowledge. They instead become advisors and guides (Alsalem, 2004). E-learning also aids in preparing society to globally communicate and to dialogue with others (Zeitoun, 2008). However, according to Algahtani (2011), the likely benefits of e-learning are greater than the benefits of traditional learning if e-learning is used and applied in proper ways.

Authors such as Zhang et al (2006) and Judahil et al (2007) observed the positive impacts of e-learning from the perspectives of the students or learners. Zhang et al (2006) stressed that e-learning permits the exploration and flexible learning and reduce the need for travel to go to classes. E-learning, according to Zhang et al (2006), permits learners to watch activities conducted in the classroom via interactive video, and when recorded, to watch and listen to lessons as many times as needed. According to Brown et al (2008) and Judahil et al (2007), this offers teachers several ways of interacting with learners and to give them instantaneous feedback. However, according to Judahil et al (2007), it is essential for those who embrace the advanced technology during the process of teaching and learning to have a variety of skills in Information and Communication Technology (ICT).

Other studies (Singh, 2001; Hemsley, 2002; and Sadler-Smith 2000) suggest other advantages and benefits of e-learning to students. For instance, according to Singh (2001), e-learning systems enable improved communication between and among students and between students and faculty or instructors. Hemsley (2002) noted that full time and part time students can participate in their chosen degree courses from any place or location, offering people who are relocated or travel, an easily accessible resource to experience learning (Hemsley, 2002). Sadler-Smith (2000) and Brown et al (2001) observed that adoption and implementation of e-learning provides disabled people with the chance to further their education from any location.

Disadvantages of e-learning

E-learning, in spite of advantages it has when adopted in education, also has some disadvantages. Studies that identify disadvantages of e-learning include (Collins et al. 1997; Klein and Ware, 2003; Hameed et al, 2008; Almosa, 2002; Akkoyuklu and Soylu, 2006; Lewis, 2000; Scott et al. 1999; Marc, 2002; Dowling et al, 2003; Mayes, 2002). For example, despite claims that e-learning can improve the quality of education, Dowling et al. (2003) argue that making learning materials available online improves learning only for specific forms of collective assessment. Also Mayes (2002) questioned whether e-learning is simply a support device for existing methods of learning. The most frequent condemnation of e-learning is the complete absence of vital personal interactions, not only between learners and instructors, but also among colleague learners (Young, 1997; Burdman, 1998). According to Almosa (2002), regardless of all the disadvantages of e-learning, there are a lot of benefits that inspire its use and encourage search for ways to reduce its disadvantages. Disadvantages of e-learning listed in various studies include:

1. E-learning as a method of education makes the learners undergo contemplation, remoteness, as well as lack of interaction or relation. It therefore requires a very strong motivation and time management skills in order to reduce such effects.
2. With respect to clarifications, explanations, and interpretations, the e-learning method may be less effective that traditional methods of learning. The learning process is much easier face-to-face with instructors or teachers.

3. When it comes to improvement of learner's communication skills, e-learning may have a negative effect. Though learners might have an excellent academic knowledge, they may not possess the needed skills to deliver their acquired knowledge to others.
4. Since tests and assessments in e-learning are frequently supervised by proxy, it may be difficult, if not impossible, to control or regulate activities such as cheating.
5. E-learning may also be subject to piracy, plagiarism, cheating, inadequate selection skills, and inappropriate use of of copy and paste.
6. E-learning may negatively impact socialization skills and limit the role of instructors as directors of the educational process.
7. Not all disciplines can effectively use e-learning in education. For instance, scientific fields that require hands-on practical experiences may be more difficult to study through e-learning. Researchers have argued that e-learning is more appropriate in social science and humanities than the fields such as medical science and engineering where there is the need to develop practical skills.
8. E-learning may also lead to congestion or heavy use of some websites. This may bring about unanticipated costs both in time and money (Collins et al. 1997; Klein and Ware, 2003; Hameed et al, 2008; Almosa, 2002; Akkoyuklu & Soylu, 2006; Lewis, 2000; Scott et al. 1999; Marc, 2002)

General conclusions of the review

E-learning involves the use of digital tools for teaching and learning. It makes use of technological tools to enable learners study anytime and anywhere. It involves training, delivery of knowledge and feedback. It motivates students to interact with each other, exchange and respect different point of views. It eases communication and improves the relationships that sustain learning. Despite some challenges discussed above, the literature has sought to explain the role of e-learning in particular and how e-learning has made a strong impact in teaching and learning. Its adoption in some institutions has increased faculty and learner access to information. A rich environment for collaboration among students can improve academic standards. The overall literature which explains the advantages and disadvantages of e-learning suggests the need for its implementation in higher education for faculty, administrators and students to enjoy the full benefits that come with its adoption and implementation.

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Editor's Note: This is a substantial, well-designed, and carefully implemented study to ensure successful adoption of information and communication technologies into higher education in Saudi Arabia. It focuses on faculty readiness, performance, and training requirements.

Enriching professional practice with digital technologies: faculty performance indicators and training needs in Saudi higher education

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Abstract

The goal of this research is threefold: first, to identify the faculty performance with regard to the use of information and communication technologies (ICTs); second, to investigate factors that may influence faculty performance, including gender, position, teaching experience, Internet and computer experience, and workload; and third, to identify the training needs of faculty based on their actual practice. Thus, a triangulated approach with the use of an online survey questionnaire (n= 188) and follow-up semi-structured interviews (n= 3) was implemented. The participants were instructors affiliated with higher education institutions in Saudi Arabia. The descriptive statistics indicated moderate performances of the faculty in terms of the five performance indicators developed by the ISTE (2008). Further, MANOVA results showed no statistically significant impact of the independent variables on the five performance indicators. Qualitative investigation revealed that there is increasing global pressure to effectively integrate technology in higher education. Therefore, faculty showed high awareness of the importance and usefulness of technology and tended to apply some technology-based pedagogical approaches. However, these seem to be hindered by traditionalism in terms of curriculum and teaching, as well as the high cost of follow-up with technology. Accordingly, relevant implications in terms of policy and practice were proposed.

Keywords: ISTE standards, faculty performance, training needs, ICT, higher education, Saudi Arabia

Research context and background

With the rapid development of information and communication technologies (ICTs), it is difficult for the current educational paradigms to remain unchallenged. ICTs have become "well integrated into the fabric of everyday life" (Robertson & Al-Zahrani, 2012: 1138). As a matter of fact, "ICT innovation may be occurring faster than our understanding of its use in practice" (Muflih & Jawarneh, 2011: 51).

An important sector that ICTs should be effectively integrated in is higher education. The current literature highlights the fact that the use of ICTs in higher education systems has significantly increased (Ajuwon & Rhine, 2008; Keengwe, Kidd & Kyei-Blankson, 2009; Lareki, de Morentin & Amenabar, 2010; Luck & McQuiggan, 2006; Muflih & Jawarneh, 2011). In contrast, "there is general resistance to the adoption and integration of computer tools into instruction" (Keengwe et al., 2009: 23). One possible cause of such a drop back is that "faculty may develop increased apprehension when the pressure to integrate technology within the curriculum encounters a lack of familiarity with technology" (Crews, Brown & Miller, 2009: para. 6). Many faculty who are willing to integrate ICTs into their teaching usually lack knowledge and necessary training on ICTs to fulfill this desire (Muflih & Jawarneh, 2011). Although some faculty members have the potential to be self-learners, others may require formal and systematic guidance and encouragement (Crews et al., 2009). For that reason, "faculty need training and assistance to make the transition from teaching in the traditional face-to-face classroom to teaching online" (Luck & McQuiggan, 2006: 1).

In terms of the take-up rate of technology, the current study context is a mirror image of global trends. In this regard, it can be argued that "ultimately, international competitiveness is likely to impact significantly and possibly irrevocably on Saudi cultural traditions and religion norms" (Onsman, 2011, p. 1). On the other hand, "the main concern for KSA's Higher Education development is to maintain its Arabian base whilst striving to become internationally relevant, the funds are applied in a centrally controlled manner that aims to balance the two ambitions" (Onsman, 2011, p. 1). The philosophy of Saudi higher education seems unable to maintain alignment or harmony between social, cultural identity, and globalization (Al-Issa, 2009, 2010; Krieger, 2007; Onsman, 2011; Robertson & Al-Zahrani, 2012). However, although traditional approaches in pedagogy are still widely accepted and practiced in Saudi Arabia (Al-Issa, 2009, 2010; Krieger, 2007; Robertson & Al-Zahrani, 2012), the hypothesis is that the content and teaching approaches in Saudi higher education in general are not keeping pace with more generic global and societal trends (Krieger, 2007; Onsman, 2011; Robertson & Al-Zahrani, 2012).

To frame the current research, two key concepts were used: performance indicators for faculty members and training needs that are necessary to meet the global demands for teaching and learning in the 21st century.

Performance indicators

Faculty performance contributes to quality education and may promote meaningful teaching and learning in the current era. In the context of Saudi higher education, there is a clear absence of performance standards for either faculty or students. Al-Hattami, Muammar, and Elmahdi (2013) pointed out: "While the Saudi National Qualifications Framework for higher education provided strong measures to assure programs' quality, it stopped short of specifying competency standards for faculty members" (p. 40). In other words, the evaluation process in Saudi higher education is far from satisfactory, "as there are no standards or performance indicators against which to evaluate" (Al-Ghamdi, Al-Gaied & Abu-Rasain, 2012: 85).

