

## INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING IN HIGHER EDUCATION: AN INCONCLUSIVE FINDINGS

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### **Abstract**

*Information and Communication Technology (ICT) has emerged as one of drivers that have significant impacts on organizational changes. Higher education institutions are not exempt from this global trend. The daily lives of faculty, as well as students and staff, are significantly affected by the introduction and dissemination of ICT. However, research findings show mix-results of ICT use in tertiary education. Rather than improve the quality of teaching and learning, the use of ICT in higher education has led to several problems that need to be addressed. This paper provides brief description about those inconsistency findings and discusses several factors that potentially impact the use of ICT in higher education. Further agendas need to be established to minimize the inconsistency impact of ICT use in higher education, in teaching and learning in particular.*

**Keywords:** ICT, teaching, learning, higher education

### **INTRODUCTION**

Information and Communication Technology (ICT) has emerged as one of drivers that have significant impacts on organizational changes (Friga, Bettis & Sullivan 2003; Schoemaker 2008). ICT now has been extending beyond the integration of hardware and software. It involves human resources and managerial activities embedded in the utilization of ICT (Jimba 1999; Ryssel, Ritter & Gemünden 2004; Sandery 1999; Seels & Richey 1994; UNESCO 2003).

Powell and Dent-Micallef (1997) stated that ICT is a catalyst for modernising and improving business performance. ICT also plays an important role in developing effective and efficient information building in businesses and organizations in general (Bhatt et al. 2010; Dhar & Sundararajan 2007). In addition, ICT allows businesses to generate and disseminate information that enable businesses give accurate and creative responses to markets and customer demands. Furthermore, ICT also become enabler for businesses to create value to improve their

competitive advantages (Ali 2004; Bhatt et al. 2010; Powell & Dent-Micallef 1997; Yuhetty 2002).

Higher education institutions are not exempt from this global trend. The daily lives of faculty, as well as students and staff, are significantly affected by the introduction and dissemination of ICT. For instance, communication channels between lecturers and students can be conducted in many ways, at any time. Online resources, including e-journals and e-books, simplify the research processes (Hudson 2010). The management of students, particularly in large classes is modernized through online enrolment, course rosters, and online grade management (Lane 2008). In addition, the use of presentation software such as PowerPoint that is already widely used in lecture classes is completed by the development of Course Web sites, whether stand-alone or as part of a Learning Management System (LMS).

### **INFORMATION AND COMMUNICATION TECHNOLOGY TERMINOLOGY**

Historically, the concept of educational technology underpins the terminology used in information technology. Educational technology includes any tool can be used to help students accomplish specified learning goals (Davies, Sprague & New 2008). Bates and Poole (2003) confirmed that the tools are any means can be used to communicate with learners other than using face-to face. Nowadays, educational technology terminology has shifted to information technology, communication technology, or information and communication technology. In practice, those three terminologies are interchangeably used.

Information and Communication Technology (ICT) is a terms that is now in popular use, generally to describe computer and communications technologies which are designed and used to gather, store, process and display information (Sandery 1999). ICT is an integration of hardware and software which is used in the creation, acquisition, storage, diffusion, retrieval, manipulation and transmission of information (Jimba 1999; Ryssel, Ritter & Gemünden 2004;

UNESCO 2003). ICT includes all equipment and devices of communication network such as, telephone system, television, radio, mobile telephone networks, computers, the Internet, and web-based devices (Shaw 2010). In addition, Seels and Richey (1994) argue that other than the convergence of hardware and software, ICT also includes a range of personnel, resources, and a set of management activities committed to supporting the utilization of abundant capabilities offered by ICT.

