Deployment of Information Communication and Technology in Higher Education Learning Environment of Emerging Nigerian Economy

2 authors:

Titus Olaniyi
Glasgow Caledonian University
4 PUBLICATIONS **0** CITATIONS

SEE PROFILE

Ojo Ademola
Dominican University, Ibadan, Nigeria
30 PUBLICATIONS **65** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Addressing the complex dynamics of Small Hydro Power (SHP) in the Global South: Focusing on Nigeria View project

STUDENTS' ENROLMENT INTO TERTIARY INSTITUTIONS IN NIGERIA: THE INFLUENCE OF THE FOUNDER'S REPUTATION – A CASE STUDY View project

Deployment of Information Communication and Technology in Higher Education Learning Environment of Emerging Nigerian Economy

[1]T.K. Olaniyi1 & [2]E.O. Ademola
[1]Reader in Engineering / Director, ABUAD Integrated Services
[2]Professor of Computer Science / Head of Department of Computer Sciences Programmes
Afe Babalola University Ado-Ekiti (ABUAD)
Ado Ekiti, Nigeria

[1]Corresponding author

ABSTRACT
This paper describes the rationale for the deployment of Information, Communication and Technology (ICT) in learning environment of Higher Education (HE) institutions with a specific focus on the emerging Nigerian Developing Economy (DE). Productive integration of ICT depends on the way it is deployed and positioned. Many HE institutions in the DE has invested heavily in the use of ICT for teaching and learning, however, its impact has been minimal hence the need for redress. ICT facilitates and improve students' knowledge and promote positive attitude to learning. Academic planners need to provide proactive support in the usage of ICT and E-learning. Significantly, If DE students are to compete with their counterparts in the developed world, effort must be made to develop their ICT abilities. Sadly, many HE institutions in DE have invested in the use of ICT but its benefits are not fully manifested. Choosing a teaching and learning method is not a passive process; stakeholders are expected to provide additional ICT skills given the complex dynamics of the job market and the increasing needs for multi-tasking workforce. This article contributes significantly to knowledge by identifying in coherent manner the various methodological approaches, personal development and supportive learning environment that are mandatory for sustaining HE development in the DE.

Keywords- Information, Communication, Technology, Higher Education, Learning, Environment, Nigeria and Economy.

1. INTRODUCTION

The development, integration and substance of information and communication technologies (ICT) has reshaped the teaching and learning processes in higher education (HE) [1] despite its low uptake [2] in the Developing Economy (DE). Leveraging on global technology improvement, the use of ICT in HE of DE is ever more critical. Increasing numbers of global HE institutions have adopted ICT for teaching, curriculum development, staff development, and as aid to students learning [3]. Although ICT has the potential to improve educational methods and the quality of teaching and learning, the advantages of ICT are often under-realised [4] and more prevalent in the DE (i.e. Nigeria).

It was argued that ICT adoptions are often poorly implemented as a result of unfounded optimism [5]. Regrettably, significant numbers of academia are still reluctant to adopt technology for teaching and curriculum development. It was stated that serious obstacles in integrating ICT in teaching and learning processes are prevalent and that there are no holistic solutions to the predicaments [6]. [7]

The rate of adoption is affected by economic, sociological, organisational, and psychological issues [7]. It was later positioned an inter-cultural study and noted that there were substantial variations in respect of barriers to ICT deployment in differing economies [8]. Given the foregoing, a problem statement is articulated in this article that includes poor adoption of ICT in Nigeria HE sector despite the huge investment. Further, this article commented on the inappropriate teaching and learning methods that has significantly affected the fruition of ICT deployment in the education sector. This paper describes the rationale for deployment of ICT in learning environment of HE institutions with a specific focus in DE. It narrated the rationale for clear understanding and deployment of proactive teaching and learning methods that effectively sustain ICT in teaching and learning environment. It synthesises the rationale for appropriate use of ICT in enhancing teaching and learning in HE and argued for supportive learning environment that proactively engaged teachers and learners in a sustainable manner. It concludes by identifying the crucial ingredients of quality teaching and learning using ICT.