Globally, higher education systems devote serious efforts to ensuring the quality of education through the provision of appropriate policies and strategies for teaching and learning in the current century. In this respect, the most relevant key performance indicators for teachers, including faculty and instructors in higher education, were developed by the International Society for Technology in Education (ISTE, 2008). The initial aim of these standards is to encourage teachers to "design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (ISTE, 2008: 1). The ISTE (2008) proposed five main performance indicators. Each indicator has four relevant standards. Table 1 summarizes these performance indicators and their practical standards.

Table 1
ISTE performance indicators and standards for teachers (2008)

Standards	Indicators
Facilitate and inspire student learning and creativity	Promote creative and innovative thinking and inventiveness Engage students in exploring real-world issues Promote student reflection using collaborative tools Model collaborative knowledge construction
Design and develop digital age learning experiences and assessments	Design or adapt relevant learning experiences that incorporate digital tools Develop technology-enriched learning environments Customize learning activities to address students' diverse learning styles Provide students with varied formative and summative assessments

Standards	Indicators
Model digital age work and learning	Demonstrate fluency in technology systems
	Collaborate with others using digital tools
	Communicate relevant information effectively to others
	Model and facilitate effective use of current and emerging digital tools
Promote and model digital citizenship and responsibility	Advocate, model, and teach safe, legal, and ethical use of digital information
	Address the diverse needs of all learners by using learner-centered strategies
	Promote and model digital etiquette and responsible social interactions
	Develop and model cultural understanding and global awareness

Faculty Training Needs on ICTs

Faculty training on ICTs is a modern necessity for quality education in the 21st century. This encourages faculty to keep abreast of the developments in the field of educational technology and enables them to provide a meaningful education for the current digital learners. Lareki et al. (2010) explained: "The introduction of information and communication technologies (ICTs) and the expansion of their use in the educational field have forced the creation of training programs for faculty on the use of ICTs" (p. 492). Such courses should address the faculty's "professional development needs, the format in which their professional development events should be offered, and the incentives that would encourage them to participate in such events" (Luck & McQuiggan, 2006: 1). As such, Keengwe et al. (2009) argued that it is important for the administration to "facilitate an environment that helps faculty to familiarize with technology and its potential uses, and to learn and use technology effectively… Make sure the training is relevant and current, to the needs of the faculty" (p. 27). Similarly, "Faculty training initiatives should be framed as an avenue to empower educators with a wider range of pedagogical options" (Muflih & Jawarneh, 2011: 51).

Although faculty training on the emergent educational ICTs seems critical, many higher education institutions do not seem to perform their tasks and appear to lack this vision. For example, Ajuwon & Rhine (2008) found that the majority of faculty did not receive formal training on ICTs and noted that self-training was their alternative to learn about ICTs. Lareki et al. (2010) reported:

> We observed that a great majority of the consulted faculty are self-taught in the use of new technologies. On many occasions, this autodidactic training has been completed with the collaboration of colleagues when there is a need to use a specific technology. (p. 496)

A number of studies, despite their paucity, have been conducted with regard to the training needs of faculty members and have specifically identified weaknesses in terms of tools and resources that faculty need assistance with. For instance, Luck and McQuiggan (2006) used a survey questionnaire to investigate the professional development needs of faculty involved in online education at Penn State in the United States. The training needs that were identified in terms of online teaching included technical support, instructional design, and access to experienced colleagues with online teaching.

Another study was conducted by Crews et al. (2009) at the University of South Carolina in the United States. This study used an online survey to identify faculty training needs toward implementing ICT tools for instruction. The identified needs were categorized into three groups. The first group was online tools, such as survey tools, e-portfolios, wikis, social networking, and blogs. The second was classroom tools, such as interactive whiteboards, classroom response

systems, and tablet computers. The third was software tools, including Web page design, screen and voice capture, and access to databases.

A third study, which used a survey questionnaire, was conducted by Lareki et al. (2010) to establish guidelines for training opportunities on ICTs at the University of the Basque in Spain. The authors came up with two main modules directed toward teaching skills and research tasks. The teaching skills that need improvement included basic computer skills, such as hardware, software, advanced computer, and Internet-related skills, including the use of Web 2.0 applications and management content systems. The research tasks covered training on the management of bibliographic programs and computer applications for research.

Research problem, aim, scope, and key questions

In the context of Saudi higher education, the measurement of faculty performance with regard to the skills necessary for the 21st century, especially in terms of ICTs, is unsatisfactory, taking into consideration the clear absence of performance standards for faculty (Al-Ghamdi et al., 2012; Al-Hattami et al., 2013), and thus requires further investigation. Further, research on "how best to prepare faculty to teach in an online environment" is limited, hence the need for more studies applying qualitative and quantitative approaches (Luck & McQuiggan, 2006: 1).

Accordingly, the aim of the current study is to determine the ICT training needs of faculty members in Saudi higher education through studying their actual performance by using the teachers' standards developed by the ISTE (2008). The study also aims to identify factors that may impact on faculty practices, such as gender, position, teaching experience, Internet and computer experience, and workload. The key questions in this study are:

1. Do faculty meet the requirement of teaching and learning in the 21st century based on the ISTE Standards for Teachers?
2. This key question has derived the following five sub-questions:
    a. Do faculty facilitate and inspire student learning and creativity?
    b. Do faculty design and develop digital age learning experiences and assessments?
    c. Do faculty model digital age work and learning?
    d. Do faculty promote and model digital citizenship and responsibility?
    e. Do faculty engage in professional growth and leadership?
3. Is there a statistically significant difference in faculty performance based on gender, position, teaching experience, computer and Internet experience, and workload?
4. What are the faculty training needs necessary for teaching and learning in the 21st century?

Methodology

To answer the research questions, a triangulated research approach was implemented by using an online survey questionnaire and semi-structured interviews. Triangulation refers to the use of two or more methods in a study to investigate certain issues (Mertens, 2005). Regarding this, Mertens (2005) stated that "the intent may be to seek a common understanding through triangulating data from multiple methods, or to use multiple lenses simultaneously to achieve alternative perspectives that are not reduced to a single understanding" (p. 293).

Questionnaire design

The survey design included two major sections. The first section aimed at collecting general information about possible factors that may impact faculty performance, including gender,

position, teaching experience, Internet and computer experience, and workload. The second section consisted of the performance indicators scale that was developed based on the standards for teachers published by the ISTE (2008). The scale includes 37 items distributed among five subscales. Each subscale corresponds to a five-point Likert-type response format (5 = Strongly agree to 1 = Strongly disagree).

Interview protocol

In-depth (follow-up) semi-structured interviews were conducted with instructors based on the findings obtained from the survey questionnaires. For the purpose of the current study, a semi-structured interview was determined to be the most appropriate because it provides flexibility, balance, structure, and data of high quality (Gillham, 2005).

Interview participants were selected based on their willingness to participate in the audio-recorded interviews. Probing was one of the main strategies used in the semi-structured interview to encourage participants to reflect on the issue under investigation. Gillham (2005) described "prompts" and "probes" as supplementary questions or "modes of exploration" (p. 24).

Sampling

The strategy used in the study was probability sampling, in which there is a possibility for every member of the population to participate (Mertens, 2005). Because the study context was higher education universities in Saudi Arabia, instructors were contacted through email and social networking tools, such as Twitter, Facebook, and LinkedIn. Instructors who showed willingness to participate were provided with the link to the online survey, which was built by using Google Forms to allow participants to easily access the online survey and to review or edit their responses. This format also provided the participants with more flexibility of time and the choice of tool for recording their responses, such as computers or handheld devices.

More than 200 instructors showed willingness to participate in the current study. After the deadline to fill in the online survey, the responses were checked and saved in an Excel sheet. Then the data were transformed to SPSS format for quality analysis. After excluding questionnaires with incomplete responses, the final number of participants included in the survey was 188.

After the initial analysis of the survey questionnaires, a random sample of three instructors from among those who showed willingness to participate in the follow-up semi-structured interviews were contacted for the actual interviews.

Validity and reliability

The vast majority of the participants speak the Arabic language. Because the ISTE (2008) Standards for Teachers was in English, the survey was first designed in English and then translated into Arabic before distribution. The researcher, whose mother tongue is Arabic, translated the questionnaire from English to Arabic to ensure its accuracy. According to Mertens (2005), "because survey research uses decontextualized words through its very nature, the researcher must be careful to interpret the words in light of the particular cultural circumstances" (p. 185). Hence, three Arabic language specialists and native speakers reviewed the translations in terms of accuracy and clarity to ensure its validity. Further, the survey validity was enhanced through piloting, in which three experts in the field of educational technology and higher education reviewed and edited the questionnaire.