#### **ICT USE IN HIGHER EDUCATION INSTITUTIONS**

Initially, the tertiary education mainly use ICT to perform administrative task and data storage including admission, registration, and student's records (Gray, Thomas & Lewis 2010; Mills 2008). The shift from manual and paper-based processes to online and electronic processes in administrative office has given a significant effect to staff in accomplishing their tasks more successfully (Coyné 2010). ICT, including e-mail, cell and desk phones, video, and teleconferencing communications technology help administrative staff to communicate more effectively with students (Young 2012). Moreover, with the popularisation of the Internet, ICT became one of the multiple resources that are widely available for academic staff and students in accessing information (Lowerison et al. 2006). Therefore, management and administrative processes in higher education now take place almost completely online using ICT resources (Mills 2008, p. 21).

The ICT use in educational sector in daily basis has also changed the way educators deliver the courses. The introduction of the World Wide Web (WWW) in 1991 has changed lecturers' role. They are not longer a single source who gives information and knowledge to students (Thomas 2011). Moreover, currently, lecturers are facing students who are grown up in a digital world and have their own styles of learning. The characteristics of this new generation of students are including lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age (Prensky 2001, p. 3). They use media-based languages and prefer to perform several tasks at once (Sánchez et al. 2011). They have their own expectations and understandings of technology as well as life and learning styles (Camp & DeBlois 2007, p.22). They are familiar with Web 2.0 world which prompts them to compare learning experiences with digital games and social

networking sites (Tanner 2011, p. 31). Consequently, students have opportunities to produce information and contribute to the creation of knowledge by searching additional information related to course materials and sharing the information online at any time. Another impact is that learning process is not limited in the classroom with face to face communication. It can be done through many type of learning through ICT, such as computer assisted learning, online learning, distance learning, blended learning or e-learning.

Therefore, educational sector, higher education in particular, is required to adapt to the learning styles of this new generation of students (Hudson 2010). Educators need to redesign teaching strategies that meet this learners' need (Prensky 2001; Oblinger and Oblinger 2005; Bates and Sangra 2011). Re-identifying the nature and form of teaching and learning as well as considering the necessity of innovation in curriculum design and delivery is important for higher education sector (Hamilton, McFarland & Mirchandani 2000). Integrating ICT in higher education curriculum is a key resource to re-design teaching and learning practices that meet current and upcoming requirements (Alavi & Gallupe 2003; Leidner & Jarvenpaa 1995; Seethamraju 2007; Tamim et al. 2011; Zeeshan, Hashmi & Bhatti 2011).

#### **POSITIVE IMPACTS OF ICT INTEGRATION INTO TEACHING AND LEARNING**

Scholars agree that ICT has positive impacts on educational applications. ICT is believed to revolutionize both teaching and learning in higher education (Bates & Sangra 2011; Laurillard 2006; Lowerison et al. 2006). Some scholars stated that ICT, such as computer, Internet and Web-based devices increase the quality of teaching and learning as well as increase sharing and construction of knowledge (Alavi, Wheeler & Valacich 1995; Leidner & Jarvenpaa 1995; Matzen & Edmunds 2007; Renes & Strange 2011). ICT integration into teaching and learning also enhances students' engagement in the learning process (Ashleigh 2005). Additionally, ICT use in teaching and learning provides means to create a learning environment in which learners can be creative, critical, constructive, and become producers of their own perspectives (Nagy & Bigum 2007, p. 81).

Research findings support the argument that ICT is important for teaching and learning practices as it has significant impact to enhance the quality of teaching as well as learning. For example, Campbell (2000) examined the effect of ICT use in