2. LITERATURE REVIEW OF SUSTAINABLE DEPLOYMENT OF ICT IN HIGHER EDUCATION

It has been described an activity theory when studying an integrative ICT from socio-cultural and pedagogical perspectives [9]. It was argued that such understanding is critical to education research where the object of its inquiry is not just knowledge, but 'useable knowledge'. It has been argued that no tool is good or bad in itself; its effectiveness depends on configuration of the events, activities and contents in addition to the interpersonal processes of the usage context [10]. As ICT enters the socio-cultural setting of education environment, learning can be translated into many ways than earlier thought [11]. It was argued in [12] that for both digital (word-processing package, computer simulation etc) and non-digital (hand writing, hands-on laboratory etc) tools in ensuring resourceful learners in a learning environment.

It was examined in [13] the integration of ICT and students in enhancing thinking and autonomous learning using observations, focus group and face-to-face interviews. The authors conceded that time constraints, limited knowledge and experience of the teachers working environment as proposal hindrances. Such findings are generically peculiar to those of the DE. Electronic Business Systems (EBS) is playing crucial roles in the global business enterprise and hence the need for resource re-direction into critical business areas to keep up with economic and market trends [14]. EBS framework for seamless integration of internal processes, suppliers and customers includes Supply Chain Management (SCM), Enterprise Resource Planning (ERP), and Enterprise Application Integration (EAI). It is dishearten to note that competent EBS professionals are hard to come by and hence the need for enhanced training in ICT's; e-marketing; e-business programming; and specialist networking to bridge the ever widening gaps between industry and academia in the DE.

Multimedia techniques are fostering scientific understanding by presenting students with multilevel scientific thoughts. It has been positioned the performance of university students studying sciences using ICT by analysing the students' characteristics and achievements [15]. It was concluded that the ICT applications in multimedia environment facilitate required basic scientific-knowledge and improved performance while promoting positive attitude towards learning. Various authors in [16] investigated the perceived barriers to adopting ICT in Omani tertiary DE institution and suggested lack of institutional support, disbelief of ICT benefits, lack of confidence, and lack of time as inherent barriers - group differences based on gender, academic rank, and academic field were generally not found to pose a significant barriers. Undoubtedly, academics in DE are expected to perceive at least moderate degrees of barriers in applying ICT to their teaching practices, it is however paramount to provide improved institutional support, training, and allowing time for academics to learn and upgrade their ICT knowledge and skills in the deployment of ICT in the HE of DE.

In the work of [17], a description of an exploratory study of ICT deployment in Greece was conducted. The author argued that teacher expectations were positively associated with students' ability and perceptions to learning. The study does not support the notion that boys have more positive ICT self-efficacy and value beliefs than girls but boys' and girls' beliefs are differentially affected by parents, teachers, and ICT instructional framework. In the work of [18], a mobile learning system for students in which they can physically face the target in addition to personal guidance and supplementary materials which help students improve achievements and favourable attitudes toward mobile learning system was developed. Authors in [19] positioned that ICT in education is an innovative modifications resulting in efficiency. The authors argued for the need for decision makers to improve the 'betterment factors' (*i.e. self regulation, learning, justice, evaluation and innovative thoughts*) for teaching and learning enhancement.

In [20], articulation of a web-based automated tool to overcome the conceptual limits of multiple-choice tests was developed. A description of managerial model (*Ordered Logistical Regression Analysis*) for ICT adoption based on objective (economic) and managerial (firms level factors) components using a survey of 500 businesses in Latvia in 2008 was developed [21]. The authors argued that perceived efficiency gains, technology absorption capacity and cultural factors enhance ICT adoption. In the work of [22], a deployment of Delphi techniques in describing the critical success factors that influence the reception of e-learning systems in the DE was undertaken. Technology awareness, motivation, and changing learners' behaviour are thought to be the suggested prerequisites for successful e-learning implementations. Important factors influencing e-learning success in the DE includes enhanced basic-technology knowledge and skills, improved learning content, computer training, motivation, institutional support amongst others. The next section describes the rationale and conceptual framework for the deployment of ICT in teaching and learning environment of HE in DE with specific focus on Nigeria – an emerging West African economy.