Because the vast majority of the participants speak the Arabic language, which could be a barrier during interviews conducted in English (Mertens, 2005), the participants were given the option to use the language they preferred (Arabic or English). Hence, the data obtained from the participants were first transcribed into Arabic and then carefully reviewed to ensure that the transcription was accurate and no points were missed. To avoid misinterpretation of the interview

results, some participants were contacted to clarify certain points that they had made. Finally, three Arabic native speakers were asked to review the translations to ensure their validity and accuracy.

The reliability of the performance indicators scale was tested by using the Cronbach's alpha coefficient (Pallant, 2007). The reliability statistics indicate high levels of internal consistency. Table 2 shows the Cronbach's alpha scores for the total scale and its subscales.

Table 2
Reliability Statistics (N = 188)

Subscale	No.	Cronbach's alpha
Facilitate and inspire student learning and creativity	9	.92
Design and develop digital age learning experiences and assessments	10	.94
Model digital age work and learning	6	.92
Promote and model digital citizenship and responsibility	6	.91
Engage in professional growth and leadership	6	.91
Total Scale	37	**.98**

Procedure for data analysis

The current study used quantitative and qualitative approaches; thus, different sets of data were generated. For the quantitative data, the SPSS software (version 20) was used to conduct factor analysis, report on issues relevant to the research questions, and test possible relationships between variables (Pallant, 2007).

With regard to the semi-structured interviews, thematic analysis, which "should be seen as a foundational method for qualitative analysis" (Braun & Clarke, 2006: p. 4), was applied. Thematic analysis stresses the recording and examination of themes within a set of qualitative data that are important to understand the phenomenon under investigation. Braun and Clarke's (2006) guide to thematic analysis was followed. This guide consists of six phases, as shown in Table 3.

Table 3
Procedure for Interview Analysis ((Braun & Clarke, 2006)

Phase	Procedure
Becoming familiar with the data	To enhance familiarity with the data: Interviews were first transcribed into Arabic and then reviewed. The Arabic manuscripts were translated into English and then piloted by three Arabic-English professional speakers to enhance the validity of the translation. The English manuscripts were read several times to uncover issues and possible hidden intents.
Generating initial codes	Through reading the interview manuscripts, several codes that were relevant to the study aim, scope, and questions were identified. The codes included words such as performance, perform, teach, use, training, needs, etc.

Phase	Procedure
Searching for themes	The codes identified in the manuscripts were sorted into two main categories: The real practices of faculty members The difficulties that faculty face and associated issues
Reviewing themes	The two themes were reviewed to check the relevance of the codes and the consistency of the ideas included in each theme.
Defining and naming themes	The two themes were named: Performance indicators, and Faculty training needs
Producing the report	A report on each theme was written to present the main ideas and findings.

Factor analysis

Considering that the performance indicators scale was developed specifically for the purpose of the current study, it was important to conduct factor analysis, which is "often used when developing scales and measures, to identify the underlying structure" (Pallant, 2007: 96).

In addition, because the scale items were theoretically distributed into five subscales (ISTE, 2008), it was also important to test the intercorrelations between the items included in each subscale. By using factor analysis, researchers "can refine and reduce these items to form a smaller number of coherent subscales" (Pallant, 2007: 172).

The extraction method used to study the communality values of the scale items was principal component analysis. No items with a communality value lower than 3 were found; therefore, no items were removed (Pallant, 2007). The number of items eligible for analysis was 37.

Because the theoretical approach of the ISTE (2008) included five main themes, the five-factor solution was suggested to match the existing theory. However, the results of this solution indicated that the items were strongly correlated and could be included in one scale. This finding is supported by the scree plot shown in Figure 1.

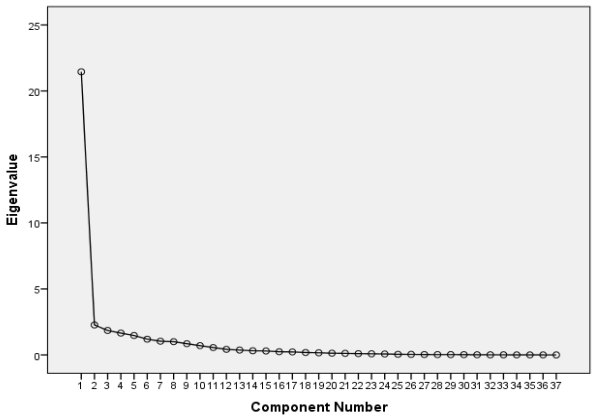

Figure 1: Screen plot for component extraction

On this basis, the current study adopted the theoretical approach of ISTE (2008); reports on each subscale are provided in the following subsections.

Results

Participants' profile and descriptive information

Most of the participants in the survey were male (about 52%, n = 97). Nearly half of the participants were professors (49.5%); the rest were lecturers (36.7%) and teaching assistants (13.8%). With regard to teaching experience, very few of the participants had more than 21 years of experience (3.2%). Most of the instructors (53.2%) had been teaching for about 10 years, and 43.6% had between 11 to 20 years of teaching experience. In terms of computer and Internet experience, the majority of participants were experts (64.9%), whereas others had intermediate experience (30.9%). Finally, most of the instructors reported that they both teach and hold other administrative responsibilities (68.6%), as shown in Table 4.

Table 4
Participants' Descriptive Information (N = 188)

	Group	N	%
Gender	Female	91	48.4
	Male	97	51.6
Position	Teaching assistant	26	13.8
	Lecturer	69	36.7
	Professor	93	49.5
Teaching Experience	Up to 10 years	100	53.2
	From 11 to 20 years	82	43.6
	More than 21 years	6	3.2
Internet Experience	Beginner	8	4.3
	Intermediate	58	30.9
	Expert	122	64.9
Workload	Teaching only	59	31.4
	Teaching with administrative work	129	68.6

Table 5 shows the profiles of and relevant information on the instructors who participated in the semi-structured interviews.

Table 5
Profiles of the Interview Participants (N = 3)

Instructor	Age	Education	Position	Duration	Time
Inst. 1	45	PhD in Arts	Associate Professor	35 min.	11 am
Inst. 2	38	PhD in Education	Assistant Professor	47 min.	1 pm
Inst. 3	42	PhD in Science	Associate Professor	29 min.	7 pm

Performance indicators

Table 6 shows the instructors' performance in terms of each subscale. Most of the instructors' responses were "agree" (i.e., 4). However, the highest scores were obtained in the subscale engage in professional growth and leadership ($M = 4$, $SD = .76$). This was followed by promote

and model digital citizenship and responsibility (M = 3.93, SD = .86) and then by facilitate and inspire student learning and creativity (M = 3.92, SD = .68). Design and develop digital age learning experiences and assessments (M = 3.85, SD = .75) and model digital age work and learning (M = 3.70, SD = .74), respectively, came in last.

Table 6
Performance Indicators

Subscale	*M*	*SD*
Facilitate and inspire student learning and creativity	3.92	.68
Design and develop digital age learning experiences and assessments	3.85	.75
Model digital age work and learning	3.70	.74
Promote and model digital citizenship and responsibility	3.93	.86
Engage in professional growth and leadership	4.00	.76
Total Scale	3.93	.69

Results of multivariate analysis of variance

A one-way between-groups multivariate analysis of variance (MANOVA) was done to investigate the impact of the participants' gender, position, teaching experience, computer and internet experience, and workload, as independent variables, on the performance indicators, including facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, model digital age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership (dependent variables). The MANOVA results showed that the proposed independent variables had no statistically significant impact on the dependent variables.

Issues surrounding faculty performance

The semi-structured interviews revealed five main issues relevant to teaching and learning in the 21st century, as shown in Table 7.

Table 7
Issues Surrounding Faculty Performance

Issue	Examples	Conclusion
The global pressure of technology	Inst. 1: *The world has become a global small village.* Inst. 2: *Our students can be considered as a digital generation. Therefore, technology for the new generation is absolutely significant.* Inst. 3: *The use of technology became a must. The whole world is evolving around technology nowadays.*	There is increasing global pressure to effectively integrate technology in higher education.
Technology awareness	Inst. 1: *Globally, most educational trends are now about technology.* Inst. 2: *Digital technology provides more interaction, flexibility, and richer information. Also, technology may help teach the huge number of students in our education.*	There is high awareness of the importance and usefulness of technology.

Issue	Examples	Conclusion
	Inst. 3: *Technology significantly helps instructors to communicate, deliver information, and facilitate the students' understanding.*	
Cost vs. value	Inst. 1: *The provision of contemporary technology is very expensive.* Inst. 2: *It is difficult to have every single technology available, but I try as much as we can.*	There is awareness of the high cost of technology and the difficulties of keeping pace with its developments.
The use of technology	Inst. 1: *I used to fetch my laptop with me and prepare some PowerPoint presentations. Computer, Internet, and networks are currently the tools of education.* Inst. 2: *I do ask for some technology-based assignments from my students.* Inst. 3: *I require assignments that are Internet-based. They must not be handwritten. Why not use technology or search Google?*	There are signs of technology use in teaching and learning activities.
The prevalence of traditionalism	Inst. 1: *Many faculty members embrace the traditional way of teaching because the curriculum that they teach does not provide any goals or objectives related to the integration of technology.* Inst. 2: *The use of advanced technology is very weak among instructors. Further, the existing curriculum is inappropriate for the technology era.* Inst. 3: *Some instructors continue to teach in a traditional way; they think that the use of technology is an extra effort.*	There is a tendency toward traditionalism. The current curriculum is irrelevant to the digital era.

