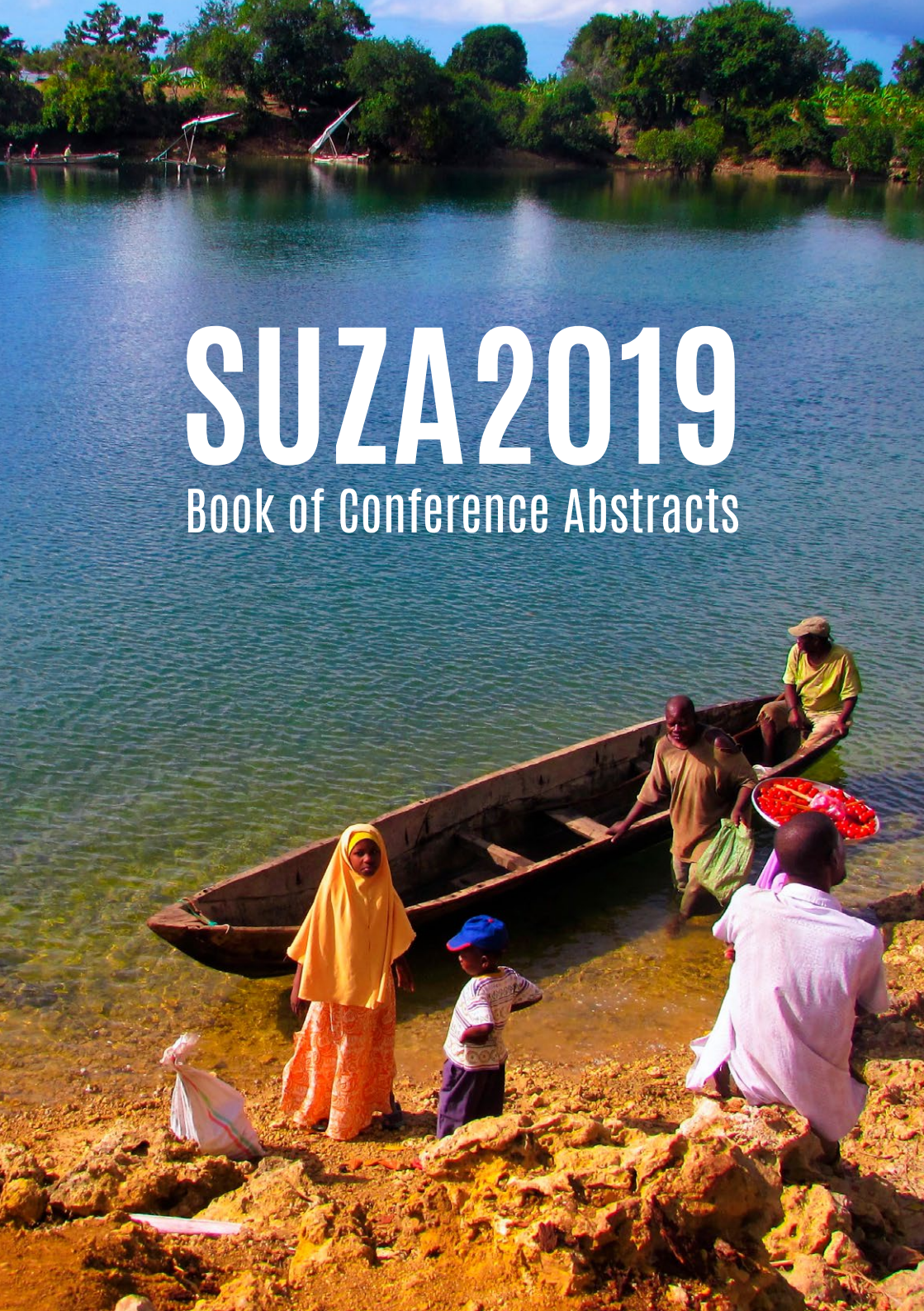

SUZA2019

Book of Conference Abstracts

TC3 Education Committee

Welcome to the IFIP Education committee's 2019 conference: Sustainable ICT, Education and Learning

IFIP (International Federation for Information Processing) is the leading multinational and apolitical organization in Information and Communications Technologies and Sciences. It is recognised by United Nations and other world bodies representing more than 40 countries/ regions all over the world. The core activity of IFIP is run by +100 working groups and 13 technical committees linking together professionals from academia and industry; from science, policymaking and practitioners. The education committee, labelled TC3, have four working groups:

WG 3.1: Informatics and Digital Technologies in School Education

WG 3.3: Research into Educational Applications of Information Technologies

WG 3.4: Professional and Vocational Education in ICT

WG 3.7: Information Technology in Educational Management

The aims are to establish and maintain liaison between national and international individuals and organisations fostering cooperative action, collaborative research and information exchange including interdisciplinary work and networks. This also includes identifying subjects for research and projects that will support future developments.

The conference addresses challenges of sustainability in the societal and educational transformation we currently experience. The aspect of localisation is a crucial perspective, making sure that local and cultural issues are considered. Local needs should be the driver in the development.