3. RATIONALES AND CONCEPTUAL FRAMEWORK FOR THE DEPLOYMENT OF ICT IN HIGHER EDUCATION LEARNING ENVIRONMENT – FOCUSING ON EMERGING NIGERIAN ECONOMY

It is important to adopt a sustainable rationale for deployment of ICT in the HE environment in the DE [2]. Regrettably, many institutions in the developing Nigerian economy has invested heavily in the use of ICT, sadly, its intended benefits are yet to be realised. Undoubtedly, there is a systemic failing in the project life cycle of ICT deployment in the HE of emerging Nigerian economy. Such failings are noted in requirements gathering, sourcing, procuring and acquiring the proposed technologies which often results in users' abandonment.

This paper reiterates that suitable teaching and learning methods that enhance quality of experiential learning should not be passive as currently prevalent. A holistic approach is required in acquiring sustainable ICT framework that contributes positively to teaching and learning in an inherently complex and dynamic environment of Nigerian education environment. Stakeholders have a singular responsibility to develop a course that interest learners (students) and keep them engaged as part of students learning and development in an integrative environment. Figure 1 describes a rational conception of sustainable teaching and learning methods as originally proposed in [2]. It argues that the generic conception of teaching and learning focuses on impacting information. It however postulates that sustainable teaching and learning goes beyond '*impacting of information'* to other crucial learning and developmental issues such *as 'transmission of knowledge and attitude to knowledge', 'facilitation of understanding', 'changing perception' and 'learning support'*. Synthesising information is paramount for learners during academic development and resumption of their life-long learning. The manner by which information is impacted in academic settings of emerging Nigerian economy need significant improvement and ICT would enhance the rigour and quality of information that is impacted during lectures, tutorials, seminars, workshops and other learning sessions.

The quality of knowledge transmission is driven by strategic leverage of the information types, teaching methods and the associated learning support available at the concerned institution. It is also important to understand the positive (reinforcing) causal relationship between *'impacting information'* and *'transmitting attitude to change'*. It is the position of this paper that if *'attitude to knowledge'* is to be improved in Nigeria HE academic settings, the *methods, tools (ICT) and procedures* for impacting information need to be significantly redress and improved. Educational planners in Nigeria need to improve the quality of information, teaching methods and learning supports available to the students.

ICT will play an important role in transmitting learners' attitude to knowledge in the Nigerian HE settings. Learners need an attitudinal change to their ill-conceived perception of knowledge and the need to challenge the frontiers of knowledge; simulation software and other modelling techniques would aid students learning of complex systems in a forward looking and dynamic learning environment. *Knowledge transmission, learning support, facilitation of understanding and change perceptions* are other conceptions where ICT are crucial in a learning process. It is however important to argue for strategic policy support that underpinned efficiency and efficacy of teaching and learning. Adopting a holistic approach to teaching and learning would enable decision makers to make informed judgement in respect of sustainable policy framework of pedagogic development in HE of DE.
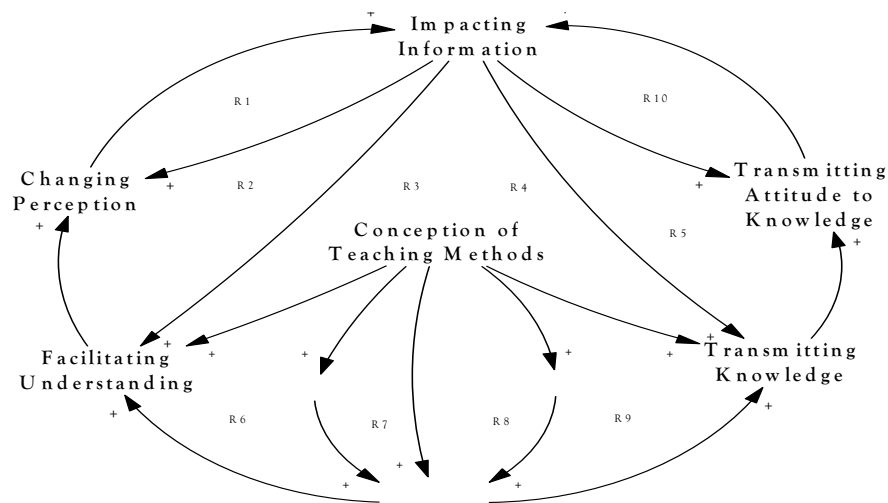
Figure 1 Sustainable Conception of Teaching Methods (Source: [2] Olaniyi and Ademola, 2013)