Faculty training needs

Table 8 presents issues surrounding training opportunities for faculty members.

Table 8
Faculty Training Needs

Issue	Examples	Conclusion
The need for training	Inst. 1: *Instructors must possess the skills that enable them to effectively use technology in their teaching approaches.* Inst. 2: *Many people use technology very well without having professional training.* Inst. 3: *Training courses for both faculty members are very few and lack quality.*	Training on technology is important.
Type of training	Inst. 1: *We need training in terms of using advanced technologies, such as social networking, for educational purposes.* Inst. 2: *Training on certain technologies, such as the interactive white board, is necessary.*	There is a need for training on: Teaching-related hardware and software

	Inst. 3: *Personally, I need training on research-related software, such as SPSS and EndNote.*	Research-related tools
Channels for training	Inst. 1: *The University should provide short-course training, conferences, seminars, and workshops on the use of new technologies.*	A variety of training courses are required, given through:
	Inst. 2: *I usually consult expert colleagues to teach my about the issues that I face when I use technology.*	Group training
		Individual training
	Inst. 3: *I depend on myself. Google has all the answers about technology.*	Self-training

Discussion, conclusions, and implications

The goal of this research was threefold: first, to identify the faculty performance with regard to the use of ICTs based on the standards developed by the ISTE (2008); second, to investigate factors that may influence faculty performance, including gender, position, teaching experience, Internet and computer experience, and workload; and third, to identify the training needs of faculty based on their actual practice. Thus, a triangulated approach with the use of an online survey questionnaire and follow-up semi-structured interviews was implemented. Participation was limited to instructors affiliated in higher education institutions and universities in Saudi Arabia.

The quantitative results generally indicated moderated performances in terms of the standards engage in professional growth and leadership, promote and model digital citizenship and responsibility, facilitate and inspire student learning and creativity, design and develop digital age learning experiences and assessments, and model digital age work and learning. Further, the MANOVA results showed no statistically significant impact of the independent variables (gender, position, teaching experience, computer and internet experience, and workload) on the dependent variables (the five performance indicators).

Qualitative investigation through semi-structured interviews revealed that there is increasing global pressure to effectively integrate technology in Saudi higher education. Therefore, faculty showed high awareness of the importance and usefulness of technology and tended to apply some technology-based pedagogical approaches. However, these seem to be hindered by the existing traditional curriculum, the prevailing traditionalism in teaching and learning, and the high cost of follow-up with contemporary technology.

These results confirm the gap between policy and practice in Saudi higher education, in which there is a clear absence of performance standards on technology for either faculty members or students (Al-Ghamdi et al., 2012; Al-Hattami et al., 2013). The findings also confirm that Saudi higher education is still dominated by traditional approaches to teaching and learning (Al-Issa, 2009, 2010; Krieger, 2007; Onsman, 2011; Robertson & Al-Zahrani, 2012).

With respect to training needs, the semi-structured interviews showed that the faculty believe in the importance of professional training on technology, which may play a critical role in advancing their pedagogical approaches. This result reflects the global trend that stresses the importance of training toward achieving meaningful education in the 21st century (Keengwe et al., 2009; Lareki et al., 2010; Luck & McQuiggan, 2006; Muflih & Jawarneh, 2011).

The results of the current study also revealed that training opportunities in terms of ICTs were insufficient and inadequate. This is in line with the findings of Ajuwon & Rhine (2008), who

reported that the majority of faculty did not receive formal professional training on ICTs and mainly depended on self-learning strategies.

The training needs identified in the present study involved teaching-related hardware and software and research-related tools. Professional training was suggested to be done through group training, individual training, and self-training. Many researchers (e.g., Crews et al., 2009; Lareki et al., 2010; Luck & McQuiggan, 2006) have reported almost the same findings, stressing the importance of providing faculty with necessary training on software and hardware relevant to both teaching and research approaches.

Based on the above discussion, this study restates the need for continued training on the use of ICT for faculty members. Further, the present work suggests that professional training on ICT should be systematically integrated into the faculty work routine and should not be seen as an extra load or as a form of extravagancy. Training on ICT is necessary for the professional development of faculty in the 21st century. Therefore, we propose a model for effective training on ICT, as shown in Figure 2.

Figure 2: Proposed Model for Meaningful Training on ICT

The model shown in Fig. 2 includes four main domains, as follows:

1. Providing logistic support: In this domain, universities and higher education institutions should sustain adequate access to contemporary technology and related tools, hardware, software, and resources. Universities and higher education institutions should also provide sustainable systems for professional support to advance the use of ICT in their systems. Further, faculty use of technology should be facilitated through proper financial incentives and psychological support to raise awareness about the importance and usefulness of ICT in education.
2. Providing needs analysis-based training: If universities and higher education institutions want to provide meaningful training on ICT, faculty members' needs and training preferences should be carefully addressed through needs analysis. This will enable universities and higher education institutions to provide relevant training courses that really meet the needs of faculty and address their individual differences. To achieve this, training courses should be provided according to carefully developed instructional designs, which may help enhance their efficiency.

3. Providing profession-related training: Universities and higher education institutions should provide faculty with the training that is most relevant to their profession. This includes training on hardware and software that are relevant to teaching and research activities. Training on both aspects is critical to the advancement of faculty in both teaching and research.
4. Providing time- and space-appropriate training: Many faculty members may view training as time-consuming and as requiring extra effort. Therefore, it is important to facilitate their training, make it more accessible, and provide it through various channels. Providing face-to-face training through small-group and individual sessions is suggested. Also, training can be given through online courses, which may provide faculty with easier access to the course materials and resources. Online training may also offer faculty with more flexibility in terms of time and space for learning. Moreover, faculty members who are experts in ICT can help by sharing their knowledge and successful experiences with their colleagues.

Research limitations and further directions

One limitation of the present study is that it is based on a relatively small sample from Saudi Arabia. Thus, the results may not be generalizable to other parts of the world. However, the findings may provide insights for future research on faculty professional development and the factors that contribute to the enhancement of 21st century education, especially in developing countries like Saudi Arabia. Further research is necessary to confirm the current research findings with larger samples. More studies with the use of various research methods, including observations, are also needed.

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Editor's Note: Branding enables institutions to differentiate themselves, their products and services, from other institutions. Although common in the business world, it is a new issue for education to attract students, donors, and community support.

Branding in Education

William Callister, Katherine Blevins, Ryan Kier and Isaac Pettway
USA

Abstract

Branding is not a new concept, but it is new to the realm of education. While colleges and universities have already started to pay attention to their brands, it is equally important to consider the effect that brand has on general education institutions and the technology manufacturers that produce products for education. Branding is about more than a logo or an image. It is about the whole of the product and the company, and how individuals connect to it. Those who find themselves in the realm of academia need to understand the role that branding plays in their educational institution, and their own lives.

Keywords: education, technology, branding, college, university, general education, higher education, homeschooling, distance learning, online learning, community

Introduction

Branding is a concept with a significant history. For decades, and maybe centuries, animal husbandry practitioners would mark their animals, often cattle and horses, by burning their brand, or logo, into its flesh. While this may seem cruel, it was critical in establishing ownership of the animal. In modern times, branding has entered the commercial and education world, albeit in a less painful fashion. Companies like Coca-Cola have established a business with a value in the billions of dollars, by creating a brand for itself (Anselmsson & Anders, 2013). They created a solid product, but more than that they developed a brand that the consumer connected to.

The American Marketing Association (2014) defines a brand as a "name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers." However, branding is about more than just a logo or image. Brand comes down to three criteria. The image that customers have of the product or service; the level of positive opinion individuals have of the product; and the value the product or service provides to the company or individual that owns it (Anselmsson & Anders, 2013). It is only in the last decade or so that the idea of branding has begun to creep into the world of education; specifically, in the grade-school categories. Colleges and universities have already been attentive to their brand, as it impacts their ability to attract new students and donors. This has not typically been the challenge for grade-school academia, as attendance is generally mandatory and options are often limited. Branding has also become a point of discussion in academia as more companies are developing technology for the classroom, and competing to get their piece of the market secured.

Defining a Brand

The professionals at *Entrepreneur Magazine* define branding as "the marketing practice of creating a name, symbol or design that identifies and differentiates a product from other products" (Entrepreneur Magazine). As discussed above, this is a very basic understanding of the concept, but one can begin to understand how branding in education and technology will assist in its growth and ability to sustain in a growing market. Education in itself has been around for many millennia, but the rapid growth in modern technology has created some new dynamics in the industry. Apple, Google, Facebook, Amazon and other technological firms offer the ability to

connect like never before. Real time data, feedback, and communications are now available at the click of a button or even a voice command. Learning institutions will need to adapt their traditions and curriculum in order to survive this technological mammoth. Allan Collins and Richard Halverson (2009) point out that these "[n]ew technologies are transforming every aspect of work; reading and interacting with the web; writing memos and sending e-mail; computing with spreadsheets and statistical analysis programs;" (p. 9) and much more. This is true in the world of education as well, and it is creating a competitive market that has not previously existed, especially in the general education category. It is for this reason that branding has become an important issue for educators and administrators.