This conference is organised by the working group 3.4. in cooperation with other TC3 working groups, and not least the local organisers from Zanzibar and State University of Zanzibar in Tanzania. We are indeed looking forward to a most fruitful meeting of professionals from the international community and local participants.

April 2019,
Sindre Røsvik,
IFIP TC 3 chair

Welcome by Zanzibar Organisers

Welcome to SUZA'19 – an IFIP TC3 conference that aims to address sustainability issues on ICT, Education, and Learning to be held in Zanzibar in April 2019. A short form of the conference is SUZA'19,– "SUstainability issues in ZAnzibar" in 2019.

I would also like to welcome you to Zanzibar – an exotic archipelago with rich history and heritage. As a semi-autonomous island state, Zanzibar aims at developing service economy strongly grounded through knowledge-base of its population. Indeed, in 21st century, sustainable ICTs, Education, and Learning are extremely vital ingredients to building knowledge-based economy. Hence, the objectives of SUZA'19 are in perfect alignment with the interventions needed to achieve the Zanzibar National Development Agenda of development through sustainable service economy.

Welcome to SUZA – "The State University of Zanzibar"! Being the only public university in Zanzibar, SUZA was established to sustain the country with skilled human capital that is critical for successful implementation of the national development strategy. As such, SUZA is a comprehensive university offering programs in a diverse range of disciplines covering ICT, Finance and Accounting, Tourism, Education, Natural Sciences, Social Sciences, Languages – Swahili and other foreign languages, Medicine and Health, and Agriculture. Plans are underway to offer more relevant programs including Fisheries, Maritime, Oil and Gas in the near future.

I am certain that hosting SUZA'19 will add to realizing SUZA's role of producing human capital that is required for sustainable development of our country. Thus, the coincidence of the conference acronym – SUZA'19 – to the acronym of our university has significant underlying relevance.

I would like to strongly to advise everyone to participate to SUZA'19 for what promises to be a memorable event! While in Zanzibar, I advise you to spare some time to visit one of SUZA's eight campuses spread around the islands. You should also take this rare opportunity to explore and enjoy the rich touristic sites, heritage and history that Zanzibar islands are fully endowed with. I believe you will take back with you happy memories of Zanzibar, and the IFIP TC3 conference on Sustainability issues on ICT, Education, and Learning.

I wish you a fruitful discussion and a nice stay in Zanzibar.

Welcome!

Vice Chancellor Idris Rai
State University of Zanzibar
Head of the Local Organising Committee

Welcome by IPC Chairs

Digitalization and ICT have a tremendous impact all over the world, also in the global South. Even though computer use was long a privilege of citizens of industrialized nations, the access to mobile technologies has reached large populations everywhere. Digitalization could be empowering for people with modest means when the cost of mobile devices has brought them to the reach of more people than ever.

Global education is largely dominated by Western universities, and development of technology takes place in industrialized countries. Education is an essential tool for achieving sustainability. The situation in many developing countries is challenging: Good quality education is scarce; moreover, the national development policies are not always well-informed or sufficiently resourced. The curricula in African schools are based on Western models, as are most books and materials. The content of textbooks might be very remote from the everyday experience of students, adding an extra level of abstraction to the content to be learned. Therefore, students need to operate from two worldviews and often have two or more cultures to contend with. The education has very weak connections to the practical life of students, resulting in rote learning without reaching a de-contextualization of knowledge. The main teaching method in the crowded classrooms is lecturing and repeating the teacher's words. Because of the shortage of materials such as textbooks or notebooks, students have to learn the material by heart. Furthermore, they are not able to practice writing sufficiently.

Because of the historical reasons, local education systems often focus on traditional subjects, while only a small proportion concentrates in emerging disciplines and professional training. However, the local education systems need to promptly seize the opportunities to accelerate provision of required skills to support innovation policies. the more technology-led future will require stronger thinking skills than ever. Thinking skills are developed in the education from early on, therefore, the importance of quality education and further training for teachers is crucial. Mother tongue education in primary schools is one of the keys to successful cognitive development. Development policies and projects need to emphasize quality education.

The local knowledge tends to get lost in a foreign-origin education system where the students are required to acquire a new, Western set of skills and which undervalues their existing skills. The organizers of this conference wish to promote strengthening education capacities in developing countries, particularly in the fields of ICTs and mobile technologies, as well as open source software and information, content management systems, and potential of cloud-based services in learning.

Strengthening local knowledge building would allow innovations based on local needs and potentials. Enhancing research capability in African, Latin American and Asian universities would diversify innovations in global scale.

We wish to invite all teachers, researchers, students, entrepreneurs and policy makers to discuss our common challenges in digitalization and education!

Enjoy your conference!

April 2019
Mikko Ruohonen, Jaana Holvikivi and Nicholas Mavengere
International Programme committee chairs

Keynote Speaker: Amos Muhunda Nungu

Director General of COSTECH
Commission of Technology
and Science, Tanzania

Sustainable Development of ICT and Education

Dr. Amos Muhunda Nungu is the Director General of the Tanzania Commission for Science and Technology (COSTECH). Previous roles include being the *Assistant Director – Directorate of Science, Technology and Innovation at Ministry of Education, Science and Technology; and Head of India – Tanzania Centre of Excellence in ICT at Dar Es Salaam Institute of Technology.*

Dr. Nungu initiated, managed and participated in many projects, including those under the European Union (FP7 & H2020), the Swedish International Development Cooperation Agency (SIDA) and the Norwegian Agency for Development Cooperation (NORAD). He has been involved in various initiatives in Tanzania and abroad, worked with various local and international organizations. He has published widely as well as given talks in various forums.