Dissemination of knowledge to students is the major reason for the deployment of ICT in modern learning environment. Students' development that improves their capabilities to use idea and information is critical in the Nigerian economy. Furthermore, students' ability to generate and test ideas as taught and rigorously discussed in the lectures and tutorials environment are needed for their career development. If students in the emerging Nigerian economy are to compete with their global counterparts, effort must be made to help develop their ability to plan and manage their learning using modern ICT in an integrative teaching and learning environment.

Aspect of the need for students' personal development cannot be over emphasised in the emerging Nigerian economy. Given the complex dynamics of the job market and increasing demand by employers to recruit and retain multi-tasking candidates, it is imperative to equip students with additional ICT skills, tools and techniques that would enable them a competitive advantage in the global job market.

4. FACILITATING PERSONAL DEVELOPMENT AND SUPPORTIVE LEARNING ENVIRONMENT

The primary purpose of a lecture in HE settings is to serve as an avenue for '*subject-matter overview and stimulation of interest*' rather than a platform for '*facts dissemination*'. The time limit for a typical undergraduate course should not exceed fifty-minute followed by in-class exercise.

For tutorials, the main objective is to serve as an avenue for clarity of objectives (*learning outcomes*) and reinforcement of the lecture themes in a '*less-structured environment*'.

The outcome of tutorials is to acquire some of the '*personal transferable skills*', e.g. in presentation and group work. Academia must master the art of 'personal development' that is impacted on the students. This would include the use of action plan, learning log, group projects, self-help groups, time management exercises, proactive examination techniques, constructive feedback, learning contracts, role play, open learning computer packages, peer and self assessment etc.
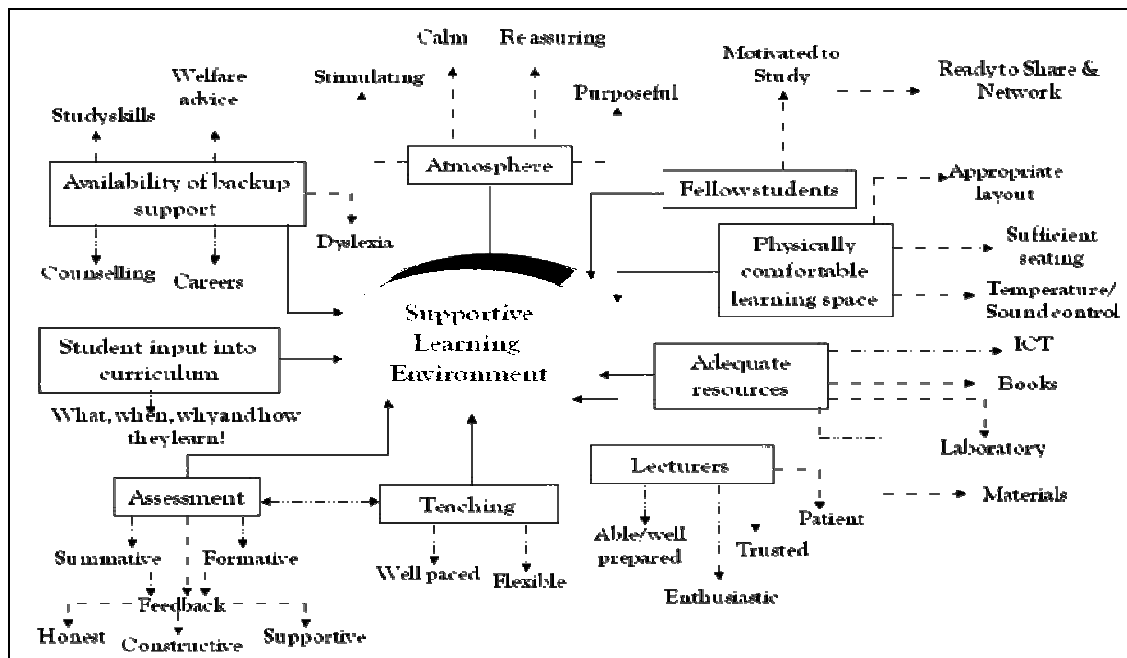