Creating a brand

In order to create and market a successful brand, an institution will need to find its consumer insight, or focus point. Major companies are successful due to their brand's ability to cater to the various demographics. All aspects are taken into consideration; age, sex, income, culture, and location of the consumer is just as imperative to the success of a brand as the actual product. Coca-Cola has many different flavors and type of beverages that cater to their target customer. While they have a corporate brand, they also have sub-groupings of brands that may cater to different consumer groups. After the customer base has been identified, a platform idea needs to be created. It needs to be a statement that sums up the brand (logo, name, products offered, opportunity, and consumer target). Following the platform idea is "how to attract the consumer", this encompasses various marketing techniques. This is about informing the potential customer about the product in a way that will move them from an informed consumer to an engaged (actually purchasing the product) consumer. This stage of the process employs a principle that the branding industry calls the "Four P's: *product*, *promotion*, *price*, and *people*… [which are] the cornerstone for this step" (Harris, 2014).

Branding in the world of academia

Education technology and branding is still in relative infancy, but the growth of academic applications for technology necessitates new strategies. In order to be successful in education and technology, the school or institution will need to create an effective brand to entice people to enroll in their program. Nita Paden and Roxanne Stell (2006) suggest that universities must ensure "that (a) there is a clear understanding of the university's brand image and the elements contributing to that image; (b) the university ensures that the distance program maintains/improves the image of the university; or (c) the university makes a decision to develop a separate identity/brand for the distance program that will stand on its own merit and not harm the university's image if it malfunctions or fails" (Paden & Stell, 2006, p. 46).

Motivations to brand in education

Branding in education carries a variety of motivations. Robert Williams, Jr., Collins Osei, and Maktoba Omar (2012) offer some important insights into these motivations in their paper on branding efforts in Ghana. They point out that a university's (or any institution) brand can play an important role in several areas. First, a positive brand image can draw in more students and donors. Second, it can be effective in retaining better teaching talent. Finally, it also plays a significant role in the brand image of the country the institution is in. Branding in education is not solely about boosting the financial position of the entity, though that is important. It can also play a critical role in building up the community it operates in, and even in developing a positive impression of the nation on the world market.

Higher Education

As discussed above, branding is often used as a tool to draw in potential customers. In higher education, branding can help build the reputation of an institution and attract potential students. Making connections between educational services and the perception of a school can set one college apart from another and make it more attractive to prospective students (Iqbal, Rasli, & Hassan, 2012). Universities are different from K-12 schools in that students have a choice of which college they would like to attend, so these institutions must compete for students. Higher education institutions provide a service to customers, and schools can utilize brands to advertise to stakeholders. In recent years, the competition for students has increased and colleges are looking for ways to grow student enrollment (Joseph, Mullen, & Spake, 2012). Many universities are now using brands to market their services more strategically to potential students (Pinar, Trapp, Girard, & Boyt, 2010).

Many universities who venture into the task of developing their brand have found significant effects, simply by changing their name. Several universities in West Virginia from 1996 to 2005 rebranded their schools as universities, instead of colleges. Interestingly, many of the schools were already technically universities, but their names did not include university in the title. Most of these schools did not change organizationally, but instead updated their names to reflect their university status. The results of the rebranding in this instance were mixed. Stakeholders, including students and parents, liked the change since it made the school appear more prestigious (Owston, 2009). Alumni, on the other hand, who had a personal connection with the previous school name, did not appreciate the change and in some cases fought to prevent the name change. Also, in the case of West Virginia, re-branding of school names did not have a significant effect on enrollment.

Researchers have suggested that it will take more than name recognition to increase enrollments in universities. According to Mullen and Spake (2012), college brands are becoming more complex and are more closely tied with a university's identity as it relates to athletics, academics, and other opportunities the institution has to offer. In addition, parents and students view different criteria when choosing colleges. Students tend to focus on social aspects of a school such as school culture, while parents are more interested in financial aid and the degree programs that are offered (Joseph, Mullen, & Spake, 2012). Attempting to brand a university can be more complex than a business, because of the variety of its target market. How a college may advertise to the parent of a student may be significantly different than how a college may advertise to a student. The difficulty of creating a brand for a university may be why branding is less prominent in higher education (Pinar, Trapp, Girard, & Boyt, 2010).

To create an effective brand, universities must understand the needs of their market and the factors that play a role in the attributes students consider when choosing a college (Iqbal, Rasli, & Hassan, 2012). Perceptions of educational quality play an important role when students are contemplating which college they want to attend. In order for a brand to influence student decisions, it must include more than a motto or mascot and focus on the quality of education offered to prospective students. As Iqbal, Rasli, and Hassan (2012) state, the perceived quality of services offered by a university is more important than objective quality. This means that students are more interested in the perception of the school as opposed to the actual education they would receive from the school. Supporting the premise that perceptions are more important to students, in their study,

Iqbal, Rasli, and Hassan (2012) also concluded that after perceived quality, prestige of a school was the second biggest influence on student choice of a college.

Many different educational services are offered at universities. With differences in majors, in financial aid, and in athletic programs, one school may have the potential to attract many different types of students. Due to these discrepancies, Trapp, Girard, and Boyt (2010) present a framework for universities to use to effectively brand their schools to increase student enrollment. Based on the assumption that universities are heterogeneous in nature, branding services for colleges is a complex process that must be viewed within a framework that considers the major aspects that attract potential students. Pinar et al. (2010) argue that for branding to be effective, the focus needs to move away from logos, mascots, and mottos and focus on a more systematic approach that will affect student perceptions. Branding a college requires consideration of several aspects of the brand that are interrelated and have an overall effect on the value of the brand. For example, academics, sports, student life, and community all play a part in the student experience and all of those topics must be measured when developing a brand for a school.

Universities have an opportunity to communicate their core values and services to students through branding. Branding has been used effectively in business for many years (Pinar, Trapp, Girard, & Boyt, 2010) and can be used in higher education to attract new students by elevating the university's image. Various branding focal points, including name recognition, student perceptions, and student experiences, are being used by colleges to advertise to prospective students. In the digital age, the options for branding in higher education are considerable.

K-12 schools

Branding is found in perhaps every institution or industry in some form or fashion. Therefore, it only makes sense to take advantage by building a brand strategy for K-12 schools that would contribute to and continue to build upon the overall learning process. Restaurants like McDonalds and Burger King have enjoyed much success with their Golden Arches and the King, respectively. K-12 schools can also build a brand that speaks to the 21st century student living in the digital age.

As with all brands, there has to be a clear cut understanding of what a school is all about, as well as what that school stands for, in order to get everyone to buy into the concept. While concerned with image management, organizations in the public, private and non-profit sector want to control their images to create brand equity and loyalty (Zavattaro, 2013, p. 511). The digital student is a catchy slogan that says the students of this school will learn in a more technological way by using technology tools such as the Internet, wireless devices, Promethean boards, and the like. The digital student will also have an email address, a school social media account, and may even be allowed to bring his or her own device to the classroom.

An academic brand must also have a clear vision that attempts to address the issue of being prepared for the next five years or the next big leap in education technology. To do so requires a great deal of due diligence in researching the latest and greatest tools, such as what Apple, Android and Microsoft offers. There also has to be a great deal of ongoing training for the educator that will use these tools in the classroom. Students today focus their attention to gadgets like these because they are fun, Internet capable, convenient because of the wireless capabilities, and filled with all kinds of applications. With that being said, students are already digitally connected, and educational facilities need to catch up to remain relevant in their lives.

As different companies compete for the best software package for education, the focus is also on whether their product meets or exceeds current and future technological standards. Additionally, parents and educators want to know that necessary steps are taken to ensure the privacy of students. As such, when it comes to protecting privacy, one might consider using legislative efforts to tie privacy promises to trademarks and brands; this approach is called branded privacy (Ohm, 2013, p. 943). Educators are at the forefront of something that is truly great; and that is the opportunity to offer an education to students that is state of the art while at the same time, equipping students with the pertinent tools needed to succeed in the new world of technology. The digital student will be given a package of tech tools and will be allowed to use them in every class in place of the textbook.

Distance learning

As recently as a couple decades ago, the thought of taking classes online was met with great scepticism and the fear of wasting time and money were common reasons for rejecting the prospect of distance education. But as technology has improved and become more mainstream, distance learning has become a significant force in education, which accommodates students throughout the United States and other countries. Students of different cultures can now take classes online with other students, and collaborate with different learning styles, all thanks to the Internet. As with all education formats, the digital student plays a big role in the effectiveness of distance learning.

Public/charter schools

When it comes to the digital student brand, the need to develop a technological educational package is paramount in keeping up with the latest and most effective technology tools. In public and charter schools, the digital student will be able to do lessons from home and access the school library anywhere-anytime, rather than needing to make the journey to the school library and waiting to use the shared computer to do research. If students get sick, coursework can still be completed, even from the doctor's office or hospital. Unlike public schools, charter schools are not governed by the same laws, which allow for more flexibility and manoeuvring in creating a total digital student brand.