Dr. Nungu held various managerial and professional responsibilities, including; and Also saved as a Board member in various Boards and Councils in the country, including the *Muhimbili University of Health and Allied Sciences*, and *Mbeya University of Science and Technology.*

Dr. Nungu holds a PhD and MSc. degrees in Information Technology (Communication Systems) from the Royal Institutes of Technology (KTH) – Sweden; and a BSc. in Computer Science from University of Dar Es Salaam

Keynote Speaker: Aape Pohjavirta

Founder and Chief Evangelist
Funzi Ltd, Finland

Mobile learning – successful cases from developing countries

Mr. Aape Pohjavirta is the Chief Evangelist and Founder of Funzi, a mobile learning and information service for the emerging markets. In that role, he has become a recognized industry leader with a vision on how science, technology, and innovation will contribute to the achievement of the 2030 Agenda for Sustainable Development.

He is also a passionate entrepreneurship coach and a frequent lecturer in universities, incubation and acceleration programs, and other institutions.

Aape Pohjavirta has worked with digital since 1988 and in the mobile industry since 1997 in various management roles and has a solid track record of international business, product, and technology development including, Exomi Ltd., C&M Capital, Sofi Securities, Vineyard Ltd., Brossco Systems, and People Group. Aape is an Apple Achiever, an international patent inventor, and an inspirational public speaker.

Keynote Speaker:
[pending]

Conference Program

Wednesday 24.4.2019 | Sea Cliff Resort & Spa

19:00	Registration & Get together -event

Thursday 25.4.2019

08:30 – 09:00	Registration		
09:00 – 09:30	Welcome session: organizers and chairs		
09:30 – 10:30	**Key note**: Sustainable Development of ICT and Education by Amos Nungu, Director General of the Tanzania Commission for Science and Technology (COSTECH)		
10:30 – 11:00	Coffee/tea break & networking		
11:00 – 12:30	**Session 1**: papers 17, 32 & 37		
12:30 – 13:30	Lunch		
13:30 – 15:30	**Session 2**: (4),9,20,41	|	**Session 3**: 12, 15, 25 ,16
15:30 – 16:00	Coffee/tea break & networking		
16:00 – 18:00	Session 4: papers 7, 11, 13, 38		

Friday 26.4.2019

09:00 – 10:00	Key Note: Mobile learning - successful cases from developing countries by Mr. Aape Pohjavirta, Funzi Ltd, Finland		
10:00 – 10:30	Coffee/tea break & networking		
10:30 – 12:00	**Session 5**: papers 1,3,23	|	**Session 6**: 18,21,31
12:00 – 14:00	Lunch and a longer break		
14:00 – 16:00	**Session 7**: papers 27,28,29,33	|	**Session 8**: 8,14, 30,40
16:00 – 16:30	Coffee/tea break & networking		
16:30 – 17:30	Use of Virtual Reality - case Bangladesh-Finland, Erkki Rötkönen		
19.00	Conference dinner, Sea Cliff Resort & Spa		

Saturday 27.4.2019 | Main Campus of State University of Zanzibar

09:00 – 9:30	Bus transportation from the Sea Cliff Resort & Spa hotel to the main campus of the university
10:00 – 11:00	Welcome by the State University Zanzibar and Key Note TBA
11:00 – 11:30	Coffee/tea break & networking
11:30 – 13:00	**Session 9**: papers 22, 24,36 Session B: cases and panel discussion TBA
13:00 – 13:30	Closing session
13:30	Lunch
15:00	IFIP TC3 AGM; gathering & 1st day at Sea Cliff Resort & Spa

Sunday 28.4.2019 | Sea Cliff Resort & Spa

IFIP TC3 AGM; gathering & 2nd day at Sea Cliff Resort & Spa

Session 1: (17, 32, 37) | Chair Mikko Ruohonen

Promoting innovation by adding entrepreneurial education to a natural sciences curriculum, case: Tanzania | Emma Nkonoki, Ville Taajamaa, Antero Järvi and Lauri Hooli

Using Mobile Devices and Online Tools to Promote Students' Learning | Ana A. Carvalho

A transformation into digitally supported education - Case from the State University of Zanzibar | Anne-Marie Mosbech Jensen, Umayra El Nabahany, Mwanajuma Suleiman and Said Yunus

Session 2: (4, 9, 20, 41) | Chair Ana Carvalho

Making use of e-portfolios to enhance learning | Josephine Gabi and Nicholas Mavengere

Sustainable e-learning – case study on the pros and cons of certification | Bent Andresen

Using Telehealth to Educate Medical Professionals in Patient's Care in Developing Countries | Olayele Adelakun, Adam Fleischer and Mildred MG Olivier

eHealth as the trigger initiative that may foster development in health care delivery in Tanzania | Simon Ernest and Andrew Mushi