Figure 2 Holistic and Supportive Learning and Teaching Environment (Source: [2] Olaniyi and Ademola 2013)

The ingredients of quality teaching and learning in an ICT enabled environment start by stating the objective(s)/learning outcome of the session in clear and unambiguous terms. Learning objectives are an integral part of the Unit/Module Guide that are given to students at the beginning of the academic sessions and reiterated in all lecture summaries. Notably, Academic Accrediting Bodies in Nigeria do not provide adequate guidance in the development of learning outcomes, objectives, assessment criteria etc and hence leave the Academic Planning Directorate of various institutions to do the same. The use of clear overhead acetates and lecture slides with the aid of ICT will enabled better experiential learning and development.

Academic management ought to provide, support, assess and monitor the appropriate use of ICT for quality teaching and learning. The need for paced delivery to enhance students learning and development should be advocated amongst academic staff – *the standard rule of thumb is that the larger the class and/or the more difficult the material, the slower the pace*. Handouts should be developed with the aid of appropriate ICT for complex diagrams, difficult or critical text. Question and Answer Sessions should be undertaken at agreed times and places after the lectures. Academic staff should be encouraged to engage the students in '*question and answer sessions*' to evaluate their grasps of the subject matter.

Figure 2 below describes the proposed generic framework for a holistic and supportive learning environment as proposed. The atmosphere of learning must be stimulating, calm, re-assuring and purposeful. The use of ICT in creating a welcome atmosphere of learning should be paramount in many Nigerian academic institutions. Academia must be encouraged of the relevance atmosphere for sustainable learning and development. Students must be taught and motivated to study on how to share their intellectual properties, develop proactively networking abilities using appropriate technologies. Resource adequacy is a dilemma that is confronting HE institutions in the emerging Nigeria economy. It ranges from adequacy of teaching and learning materials, laboratory equipments, up-to-date text books, appropriate development of ICT etc. It is hope that with the appropriate deployment of ICT, many of the resource shortcomings can be minimised. The use of ICT will play significant roles in simulating complex laboratory experiment on personal computers in engineering, science, biological, social and management, medicine and health sciences and legal studies.

The use of ICT is not a passive process on the part of academia - lecturers and other instructional staff must be able/well prepared, enthusiastic, trusted and patient. The issue in respect of 'trust and patience' is alarming in Nigeria HE sector – there are clear mismatch between attainment of discipline/morality and the need to ensure 'trust' in academic environment. Given the differing socio-cultural and economic settings in Nigeria with an increasing influx of students from other developed economies into Nigerian academic settings, it is imperative to state that *'home discipline'* differs from *'academic discipline'* and that morality in academic settings is a process and various students differs in its uptakes – academia must accept this as a reality.