*Business Systems* class on students' interaction and ability to absorb knowledge from learning group. The researcher compared two groups of students from the Griffith University Australia. The first group is students who study at Logan campus which embracing flexible learning and the second group is students who study at the main campus at Nathan which delivered the subject by traditional means. Flexible learning is a teaching method that "generally endeavours to empower the student with greater autonomy and responsibility for his or her own learning" (Campbell 2000, p.352). In the flexible learning, ICT is an important element for learning practices. Campbell found that students from Nathan campus have a higher failure rate than students studying at Logan campus. In addition, students who study at Logan campus have a stronger feeling of friendships and higher motivation than students who study in Nathan campus. Similar result comes from Serva and Fuller (2004) who identified whether two constructs – active learning and effective media use – are important dimensions for positive student learning experience. The researchers conducted a survey involved 727 business students who were asked to assess the effectiveness of media use. The finding shows that the effectiveness of media use can greatly enhance students' learning experiences. Furthermore, Lowerison et al. (2006) found that the use of computer-mediated learning in postsecondary courses improves student engagement in class, and it also enhances instructors' access to learners' feedback. The finding supported Alavi and Gallupe's (2003) study which revealed that students are more engaged in learning activities because of less physical boundaries of the classroom and ease of access to the learning content and resources.

Literature also notes that ICT integration into higher education curricula prompts educators to provide learning environments in which they can develop students' soft skills required by business world (Bennis & O'Toole 2005; Chia & Holt 2008; Hay & Hodgkinson 2008; Mintzberg 2004; Pfeffer & Fong 2004; Schoemaker 2008). The deployment of ICT in teaching and learning enhances students' competence on team work and problem solving (Baldwin 1998). Furthermore, ICT significantly influences to the development of students' skills and competencies needed in business practices, such as communication, information handling, team work and problem solving (Alexopoulos & Lynn 2010; Baldwin 1998; Bates & Sangra 2011; Kooti 2011).

The positive impact of CT integration into teaching and learning practices is supported by two meta-analysis studies (Matthews 2012; Tamim et al. 2011). A second-order meta-analysis study (Tamim et al. 2011), a synthesis of 1,055 studies, proves the significant and positive influences of ICT integration into teaching and learning on student achievement. Another meta-analysis study conducted by The US Department of Education also confirms that students who learn through online environment have higher performance than those who learn through classical technique (Matthews 2012).

It can be concluded that ICT such as, computers, the Internet, and other web-based devices, are not only tools that serve and deliver the knowledge, but also become learning environments that prompt lecturers to design more active-learning methodologies (Yusuf 2012).

#### **INCONSISTENCY OUTCOME OF ICT USE IN BUSINESS EDUCATION**

Despite the significant role of ICT in enhancing teaching and learning quality, the findings from previous studies show inconsistent results (Hu & Hui 2012; Noguera & Watson 2004; Redmann & Kotlik 2004; Serva & Fuller 2004). Instead of improving the teaching and learning processes, the integration of ICT led to some problems.

Noguera and Watson's (2004) study found that ICT integration in teaching and learning had no significant impact on student achievement and satisfaction. The finding is supported by other research (Redmann & Kotlik 2004; Serva & Fuller 2004) which found that the use of ICT in business schools has low impact on learning effectiveness. Moreover, Hu and Hui (2012) emphasized that technology-mediated learning has no significant effect on learning effectiveness and satisfaction. Hu and Hui (2012) asserted that there is no evidence that ICT use in teaching will give better results for learning effectiveness than face-to-face method. In a recent study, Romeo, Lyoyd and Downes (2012) emphasized that ICT integration into learning practices has not given the significant impact to learning effectiveness as expected. Moreover, a study of Redmann and Kortlik (2004) found that lecturers still faced problem to integrate ICT in teaching and learning because they were not using the Internet for instructional purposes. The finding from Redmann and Kortlik's study is confirmed by Serva and Fuller (2004) who found that business educators infrequently used ICT properly to enhance the quality of teaching and learning.

The inconsistent research findings of ICT use in higher education indicate that an investment in ICT in undergraduate and graduate courses has not been equivalent in the actual use of ICT (Serva & Fuller 2004). Lecturers seem oblivious to the need of addressing successful implementation of using ICT to enhance the design and delivery of curricula. For this reason, Hawawini (2005) suggested that it is necessary to understand how educators in the higher education sector use ICT effectively in teaching and learning to enhance the design and delivery of the business curriculum.