Session 3: (3, 12, 15, 25, 16) | Chair Johannes Magenheim

How teachers' inclusionary and exclusionary pedagogical practices manifest in disabled children's uses of technologies in schools | Sue Cranmer

A pilot project, "Keeping Safe", exploring the use of "Scratch 3" coding files, and music files created in "Sibelius" to support young adults with learning difficulties and disabilities at Lambeth College, south London | Lawrence Williams and Lloyd Mead

Digital games in primary schools for the development of key transversal skills | Rosa Bottino, Augusto Chioccariello, Laura Freina and Mauro Tavella

Computer Thinking nurturing skills and inspiring pedagogy for sustainable education in the 21st century | Christophe Reffay and Phuwadol Viroonluecha

Session 4: (7, 11, 13, 38) | Chair Nicholas Mavengere

Researching Computers and Education through Actor-Network Theory | Arthur Tatnall

Automatically Generating Programming Questions Corresponding to Rubrics Using Assertions and Invariants | Masami Hagiya, Kosuke Fukuda, Yoshinori Tanabe and Toshinori Saito

Design sprint in learning software development | Jaana Holvikivi

Principles for the Design of an Educational Voice Assistant for Learning Java | Carlos Delgado Kloos, Carlos Alario-Hoyos, Pedro J. Muñoz-Merino, Cristina Catalán-Aguirre and Nuria González-Castro

Session 5: (1, 3, 23) | Chair Rosa Bottino

Improving capacity for knowledge management in county governments: Perspectives from selected counties in Kenya | Joshua Ndiege and Patrick Wamuyu

Institutional learning in e-government innovation projects for development | Endrit Kromidha

Integrating information and communication technology in pre-service teacher education in Zanzibar: status, challenges and opportunities | Umayra El Nabahany and Said Juma

Session 6: (18, 21, 31) | Chair Javier Osorio

Enhancing virtual learning by improving the learning environment and user experience | Nicholas Blessing Mavengere and Mikko Ruohonen

Teachers' Perception on Using KioKit to Enhance Teaching and Learning to STEM subjects in Zanzibar | Raya Ahmada, Ali Abdulla, Said Yunus and Maryam Ismail

Challenges and opportunities in the Management of social Media Records at the Midlands State University, Gweru, Zimbabwe | Shephard Pondiwa and Margaret Phiri

Session 7: (27, 28, 28, 33) | Chair Lawrence Williams

IT Professionals from India and Finland –are they different? | Mikko Ruohonen, Najmul Islam and Nicholas Mavengere

Antecedents of sustainable vocational education and training in ICT | Javier Osorio and Julia Nieves

How informatics education helps to understand and shape the digital society | Ralf Romeike

The Integration of Web 2.0 in Teaching-Learning in Tanzania Higher Learning Institutions: The Case of The State University of Zanzibar (SUZA) | Said Yunus, Umayra El Nabhany, Ali Abdulla, Raya Ahmada and P. Malliga

Session 8: (8, 14, 39, 40) | Chair Arthur Tatuall

Will the visualization of internet affect languages of education? | Jaana Holvikivi

The Introduction of ICTs in Chilean Schools - An Analysis of the Various Initiatives Since Enlaces and The Issues Faced by The Mapuche | Fernando Toro

Digital Literacy Enhancement Status in Kenya's competency-based curriculum | Maina Gioko and Rosemary Waga

The Innovation Cycle for Sustainable ICT Education | Daniel Burgos

Session 9: (22, 24, 36) | Chair Said Yunus

Awareness of Open Education Resources (OER) in Higher Learning Institutions: Perspectives from Undergraduate Students from the State University of Zanzibar (SUZA) | Maryam Ismail, Mwanajuma Mgeni, Said Yunus and Ali Abdulla

Toward Pedagogy Centered Virtual Learning Space Design | Erkki Rötkönen, A.K.M. Najmul Islam and Erkki Suutinen

Student's Acceptance of Learning Management Systems: A Case Study of The National Open University of Nigeria | Nasiru Yakubu, Muhammadou Kah and Salihu Dasuki

Promoting Innovation by Adding Entrepreneurial Education to a Natural Sciences Curriculum – Case Tanzania

Ville Taajamaa, Emma Nkonoki, Antero Järvi, Lauri Hooli
University of Turku, Finland

Abstract

This paper presents the results from train-the-trainer workshop held for Tanzanian university faculty from four different universities. The aim of the workshop was to build entrepreneurial education capacity and competencies of local faculty. Findings from the workshop were planned to be integrated into the existing curricula of the universities together with activating and student-centred teaching methods. Main approaches were Problem based Learning and Design thinking.

This was the first workshop in a multi-year project with main intention and focus set on innovative and entrepreneurial education from the perspective of knowledge, skills and mindset.