Proactive academias need to recognise that learners are drawn from various background and exposures. Hence, patients are crucial in enabling supportive learning environment in all academic institutions of higher learning. Assessment is an area of concern in many academic institutions of higher learning in Nigeria. There is a need of clear guidance in the use of summative and formative assessment. In many sadden instances; assessors are at the liberty of setting assessments at will (including late nights, weekends, religious dates etc) without diligent adherence to the learning contracts. Sadly, many of such assessors have been glorified by management as heroes while committing what is openly described as academic fraud in the developed nations.

The issue in respect of students' feedback has become an important element in many academic settings. Students' feedback must be honest, constructive and supportive – instances of lack of feedback have been witnessed in many of the summative assessment across Nigerian higher education institutions. Assessors have equally reported lack of interest by students on the feedback given – *this is evidenced by many of the paperwork that often litters the classrooms after assessment feedback.*

Honest, constructive and supportive feedback will be retained by students for their future academic and professional usage. Students and industry input to curriculum development is gaining ground in the developed nations' HEs. Student and industry involvement in the Nigerian HE sector is negligible – many academic is of the opinion that there should be a permanent curtain between assessment framework and students participation! Academic institutions need to recognise the importance of end users (students, and industry) in the development of their products (*academic qualifications*) and services (*supportive learning environment*). The need for backup support is a paramount aspect of learning and development; and the ICT usage play a significant role in ensuring the same. Backup support services would include study-skills centre, welfare advice, counselling, career and dyslexia support.

Although many institutions boast of counselling students, however the natures of the counselling are mainly medical or spiritual while failing on many other aspects of counselling services. Study skills centre should form part of the Learning Resource Centre where students are given an opportunity to develop their skills and knowledge during the course of their experiential learning in the HE academic settings of DE.
Career and dyslexia support lacks significantly in Nigeria HE settings. Many academic institutions do not see it as moral responsibility to make sure that their students compete favourably in the job market and in further education. This paper calls for the need to provide adequate career development support for learners.

5. CONCLUSIONS OF DEPLOYMENT OF ICT IN NIGERIAN HE SETTINGS

Proactive deployment of ICT in the Nigerian HE academic settings will depend on larger social cultural environment context as no tool is good or bad in itself. Constructive utilisation of ICT will facilitate improved students' knowledge and enhances positive learning attitude. Positively integrated ICT environment would enable prompt gaining of professional knowledge and facilitates opportunity to receive remedial instruction.
Provision of proactive institutional support, technical training, and time to faculty members in their knowledge and skills in ICT usage is urgently needed. E-learning would be an effective tool for delivering pedagogic materials; improved technology awareness, motivation, and changing learners' behaviour and as some of the 'success factors'. Identifying the success factors in learning and teaching would enable focusing on pedagogic programmes that promotes self-regulation, self-learning, self-justice, self-evaluation and innovative thoughts.

If Nigerian graduating students are to compete with their global counterparts, effort must be made to develop their ICT capabilities. Regrettably, many institutions in Nigeria have invested heavily in the use of ICT but its benefits are yet to be fully manifested. Various methodological approaches should be adopted for knowledge dissemination (i.e. worksheet, self-

directed private study, ICT produced handouts, e-books, video and audio tapes, internet and intranet, open learning materials, skill development in library and learning resource centres). Personal development and creation of supportive learning environment with the aid of ICT are needed in the Nigerian education sector. Issue of concern would include the atmosphere, resources adequacy (*ICT, e-books, laboratory etc*), lecturers (able, enthusiastic, trusted and patient), appropriate assessment and feedback, students and industry input into pedagogic development, availability of backup support services etc. Teaching and learning methods should not be a passive process and hence the need for systemic and holistic methodology. Future work will include amongst others the comparison study of ICT uptake and its effectiveness in government and private Nigerian HE institutions.

REFERENCES

[1] Pulkkinen, J. 2007. Cultural globalization and integration of ICT in education. In K. Kumpulainen (Ed.), *Educational technology: Opportunities and challenges (pp. 13–23). Oulu, Finland: University of Oulu.*

[2] Olaniyi, T. K., and Ademola, E. O. 2013. Integrating Information Communication and Technology into Classroom Environment in Higher education. *iSTEAMS Research Nexus, Vol 4, pp.150-158.*

[3] Kumpulainen, K. (Ed.). 2007. Educational technology: opportunities and challenges. Oulu, Finland: University of Oulu.