#### **POTENTIAL PROBLEMS**

Literature shows that ICT enhances the quality of teaching and learning. However, higher education institutions have to be aware that there are problems need to be addressed. Some studies demonstrate that academics staffs in the higher education institutions are experiencing anxieties in integrating ICT into their daily lives (McPherson & Nunes 2008; Redmann & Kotrlík 2004). Lecturers also still have problems working with computers because they are computer illiterate (Pannen, Riyanti & Pramuki 2007) or lack skills to embrace ICT development (Conole 2007; Pannen 2003). Serva and Fuller (2004) found that ICT are seldom used properly by higher education educators to enhance the quality of teaching and learning at the undergraduate level. Their usage of ICT is limited only for preparing materials and recording student data base.

#### **FACTORS INFLUENCING THE ICT USE IN HIGHER EDUCATION**

Bingimlas (2009) and Ertmer (1999) argued that identifying the barriers of ICT use would help academic institutions to improve the use of ICT enhance the quality of teaching and learning. "Barrier" is defined as any situation that makes any progress or achievement is difficult to be obtained (WordNet 1997). Barriers of ICT use in teaching and learning in higher education can be classified into two groups of barriers. They are barriers related to people and barriers related to system/institution. Barriers related to people include any condition perceived or performed by educators, staff, and students. For examples, perceived of usefulness, perceive of ease of use of ICT; unwillingness to use ICT; lack of ICT skills; and insufficient time to plan and to use ICT (BECTA 2004; Bingimlas 2009; Davis 1989; Mumtaz 2000). System/institution barriers involve inadequate technical and administrative support; inappropriate teacher training; lack of access to

resources; and lack of incentives for integrating ICT in teaching. Other factors belong to institution/system barriers are organizational structure, organizational culture, and leadership.

#### **Factors Related to People**

Prior research revealed that educators' perception of ICT use has become a central factor that influences the effective use of ICT in teaching and learning (Cheng 2011; Igbaria, M. 1994; Igbaria, Magid, Guimaraes & Davis 1995; Igbaria, M. & Tan 1997; Van Raaij & Schepers 2008). A perception about e-learning system as an enjoyable method in teaching increases teachers' willingness to accept and use the ICT in the teaching (Cheng 2011). On the other hand, a negative perception on the ability of ICT tools obstructs the integration of ICT into teaching and learning (Brinkerhoff 2006). BECTA (2004) reported that "no benefit of technology use" perceived by teachers prevent them to integrate ICT in the teaching practices. Other factors related to people are an adequate level of competence to use ICT (Drent & Meelissen 2008) and willingness to use ICT (BECTA 2004; Birch & Sankey 2008; Mumtaz 2000; Weston 2005).

#### **Factors related to Institutional/System**

Literature also shows that several institution or system factors might hinder or support the use of ICT in teaching and learning (Ali 2004; Balanskat, Blamire & Kefala 2006; BECTA 2004). For examples, reward strategy and training in solving technical problems (Mumtaz 2000), an access to resources, the quality of ICT infrastructure, quality of hardware, and the availability of internet facilities (BECTA 2004; Bingimlas 2009). There are also factors that come from institution such as, organizational structure, organizational culture and leadership which have influence to the ICT use in teaching and learning in higher education level (Mumtaz 2000).

#### **CONCLUSION AND RECOMMENDATION**

A rapid transformation in information and communication technology (ICT) is having a significant impact on every sphere of life, including higher education sector. However, research findings show inconclusive results. There are several potential factors which might hinder or support the ICT integration into teaching and learning.

At least two issues that need to be addressed for future agenda. First, scholar and academics practitioners need to build mutual relationship in examining factors that potentially hinder the use of ICT in teaching and learning. This agenda is necessary to improve the way educators use ICT in their teaching activities. Second, scholars need to

analysis the effective use of ICT in teaching and learning in higher education sector. Measuring the effectiveness of ICT is important to ensure the beneficial impact of ICT.

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