The results show that participants of the workshop understood both at a general and at a context level how to add entrepreneurial practices and mindset to the natural sciences based curriculum. This was also the main aim of the workshop. Concerning educational content challenges there was more distribution among answers. Participants had different challenges concerning the topic. Process wise the practical and activating approach to the training was well understood and received. One of the main challenges was the question how to implement new approaches to the existing curricula

Keywords

Innovation, Entrepreneurial Education, Design Thinking, Problem Based Learning, University Curricula, East Africa

Using Mobile Devices and Online Tools to Promote Students' Learning

Ana Amelia Carvalho
University of Coimbra, Portugal

Abstract

Keeping students' attention in class and engaging them in learning is not an easy task. In this paper we report the approaches and strategies used in a university course 'Games and Learning'. An action research study was conducted involving three cycles. During the first one, a flipped learning approach was used to motivate students to read the papers before class. In the classroom, students had to use their mobile devices to answer quizzes, fill a form, and summarize the lesson. During the following cycles, students worked in groups, analyzing digital games. Along the second cycle students analyzed a video game and during the third cycle they analyzed a serious game. We realized that asking them to submit some tasks online before class, helped them to work more and achieve better results. From the first group work to the second one the majority of students improved their critical digital game analysis. The collected data supported the conclusion that students were engaged in learning.

Keywords

Mobile Devices, Flipped Learning, Students' Engagement

A transformation into digitally supported education: Case from the State University of Zanzibar

Umayra El Nabahany[1], Anne-Marie Mosbech[2], Mwanajuma Mgeni[1] and Said Yunus[1]
[1] State University of Zanzibar, SUZA, Zanzibar, Tanzania
[2] University of Copenhagen, UCPH, Denmark

Abstract

The following case shares lessons learned on how to build sustainable institutional capacity in e-learning. The project was carried out in partnership with the University of Copenhagen as part of the larger Building Stronger University, BSU, programme funded by the Danish International Development Agency, Danida.

Keywords

digitally supported education, digital learning, online and blended learning, skill development

Making Use of Portfolios to Enhance Learning

Josephine Gabi[1] and Nicholas Mavengere[2]
[1]Manchester Metropolitan University
[2]Tampere University of Technology

Abstract

Portfolios have been used in learning for a while. The value of the use of portfolios for learning have been well documented. For example, portfolios encourage students to reflect on their strengths, needs, errors, interests, challenges, and objectives, as well as, encourage interactive processes among students, teachers, and parents. Thus, it is value to strengthen the use of portfolio, for instance, by making use of appropriate pedagogical approaches and technological adoption. This research seeks to highlight the evolvement of use of portfolios from paper based in academic year 2015/2016, to an electronic portfolio in the form of a word-processed document in academic year 2016/2017 to students creating e-portfolio's in academic year 2017/2018. To capture this process prior to the academic year 2017/18 academic year students had been required to keep portfolios in the form of a word-processed document or paper based. The results show that the adoption of technology and improved pedagogical techniques enhanced students' educational performance and satisfaction. Therefore, this research advocates for the adoption of technologically-driven pedagogical philosophy to enhance the use of portfolios in learning and teaching.

Keywords

paper-based-portfolios, Microsoft word-based portfolios, electronic portfolios, enhancing learning, students' satisfaction.

Sustainable e-Learning – Case Study on the Pros and Cons of Certification

Bent B. Andresen
Danish School of Education, Aarhus University Tuborgvej Copenhagen NV, Denmark

Introduction

The paper deals with quality of e-learning. In particular, it deals with a project regarding certification of e-learning. This project has been carried out at vocational schools in order to cover current needs for formative feedback on e-learning plans. To develop high-quality e-learning, school leaders and teachers in vocational education often need feedback on their planning processes (OECD, 2013). Usually, they have experiences with direct instruction (Hattie, 2009) and communities of practice (Lave & Wenger, 1991), but it can be a challenge for them finding the best blend of face-to-face and online activities and such activities. Regarding this sort of blended learning, there is research evidence suggesting that the learners' outcome generally is higher than the outcome from merely face-to-face education or merely online learning. This, of course, depends on the quality of vocational e-learning courses. Major quality factors include clear learning objectives (Hattie, 2009), the participants''time on task' (Means et al., 2009), and the use of digital video instead of text based learning materials (Hattie, 2012). This paper presents findings from research on certification of elearning. The purpose is to investigate the perceived usefulness for school leaders and teachers of the certification process and the related feedback on course descriptions. Does it foster capacity building and sustainable development of e-learning in vocational education?

Keywords

E-learning, certification, best practices, capacity building

Using Telehealth to Educate Medical Professionals in Patient Care in Developing Countries

Olayele Adelakun
DePaul University, United States

Abstract

Telehealth is a broad concept that encompasses telemedicine, telecare, telehomecare, Teledermatology, telemonitoring, teleradiology, mhealth among others. Telehealth and telemedicine are often used interchangeably and it is the use of technological tool to provide medical service for a patient remotely. The key word is the remoteness of the care and reliance on telecommunication system. The need for telemedicine in developing countries has been emphasized by many authors who pointed to the need to connect medical personnel from highly equipped medical centers in developed countries with scarce diagnostic and monitoring equipment to patients in remote location in developing countries. One of the best use of telehealth in developing countries is for knowledge sharing to reduce or prevent the spread of contagious disease like AIDS.