[4] Surry, D. W., and Farquhar, J. D. 1997. Diffusion theory and instructional technology. *Journal of Instructional Science and Technology, 2(1).*

[5] Taylor, P. 1998. Institutional change in uncertain times: lone ranging is not enough. *Studies in Higher Education, 23, 269–278.*

[6] BECTA (British Educational Communications and Technology Agency) June, 2004. A review of the research literature on barriers to the uptake of ICT by teachers.

[7] Straub, D., Keil, M., & Brenner, W. 1997. Testing the technology acceptance model across cultures: a three country study. *Information & Management, pp. 33, 1–11.*

[8] Pelgrum, W. J. 2001. Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers and Education, 37, pp. 163–178.*

[9] Lim, C. P., and Hang, D. 2003. An activity theory approach to research of ICT integration in Singapore schools. *Computers & Education 41, pp. 49–63.*

[10] Salomon, G. 1993. On the nature of pedagogic computer tools: the case of the Writing Partner. In S. P. Lajoie, & S. J. Derry (Eds.), *Computers as Cognitive Tools*, pp. 179–196. *New Jersey: Lawrence Ehbaum Association.*

[11] Papert, S. 1993. *The children's machine: rethinking school in the age of the computer.* New York: Basic Books.

[12] Sutherland, R., Amstrong, V., Barnes, S., Brawn, R., Breeze, N., Gall, M., Mattewman, S., Olivero, F., Taylor, A., Triggs, P, Wishart, J., and John, P. 2004. Transforming teaching and learning: embedding ICT into everyday classroom practices. *Journal of Computer Assisted Learning 20, pp. 413 – 425.*

[13] Lim, C. P., and Chai, C. S. 2004. An activity-theoretical approach to research of ICT integration in Singapore schools: orienting activities and learner autonomy. *Computers & Education 43, pp. 215–236.*

[14] Li, E. Y., Yen, H. J. R and Cheng, C. Y. J. 2008. A fit-gap analysis of e-business curricula and job demand in Taiwan and the US. *Computers & Education 51, pg. 969–987*

[15] Su, K. 2008. An integrated science course designed with information communication technologies to enhance university students' learning performance. *Computers & Education 51, pp. 1365–1374.*

[16] Al-Senaidi, S., Lin, L. and Poirot, J. 2009. Barriers to adopting technology for teaching and learning in Oman. *Computers & Education 53, pp. 575–590.*

[17] Vekiri, I. 2010. Boys' and girls' ICT beliefs: Do teachers matter? *Computers & Education 55, pp. 16–23.*

[18] Akhshabi, M., Khalatbari, J., and Akhshabi, M. 2011. An experiment on conducting mobile learning activities on the virtual university. *Procedia - Social and Behavioral Sciences 28, pp. 384 – 389.*

[19] Bidarian, S., Bidarian, S and Davoudi, A. M. 2011. A model for application of ICT in the process of teaching and learning. *International Conference on Education and Educational Psychology (ICEEPSY 2011).* Procedia - Social and Behavioral Sciences 29, pp. 1032 – 1041.

[20] Muñoz de la Peña, D., Gómez-Estern, F., and Dormido, S. 2012. A new internet tool for automatic evaluation in control systems and programming. *Computers & Education 59, pp. 535–550.*

[21] Ulmanisa, J. and Denins, A. 2012. A Management Model of ICT Adoption in Latvia. *International Conference on Leadership, Technology and Innovation Management.* Procedia - Social and Behavioral Sciences 41, pp. 251 – 264.

[22] Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J. and Ciganek, A. P. 2012. Critical success factors for e-learning in developing countries: a comparative analysis between ICT experts and faculty. *Computers & Education 58, pp. 843–855.*