Education is about more than simply transferring information, it is about preparing the student for the real world (Rowland, 1966). For this reason distance learning, and technology in general, need to be carefully considered in the brand image of an educational institution. Technology must become a critical component in the education process; this must happen, considering that society "needs and uses technology at [the] pace [seen] today" (Starkweather, 2011, p. 36).

Private homeschooling

Without much being said, private home-schooling is very similar to distance learning. Both occur where the student is located, rather than where the classroom is located. This is a great opportunity for the concept of the digital student brand where resources are unlimited, the availability to technology is right at the fingertips, and mom's cookies are baking in the oven. While technology continues to advance, educators are charged with the task of equipping students with the tools of tomorrow. Best practices of the past definitely have a place in this process but the diligence to find and use more technological means of delivering instruction is paramount.

Technology branding in the education market

Branding, as discussed above, plays a significant role in the academic world of schools. It also is a critical component of the technology manufacturers who seek to position their products in the academic realm. In the past decade or so, companies developing educational technologies have discovered a need for branding. This was often focused more on the overall cost than which piece of technology was better than the other. A quick look at the blog *Edudemic* (Dunn, 2011)

provides some insight into the changes in education technology over the last several decades and centuries. Recent changes in technology have created something of a glut on the market, requiring manufacturers to pay closer attention to their branding and for educators to focus on their specific needs.

Branding for the schools

When marketing a given product, companies must consider the way that the product is perceived by their target market: schools. A decade or two ago, there were few technologies in widespread use in the average school. Often, there were only a couple of companies making these products and the resulting competition was a focus on value and quality. This could be done in the form of statistical analysis and flyers sent to the schools.

Today, there are many companies making very similar products. Within the tablet market alone, educators must choose from Apple, Android, and Microsoft, with a large number of different manufacturers making the Android and Microsoft tablets. With the dramatic range that these devices cover in features and quality, a simple statistical analysis and flyer is not going to be enough. Manufacturers must consider how their product is positioned in front of the school's technology decision-maker. In order to do this, the manufacturer must also understand the dynamics of the schools' technology needs.

Branding for the educators

Educators have a lot to do. Their plates are constantly being piled high with extra helpings of homework to be graded, individualized education plans (IEPs) to be annotated, extra-curricular activities to sponsor, and many more responsibilities. Technology manufacturers must create a brand that meets some of the needs of a teacher. *Jupiter iO* (Jupiter Ed, Inc., 2014) is a good example of this principle. In an ad placed on the *eSchool News* website, they portray a woman in a superhero costume with a comic book style title of "One for All & All In One" and a speech bubble with the teacher saying "I have the POWER to grade with super speed" (Stransbury, 2013). They have created an image for their brand that connects with a teacher's desire for more time, or at least more efficient use of their time. They are seeking to connect to their desired market on a personal level.

Branding for the community

Schools are often most concerned with the benefit/cost analysis of a product, while teachers are often primarily focused on how it will benefit their workload. One other factor that must be considered is the community in which the academic institution operates. In grade-school programs, the community's tax dollars are often a significant portion of the school's budget. It is for this reason that schools need to consider how the community will perceive a technology purchase. Large expenditures for technology may result in negative pushback from the community unless they also perceive value in the product. Branding must take this into consideration in its efforts. The branding efforts can no longer be primarily focused on the administrators of educational programs, but must also consider the image that is portrayed to the potential patrons of the institution. Branding at the general education level builds more than just a connection to the school, it can also develop a sense of pride within the community (Jones, 2014).

Conclusion

Brand is more than just a logo on a product. It is more than the quality of the product. In fact, it is greater than the sum of all of the components: image, strength, impression. A brand's strength, or weakness, is found in the level of connection that the product has with the consumer. An example of this can be found in the rebranding efforts of the Lowes chain of grocery stores. They have sought to do a complete overhaul of their brand. They have reformatted the way their stores look, sought to offer higher quality products, and engaged their customers in novel, and entertaining

ways. Some have described the shopping experience at the new Lowes stores to be similar to going to Disney (Carlock, 2014). This is an example of a retail outlet that is seeking to connect with their customers in an engaging and entertaining way. This will stick with a customer long after they leave, even though the product may be similar or better elsewhere. That personal connection will likely mean more to their continued patronage than anything else.

This reality can be found in the realm of branding at the higher education level. While the quality of the education, value of the cost, and similar factors have always been important, and remain so, there are other factors. Increasingly, students are equally concerned with what student life is like on campus. Education facilities, at every level, must remember that the experiential factors need to be included in branding efforts, as those are likely to be the memories that stick with potential students or donors (Joseph, Mullen, & Spake, 2012). This is equally true with educational technology manufacturers. Quality and value are critical components of the product's brand, but the experience is what most often sticks out in the consumer's memory. It is time for product designers, marketers, and educational institutions to keep this in mind in the process of developing their brand.

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Editor's Note: This study is concerned with successful engagement to enhance learning. It deals with strategies such as: build trust, create a social presence, encourage collaboration, focus on personal contact, and integration of e-learning technologies.

Student engagement, e-connectivity, and creating relationships in the online classroom: emerging themes

Andree Swanson, Bill Davis, Omar Parks, Stan Atkinson, Brenda Forde, and Kunsoo Choi
USA

Abstract

As complex as it is for traditional on ground students to return to school, online adult learners have difficulty in engaging with other students, faculty, and administrators. With an emphasis on anytime, anywhere learning, some students tend to isolate themselves and do not reach out for assistance. As more and more students take online courses, curriculum could be designed with the student in mind when it comes to learning, objectives, and outcomes of the objectives. Considering all the factors of student engagement (points to engage students) is difficult, yet, the researchers engaged in a deep review of peer-reviewed literature on the topic.

Keywords: classroom relationships, online classroom, e-connectivity, student engagement

Introduction

Communicating in the online learning environment is difficult at best. To feel connected to faculty and fellow students is almost impossible. Interpersonal exchanges are "more difficult for online students to engage in the kinds of collaborative peer interactions that often result in the construction of meaning and achievement of learning goals" (Slagter van Tryon & Bishop, 2012, p. 347).

Swanson, Hutkin, Babb and Howell (2010) stated, "online students face challenges with communication and socialization in the asynchronous distance-learning classroom because of a missing face-to-face, nonverbal communications" (p. 1). Swanson et al. (2010) found that students did not feel connected with their faculty. Drs. Parks, Washington, and Swanson looked into this lack of student engagement, e-connectivity, and creating relationships in the online classroom.

Literature review

An in-depth dive into the EBSCOHost, ProQuest databases, and Google Scholar was conducted to identify literature related to e-connectivity or the concept of building relationship and student engagement with students in an online classroom.

Review of online learning

Watson, McIntyre and McArthur (2010) conducted two studies that examined various applications of online learning in both design and context. The results of this study highlighted two areas: 1) "the impact that fostering positive, interpersonal, interdisciplinary", and 2) "transcultural relationships between students and online design education can have upon their levels of trust and the effectiveness and outcomes of their online collaborative assets" (Watson et al., 2010, p. 1).

Encouraging trust through pedagogy.

Lack of face-to-face interaction and the prospect of never having the opportunity can bring anxiety to some students. Disciplinary differences, variance in online learning experience(s) and differences in features of online learning are all "potential barriers" to creating "effective collaborative relationships" in the online environment (Watson et al., 2010). Strong interactive skills and the confidence to take risks are essential factors for "effective" and worthwhile "learning experiences" (Watson et al.).

New students registered for a fully online master's program orientation. Students created individual profiles and visual essays to share themselves with others in the class. Completing the profiles and essays allowed them to open up to one another which increased their sense of intrinsic motivation (Watson et al.).

The visual essays created an initial discussion point and assisted students to identify common interests and goals. This initial task also helped students to practice their technical skills in the learning environment and helped them become comfortable with navigating the platform. Lastly, students had the opportunity to personally connect and create allegiances while building trust (Watson et al.).

If the technology limited communication opportunities, in turn it could wear down opportunities to build trust. The limitation of communication impacted the ability (or lack thereof) to build collaboration through teamwork. Asynchronous learning environments, specifically discussion boards, can serve as a point of connection for students who are located in various places around the world, but also can create unique issues. The lack of "facial expressions and body language" sometimes made it difficult for recipients to accurately interpret messages, especially if a student is involved in a "high-pressure discussion or teamwork situation" (Watson et al., p. 1). A breakdown in trust can also result when students are put in teams that fail to communicate on a regular basis. When this occurs, students within the group cannot accurately gauge other members' commitment to the group (Watson et al.).

Promotion and engagement in collaborative opportunities create situations where students can communicate regularly and provide a foundation to circumvent conflict and increase the chances of building trust among students. Students were given the opportunity to participate in reflective end-of-course evaluations to express their experiences and challenges with learning materials and the learning environment. Providing this opportunity provides both students and researchers with an opportunity to modify the necessary details and include revisions as required.

Encouraging trust

- Strong interactive skills
- Confidence to take risks

Figure 1: Watson, McIntyre and McArthur's review of case study one

This figure identifies the two components identified to encourage trust in the online classroom (Watson et al., 2010).

Online learning in a new blended learning program.