This research presents the early outcomes of a pilot study comprising of IS researchers from DePaul University ("DePaul"), Chicago and orthopedic doctors from Rosalind Franklin University of Medicine and Science ("RFUMS"), North Chicago, USA, and other medical professionals like nurses. The objective of the research project was to determine: (a) whether diabetic foot ulcer (DFU) healing rates can be improved after implementation of a structured telehealth (distance learning) educational program with our partner site in Port-au-Prince, Haiti, and (b) to assess qualitative barriers to the use of telemedicine/health for professional continuing education and consultation for the improvement of DFU outcomes.

eHealth as the Trigger Initiative that may Foster Development in Health Care Delivery in Tanzania

Ernest Simon[1] and Andrew Mushi[2]
[1]MSc Leadership and Management Candidate/ Ministry of Health, Community Development, Gender, Elderly and Children
[2]Dar es Salaam Campus College, University of Mzumbe, Dar es Salaam,

Abstract

The Ministry of Health, Community Development, Gender, Elderly, and Children developed eHealth Strategy to leverage the implementation of ICT in health service delivery. The eHealth strategy in Tanzania was accord from the World Health Organisation after recognized the usage of ICT in supporting the delivery of health and health-related interventions (WHO, 2012). The strategy promised various issues to be done by the Ministry in various capacities through its 16 Strategic Objectives (SO). Those promises were divided into four main categories of implementation which are eHealth Foundation with three SO, eHealth Solution with eleven SO, Change and Adoption with one SO, and lastly eHealth Governance with one SO. The implementation of eHealth initiatives has contributed tremendously to the changes and awareness of ICT in health services delivery in various capacities due to well structured and adhering of the SO agreed on 2013. This has proven by changes of attitude for the health practitioners including Doctors, Nurses, Administrators who are working to the health facilities in Tanzania, clients are recognized the importance of ICT in service delivery especially on reducing waiting time, existing link between one department for example finance unit, Medical record unit, and dispensing/ Pharmacy during the delivery of care to patients this link facilitate well-structured communication within the facility. Furthermore, the improved access of client information for the purpose of proper completion of a continuum of care to authorized practitioners within the facility.

How Teachers' Inclusionary and Exclusionary Pedagogical Practices Manifest in Disabled Children's Uses of Technologies in Schools

Sue Cranmer
Lancaster University, United Kingdom

Abstract

There has been much debate in recent years about how to promote regular and effective use of digital technologies for learning in schools. Alongside this, there has been much critique of how inclusive education policies are enacted in schools, often said to amount to little more than integration rather than inclusion. This paper will bring these debates together by exploring pedagogical practice in relation to digital technologies and inclusion. It will draw on a wider project carried out with visually impaired children as an illustration to investigate how disabled children use and experience digital technologies to learn. In particular it will consider teachers' inclusionary and exclusionary practices with technology to understand the implications. It will call for teachers to be supported further to develop inclusive digital pedagogy.

A pilot project, "Keeping Safe", exploring the use of "Scratch 3" coding files, and music files created in "Sibelius" to support young adults with learning difficulties and disabilities at Lambeth College, south London

Lloyd Mead[1], Lawrence Williams[2], Ellie Mead[3] and Beth Mead[4]
[1]Lambeth College Tutor, [2]MirandaNet Council, [3]safeguarded secondary pupil (aged 14) and [4]safeguarded secondary pupil (age 12)

Abstract

This project outlines a continuing curriculum project (from 2009 to the present), now using "Scratch 3" to support the sequencing skills of young adults with learning difficulties, at Lambeth College, south London. Student support files, in "Scratch 3" and in "Sibelius", are being created by secondary school pupils, aged 12 to 14, and developed for the students at the College, as part of an on-going collaboration.

Digital games in primary schools for the development of key transversal skills

Rosa Bottino, Augusto Chioccariello, Laura Freina and Mauro Tavella
Institute for Educational Technology of the Italian National Research Council

Abstract

Digital games are becoming more and more popular worldwide, arous-ing children's interest and fostering their motivation. Furthermore, tablets and smartphones are increasingly popular and widespread all around the globe, guar-anteeing access to the web and to an ever-grow-ing availability of games. This paper is based on the assumption that introducing digital game play into primary schools may support the development and consolidation of some transversal skills in a way that is perceived by students as interesting and motivating. When the games are carefully selected, the great effort spent by children in playing will provide them with the pos-sibility to acquire and exercise, at an early age, basic skills which are important for their future. In particular, in this paper, different modalities in which digital games can be used in primary schools to foster basic transversal skills are presented. Logic and spatial reasoning skills as well as com-putational thinking are in particular considered. The reported experiments show that game based activities, when appropriately organized, can positively affect students' school per-formance as well as students' learning attitudes and behavior.

Keywords

Digital games, reasoning skills, computational thinking, primary school.

Computer Thinking nurturing skills and inspiring pedagogy for sustainable education in the 21st century

Christophe Reffay[1] and Phuwadol Viroonluecha[2]
[1] University Bourgogne-Franche-Comté, ELLIADD, FR-EDUC, Besançon, France
[2] Top Sky Group, JobBKK, Bangkok, Thailand

Abstract

Creativity, Innovation, Information search, problem-solving and data treatment are important not only in developed countries where people use many digital objects in their everyday life. Developing countries are necessary concerned by many aspects of the information society and digital era. Even if a large part of the population still does not access to the internet, because of a lack of reliable infrastructure, the information and knowledge societies are imposing their pace of innovation to the entire world. A more and more complex world is coming. Developing countries also feel the need to educate their people and give them the most of the 21st century skillset in order to face this complexity and the new challenges. For this reason, and because some of these competencies can be taught even without computers, Computational Thinking may nurture these skills even in developing countries.

In this presentation, we try to show how the integration of Computational Think-ing with collaborative problem-based learning can cultivate learners how to learn and work on a real (authentic) problem together by bridging computer science main concepts and these skills to some efficient collaborative learning methods. Different recent viewpoints from developing countries are presented to show how they face this challenge in their nation.

Keywords

Computational Thinking, 21st Century Skills, Collaborative Problem-Solving.

Researching Computers and Education through Actor-Network Theory

Arthur Tatnall
Victoria University, Melbourne, Australia

Abstract

The teaching of information technology and education needs to keep up to date to remain relevant. With technology changing rapidly this is no easy task. It is even more important that research into this area be sustainable and to keep up to date. The use of, or teaching about, computers in education involves both humans – teachers, students and parents, and non-humans – technology. Research into computers and education is socio-technical as it has to deal with both human and non-human actors, and so actor-network theory (ANT) can provide a useful research approach. This paper outlines actor-network theory and Innovation Translation (informed by ANT) and provides some examples of research using ANT as a lens for analysis.

Keywords

Information technology, education, research, actor-network theory.

Automatically Generating Programming Questions Corresponding to Rubrics Using Assertions and Invariants

Masami Hagiya[1], Kosuke Fukuda[1], Yoshinori Tanabe[2], and Toshinori Saito[3]
[1] Graduate School of Information Science and Technology, University of Tokyo
[2] School of Literature, Tsurumi University
[3] Graduate School of Practitioners in Education, Seisa University

Abstract

The importance of programming in the context of primary and secondary education is increasing, reflecting incorporation of programming in the reformation of Japanese curriculum guidelines for schools, the release of which is planned in 2020. Earlier research developed proposed rubrics for assessment of student attainment levels in various fields of high-school informatics, including programming. The reformation requires that university entrance examinations should include informatics; it has thus become necessary to create a large number of questions exploring various levels of attainment. Here, we develop methods automatically generating questions in the field of programming; we use program correctness proofs and a theorem prover to this end. Questions corresponding to each level are automatically generated from a single program featuring a correctness proof by analyzing the source code and the proof with the aid of a theorem prover. These methods can help prepare questions for university entrance examinations, and can also be applied to E-learning systems when questions are used to allow evaluation of student attainment levels. We conducted a small experiment, and the results show that this is a promising approach.

Keywords

Programming education, Rubric, Examination, Correctness proof, Invariant, Assertion

Design Sprint in Learning Software Development

Jaana Holvikivi
Metropolia UAS, Finland

Abstract

Agile methods are replacing former, highly systematic project man-agement practices in software development. In this paper, a case of a design sprint trial at a university is described, and its benefits and challenges are ana-lysed. The experience is compared to other reported cases and project-based learning practices. Research on this subject is still at an emerging stage, as de-sign sprints are just entering education, even though agile methods are common in industry. Much of higher education still depends on very traditional teaching practices and conventional curricula. Agile methods can be taught in various ways, design sprint being the latest innovation. Generally, the results of using agile methods as course structure, and applying short design sprints, have been very promising. The advantages over other methods are related to hands-on practice, quick implementation and improved student co-operation.

Keywords

agile methods, higher education, collaboration practices, design sprint, software engineering

Principles for the Design of an Educational Voice Assistant for Learning Java

Carlos Delgado Kloos, Carlos Alario-Hoyos, Pedro J. Muñoz-Merino, Cristina Catalán Aguirre, Nuria González Castro
Universidad Carlos III de Madrid, Leganés, Madrid, Spain

Abstract

Conversational agents, be there text- or voice-powered, are acquiring a level of maturity that makes them useful for natural and smart interactions. In this paper, we explore some design principles for voice-commanded assistants for educational use, in particular, of one designed to train Java concepts as a complement to a MOOC (massive open online course) about programming.

Keywords

Conversational agents, voice assistants, VUI, MOOCs, Java teaching, design decisions

Improving Capacity for Knowledge Management in County Governments: Perspectives from Selected Counties in Kenya

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Abstract

While several studies have indicated the critical role played by a country's ability to exploit knowledge as an economic resource, very few studies can be traced to understanding the practices of County Government in exploiting knowledge especially in Africa. The purpose of this study was to investigate the current knowledge management practices and technological solutions employed by County Governments in Kenya to support knowledge management. Based on interviews with senior and junior County officials and qualitative data analysis, the study findings revealed that there were no systematic knowledge management practices in existence within the surveyed County Governments. The few knowledge management practices identified were isolated, informal and uncoordinated; they were neither documented nor communicated. Furthermore, the existing policy frameworks to support knowledge management practices were inadequate. The study also revealed scarcity of relevant technological solutions tailored to support knowledge management practices. This research provides an advancing understanding of the prevailing local challenges hindering effective utilization of knowledge management practices and systems.