Administrators at a fine arts college introduced a blended learning program that included online learning. Administrators, faculty, and students felt distrust as this effort was designed to reduce costs and not enhance the learning experience. The stakeholders were concerned that the online learning component would lead to isolation. Faculty were concerned about a surge in contact hours with the online element (Watson et al., 2010).

Administrators acknowledged their concerns and focused on the online resources. Moving lectures to an online format could provide several benefits for learners. Students could review the online lectures at their own pace and as many times as they need to retain the information. Foreign students could also benefit from online lectures, especially if English was not their first language. Foreign students could also feel more comfortable asking questions in the online environment (Watson et al.).

Administrators created a blended online community by introducing online galleries that allowed students to upload their work and peer review others. These components were critical for the art and design programs. Students used the platform to periodically upload their work throughout the design process. Administrators successfully managed (controlled) the mistrust issues and apprehension. The researchers acknowledged that mistrust should be addressed appropriately providing the rational for the change, specifically highlighting the pedagogical advantages that the change brings to everyone involved (Watson et al.).

Actively build trust

- Address issue upfront
- Share class information
- Enables learners to bond with one another

Figure 2: Watson, McIntyre and McArthur's review of case study two

This figure identifies the elements of distrust that arose in the online classroom (Watson et al., 2010).

Student retention in distance education

Naidu (2011) addressed the issue of online student retention. Educators need to address the needs of the many instead of the needs of the few, which is a change from decades ago when higher education was a prized achievement of the rich and bright. Many methods to influence positive student retention exist including a process where students can assess their readiness to engage in the rigors of distance education, in synchronous and asynchronous environments, and develop needed computer and research skills before starting a program. Alternative learning strategies were recommended by Naidu (2011), but these were not specified. Social presence can be enhanced by rich discussion threads on topics of interest to the students, team assignments, and web-based synchronous teleconferences. One limitation of technological advancements in distance education is that global students who live in remote areas may have limited access to technology. It was not clear on whether Naidu focused on instructor social presence or student social presence or both.

Create a social presence

- Rich discussion threads improved social presence

Figure 3: Naidu's Findings on Student Retention in the Online Classroom

This figure shows the two areas that Naidu discussed in distance education (Naidu, 2011).

Student engagement in online courses

Robinson and Hullinger (2008) linked student engagement in online courses to the amount of effort students exert in learning synthesizing the material. Using the National Survey of Student Engagement (NSSE) the researchers measured the engagement of 201 undergraduate students from several universities and several different classes. NSSE measured "level of academic challenge, active and collaborative learning, student interaction with faculty members, enriching educational experience, and a supportive campus environment" (p. 102).

Findings were mixed. The levels of academic challenge in the online classroom were gratifying as students reported the amount of effort to be successful in the class was more than they expected. Advantages of online learning included having more time to deliberate on theories and their application, various modes of stimulation with multimedia, and meeting high expectations set by the course and the instructor (Robinson & Hullinger). While many higher level critical thinking and technology skills were enhanced, speaking skills were not improved, which was not a surprise.

Student faculty interaction mostly consisted of faculty feedback on assignments. Technology, according to Robinson and Hullinger (2008), offered several communication tools to stimulate interaction. Discussion on reading assignments and career advice from faculty were lower than expected, however, and thus could be improved.

Active and collaborative learning had positive results with most of the participants indicating peer reviews and working with other students on projects. Most of the students accessed the online library often to complete assignments. This is a measurement of active engagement, according to NSSE (Robinson & Hullinger, 2008).

Part of an enriching educational experience is learning new technology skills, acquiring learning techniques to use in life challenges, and using social interaction to solve problems. The findings showed men more engaged in memorization, quantitative analysis, and technology while the women were more engaged in synthesis, writing, and collaboration with peers. The higher achievers of A and B students were more engaged than those students of lower achievement. The younger students (less than 25 years old) were more socially active in online discussions and had to work harder to complete the class successfully. The older students, by contrast, limited their discussions to assignment completion and used more higher-order critical thinking skills.

While many of the outcomes of this study were positive, challenges and potential for improvement included: more discussions on the class readings and career advice, using technology to enhance speaking skills, requiring more synthesis of course material over memorization, and more online presentations and peer reviews. The NSSE was found to be valid in measuring engagement, and university leaders could use this instrument to gauge the level of student engagement in their online classes.

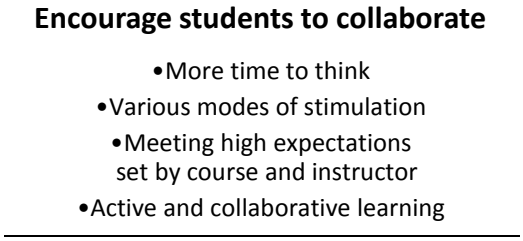

Figure 4: Robinson and Hullinger (2008) review on student engagement in online courses

This figure illustrates the highlights of the Robinson and Hullinger study.

Using community development theory to improve student engagement in online discussion: a case study

Skinner (2009) studied a real-life case where on-line discussion questions, particularly the first introductory question, did not engage students and inspire them to actively participate and become engaged. The study found that a large percentage of students were late in the discussion and did not fully participate. This was due to a lack of motivation. Skinner explored some reasons for lack of motivation and discussed the difference between active and passive participation. Results showed that instructors need to reach each student and make personal

contact. The key is to build questions that truly interest students and entice them. This will in turn motivate students and get them engaged.

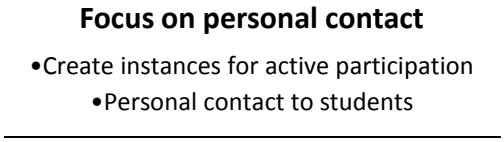

Figure 5: Skinner's (2009) using community development theory to increase student engagement

This figure illustrates the highlights of the Skinner study.

Student engagement in pharmacology courses using online learning tools

Karaksha, Grant, Anoopkumar-Dukie, Nirthanan, and Davey (2013) defined engagement in great length and discussed how the term has emerged. Karaksha et al. (2013) performed a study on the use of various e-tools including animation and what impact this would have on student engagement. In general, students like the added e-tools but did not find the e-tools could replace the traditional lecture information but only supplement it. In the first study, the students did not use the extra e-tools very often. During the second study, the e-tools were promoted through a marketing strategy with reminders and encouragement. The use of the e-tools went up dramatically. The students found the e-tools engaging and said it help to reinforce the material. The study concluded that if e-tools are properly promoted student engagement can increase.

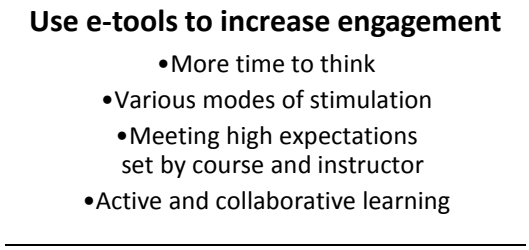

Figure 6: Karaksha, Grant, Anoopkumar-Dukie, Nirthanan, and Davey (2013) Review on student engagement in pharmacology courses using online learning tools

This figure illustrates the highlights of the Karaaksha et al. (2013) study.

Concept of agentic engagement

Reeve and Tseng (2011) original work "proposed the concept of agentic engagement … defined as "students' constructive contribution into the flow of the instruction they receive" (p. 258) as cited in Reeve (2013, p. 579). Reeve's conducted a series of three studies. The first study produced an Agentic Engagement Scale, the second study measures the validity of the scale in the form of associated scores with assessment of agentic engagement, and the third presents evidence that agentically engaged students possess a perchance to produce an impelling, supportive learning environment for one another. Agentic engagement focused on "The role and function of the teacher in supporting the learner's motivation and academic progress" (Ryan & Deci, 2000 as cited in Reeve, 2013, p. 591).

Agentically engaged students work transactionally with the teacher to create learning conditions that can vitalize their otherwise latent inner motivational resources" (e.g., autonomy-supportive teaching) (Ryan & Deci, 2000 as cited in Reeve, 2013, p. 591). In completing the three studies there was an indication that agentically engaged student experiences were more positive than those students who were not agentically engaged. The study provided insight into the connection between student autonomy, the most advantageous learning approaches and the ability to motivate students in a supportive environment.

Consider agentic engagement

•Student autonomy
•Different learning approaches
•Motivate in a supportive manner

Figure 7: Reeve and Tseng (2011) Review on concept of agentic engagement

This figure illustrates the highlights of the Reeve and Tseng (2011) study.

Concluding comments and further research

In this essay, the researchers reviewed literature on student engagement, e-connectivity, and creating relationships. Although there seems to be many studies reported that document specific situations, no validated instrument exists to measure engagement and e-connectivity in the online classroom. The researchers determined that the key to successful engagement is to: 1) build trust, 2) create a social presence, 3) encourage collaboration, and 4) focus on personal contact. Themes that emerged from the literature review are shown below in Figure 8:

Themes of Engagement	
Building trust	Strong interactive skills Confidence to take risks
Actively build trust	Address issue upfront Share class information Enable learners to bond with one another
Create a social presence	Create rich discussion threads improved social presence
Encourage students to collaborate	More time to think Various modes of stimulation Meeting high expectations set by the course and the instructor Active and collaborative learning
Focus on personal contact	Create instances for active participation Personal contact to students
Use e-tools to increase engagement	More time to think Various modes of stimulation Meeting high expectations set by the course and the instructor Active and collaborative learning
Consider agentic engagement	Student autonomy Different learning approaches Motivate in a supportive manner

Figure 8: Themes of engagement

This figure illustrates the themes of engagement that emerged from the researchers' literature review.

Future research could take place in the online educational setting. Researchers can explore a set of underpinning variables used to build trust (for example, creating a social presence, encouraging collaboration, encouraging personal contact). Exploration could also take place to create a validated assessment to evaluate the levels of connectivity in a particular classroom or program.

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Editor's Note: In this study, mandated use of a technology did not backfire, probably because the teachers and students were already familiar with Kindle books and accepted the need and value of this technology.

Kindles in the classroom:
A survey of teachers and their perceptions of a mandated high school Kindle initiative

Erin Margarella and Matthew Ulyesses Blankenship
USA

Abstract

This study presents results from a mixed-methods survey that investigated the effects of a mandated Kindle initiative on teachers at a large suburban high school in West Central Florida. The focus of this study targeted teachers' perceptions of technology as well as their desire to incorporate additional forms of technology into their instruction based on the mandated initiative. Substantive findings demonstrate a positive attitude toward other forms of technology and an increased desire to integrate technology.

Keywords: technology, survey, literacy, e book, professional development, mandated

Introduction

This study presents results from a mixed-methods survey that investigated the effects of a mandated Kindle initiative on teachers at a large suburban high school in West Central Florida. The focus of this study targeted teachers' perceptions of technology as well as their desire to incorporate additional forms of technology into their instruction based on the mandated initiative. Substantive findings demonstrate a positive attitude toward other forms of technology and an increased desire to integrate technology. The purpose is to measure the effects of a mandated Kindle Initiative on teachers at a large suburban high school and their perceptions of technology integration in their classrooms. Specifically, we sought to answer the following questions:

1. Does the implementation of a mandated school-based Kindle Initiative impact teachers' perceptions of additional forms of technology?
2. Does a mandated school-based Kindle Initiative affect teachers' likelihood of integrating additional forms of technology in their classrooms?

Perspectives

Founded within cognitive constructivist theory, the New Literacies perspective (Leu, Kinzer, Coiro, & Cammack, 2004) acknowledges that new literacies are steadily developing and challenges teachers to adjust reading instruction in response to emerging technologies. While the research regarding the effectiveness of e-books is emerging, the potential for advancement and improvement is reassuring. As students become increasingly independent with technology, educators must determine methods for incorporating it in meaningful ways and supporting students throughout personal explorations. E-books may provide an effective method for accomplishing this, but, prior to supporting school-wide technology initiatives, school leaders and educators must first develop methods for ensuring equitable access to learning opportunities.

Accommodating a technologically evolving population is more challenging now than ever before. As Facebook, Twitter, YouTube, iPhones, iPads and other technologies become increasingly popular, so too do the ways in which people communicate and exchange information. Reading, writing, and sharing have evolved into a new, more social and easily accessible, format (Bromley,

2010). Students have access to a wide variety of technologies at their fingertips and are utilizing them to systematically perfect their ability to multitask (Carrier, Cheever, Rosen, Benitez & Chang, 2009; Williams, 2008) diversify learning opportunities, and strengthen their efferent and aesthetic responses (Larson, 2009) to texts. In an effort to accommodate the changing needs of students and the general population, some schools are opting to revamp their curricula and utilize the latest trends including Smartboards, blogs, e-books, portable e-readers, and, in some cases, fully online learning opportunities. In a few instances, this initiative includes replacing all traditional textbooks with new and unique interactive e-books (Fasimpaur, 2004) including the Kindle, Nook, and iPad.

The features afforded by e-book technology, when accessible through the Internet, support literacy development and personalized transactions (Rosenblatt, 1978) and opportunities for increased engagement with a given text (Larson, 2009). E-books (electronic books) support learning through scaffolding, interactive activities, sound, and animation. Rhodes (2007) posits that electronic books will enhance a strong print-based literacy curriculum. Through their use, many students can master skills they would not have otherwise been able to (Rhodes, 2007). Often, e-books can replicate traditional storybooks, but enhance them through the addition of multimedia effects (Shamir & Korat, 2006). Although a reader cannot effectively change the text of a particular passage within an e-book, they can transact (Rosenlbatt, 1978) with it, while utilizing digital tools (Eafleton & Dobler, 2007) and transform the text into something more personally relevant than would be possible with a traditional print text. Pricer (2010) articulates that e-books can utilize "metaphysical elements" (p. 56). Students could, "imagine . . . jumping in the book and running with the dinosaurs or flying with a flock of birds, or . . . actually think [they are] listening to a concert being given by Bach or Beethoven" (Pricer, 2010, p. 56). Learning, as a result, can become more relevant, meaningful, and multidimensional.

Recent studies of e-book reading and response behaviors suggested that e-book reading supports comprehension and strengthens both aesthetic and efferent reader response (Larson, 2008, 2009). These responses can result from the presence of "multimedia, interactive effects, written text, oral reading, oral discourse, music, sound effects, and animations" (Shamir, 2009, p. 82). Although multimodal features (animation, sounds etc.) of interactive e-books may also potentially distract readers as they comprehend and attempt to make sense of the story (Burrel & Trushell, 1997). Reading motivation appears higher after children interact with multimodal texts, especially among children with reading difficulties (Glasgow, 1996).

Methods

In order to accurately gauge the teachers' perceptions of technology and to measure any teacher perceived increase in implementing technology in the classroom after the mandated technology initiative, we set out to construct a survey. The survey was developed through a series of steps to ensure the accuracy and reliability of measure. Survey methodology was used in order to have as little impact on teacher time as possible and the preserve anonymity of teachers responding. This improved the accuracy of the results.

To begin, the primary investigator created a rough set of survey questions following a review of the literature on e-books and technology. These questions were then presented to the research team for comment, review and revision. This primarily took place in a committee format where each question was first reviewed independently and then as a set for content validity.

Following this meeting, each member of the research team reviewed the questions again offering final grammatical and substance suggestions and the primary researcher formulated the final survey. The final survey was uploaded into a commercial survey tool, surveymonkey.com, and sent to the research team for a final review.

Following small changes in formatting for ease of reading and clarity, the primary researcher contacted the Assistant Principal of Kindle High School in order to relay the survey to teachers. The survey was sent to all 95 of the teachers employed at Kindle High School via an email. Participants were informed about the purpose and goals of the research project and informed that anonymity would be protected. Participants self-reported their responses and no identifiable information was collected. Participants were not coerced or compensated in any way.

Data sources

Our population included 119 teachers employed at a large suburban high school in Florida. Known within this study as "Kindle High School," this school is the first of its kind in Florida to replace all traditional textbooks with Kindle e-readers. The 119 teachers represented all content areas, but did not include non-instructional positions such as media specialists, administrators, or guidance counselors. The instructional staff consisted of five first-year teachers, 33 with 1 - 5 years of experience, 33 with 6 - 14 years of experience and 48 with 15 or more years of experience (Kindle High School Improvement Plan). Fifty-three teachers held an advanced degree and four were Nationally Board Certified.

Results

Our survey had a response rate of 21.8% (N=26). Of the respondents, 96.2% (N=25) viewed technology as a priority in the classroom and 88% (N=22) used technology on at least a weekly basis in the classroom. The form of technologies often reported were document cameras, computers and mobile computer labs. With this information, it was not surprising that 100% of respondents (N=25, one respondent skipped this question) felt somewhat comfortable or very comfortable using technology prior to the Kindle Initiative.

Following the mandated Kindle Initiative, 57.7% (N=15) of respondents utilized the Kindle in the classroom on a weekly or daily basis and 70.8% of respondents (N=17, two respondents skipped this question) reported receiving monthly professional development concerning utilization of technology in the classroom. After the mandated Kindle Initiative, 79.2% (N=18) of respondents reported a meaningful effect on his or her desire to incorporate technology in the classroom. Finally, as a direct result of the Kindle Initiative, 79.2% (N=18) of respondents reported they are very or extremely likely to seek out other forms of technology for instructional purposes. These included smartboards, laptops, moodle and online submission websites. With these results, the mandated Kindle Initiative had a meaningful effect on teachers' probability to use other forms of technology for instructional purposes. Many respondents reported an "increase in engagement" among students and one respondent said students have "more energy [and interest] in research."

Conclusions

In today's classrooms, reading instruction, along with the broader notion of literacy instruction, is undergoing a tremendous transformation as new technologies demand new literacy skills (Leu, Kinzer, Coiro, & Cammack, 2004). The International Reading Association (IRA 2009) has emphasized the importance of integrating information and communication technologies into current literacy programs. As devices such as the Kindle become increasingly popular, it seems logical that such technologies should, then, be promoted in content high school classrooms. This study has demonstrated the overwhelmingly positive impact of such an initiative on teachers' perceptions of technology integration in high school content classrooms. Using technology in the classroom is an important aspect of a 21st Century Education. This study measured and analyzed the increased technology use at one Florida High School that implemented a Kindle Initiative for all students and classes.

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