Keywords

Knowledge management practices, Knowledge management systems, County Governments, Developing countries, Kenya

Institutional Project-Based Learning: Evidence from a Multi-Actor e-Government Reform

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Abstract

This study contributes by providing a conceptual framework around learning in public administration reforms. Large e-government projects through which reforms are introduced often involve multiple organisations, they are complex, require a careful consideration of power and have a long institutional impact on society. Project-based learning (PBL) and institutional theory from public administration studies form the theoretical framework this study builds upon. Findings suggest that learning in public administration reforms in the context of a developing country is characterised by strategic, constructive and reflective practices that follow each other in cycle along project implementation stages. The unit of analysis in this study is project organisations instead of students or employees where project-based learning has been traditionally applied, making the contributions of this study unique and relevant not only for project managers, but also for policy makers, local policy leaders and international organisations.

Keywords

public sector, project-based learning, institutional theory, e-government, developing country.

Integrating ICT in Pre-Service Teacher Education in Zanzibar: Status, Challenges and Opportunities

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Abstract

The notion of integrating ICT in education has proven to provide various solutions to educational issues. Preparing pre-service teachers for ICT integration has been crucial in many teacher training colleges and universities. The present paper with preliminary data findings explores the status, challenges and opportunities that exist in the integration of ICT tools in pre-service teacher education at the State University of Zanzibar. This was a mixed study that employed both qualitative and quantitative methods. However, the major approach used was quantitative. Initial findings indicate that despite SUZA having its own updated Learning Management System (LMS) and ICT tools and infrastructures, there are still many challenges related to infrastructures, readiness, ICT skills and comfortability in integrating ICT tools in teaching and learning. In addition, the paper explores the many opportunities that are available at the State University of Zanzibar in the integration of ICT in education particularly in pre-service teacher education.

Keywords

ICT; learning; teaching; pre-service teachers; teacher education; Zanzibar.

Enhancing Virtual Learning by Improving the Learning Environment and User Experience

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Abstract

Learning is an essential virtue in a dynamic environment. Technologies offer both opportunities and challenges to learning. The global nature of the environment today calls for virtual learning, which offers dimensions, such as, convenience, time and cost factors. This research seeks to promote virtual learning experience by improving the learning environment and user experience. The research is based on a total virtual learning experience of a masters' level information and communication technology for development (ICT4D) class at the University of Tampere. A survey was conducted at the mid-course stage to assess the virtual learning experience and propose ways to improve learning process. The assessment included how well the virtual environment and pedagogy promoted quality learning, that is, constructive, collaborative and conversational learning. The research seeks to promote quality learning by improving the learning environment and participants' virtual learning experience. That is, context is embraced to map the learning process that suits the learners and study contents. The results of this study included highlight of pedagogical techniques and technological tools that fit the learners' and study content requirements to foster learning in a virtual environment.

Keywords

virtual learning, user needs in virtual learning, context in virtual learning, virtual learning review, quality learning

Teachers' Perception on Using Kio-Kit to Enhance Teaching and Learning STEM subjects in Zanzibar

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Abstract

In the current situation, teachers are encouraged to use active strategies than traditional approaches to teaching and learning. These approaches are known as students centered approach where students are the center of the learning various technologies were imposed in teaching and learning phenomenon. The most current technology that gains its popularity especially in Africa for teaching and learning process is Kio-Kit. It is a digital education toolbox which contains different forms of digital contents to help students in their learning process. The box contains 40 Kio tablets in which students use them to access the contents available in the Kio-Kit box. The paper discusses the perception of using this type of technology from school teachers who have been trained to use them to enhance the teaching of STEM subjects. The challenges encountered during the exploration of Kio-Kit in classroom are then discussed and some suggestions are proposed. The results show that Kio-Kit enhances teaching and learning and helps the students gain necessary skills for the 21st century digital era. The results reveal that the STEM teachers are ready and willing to use the Kio-Kit technology in the classroom. It can be seen that most of the teachers have the desire to integrate the technology effectively in their teaching as long as the loaded contents in the Kio-Kit is relevant and adequate number of Kio-Kit are distributed in their schools and intensive training is provided to teachers on the use of this technology in the teaching and learning.

Keywords

Kio-Kit, Digital Classroom, ICT, STEM, Zanzibar.

Challenges and opportunities in the Management of social Media Records at the Midlands State University, Gweru, Zimbabwe

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Purpose

The purpose of this paper is to highlight challenges and opportunities that have been created for the Midlands State University following the adoption and use of social media records.

IT Professionals from India and Finland –are they different?

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Abstract

The study of the IT industry professionals in a large country, such as India, is the importance of the size and adaptability of the IT people in the country. The prominence of Indian companies globally is due primarily to their ability to provide knowledgeable and skilled IT professionals. The Indian IT industry has also been able to adapt fairly well to the changing needs of their global clients. Global businesses have not only been outsourcing their IT work to Indian IT service companies over the past three decades, but they have also started to locate in-house units in India in order to make appropriate use of the availability of this sizable and skilled workforce. On the other hand IT industry in a small country, such as Finland, is essential because of its significant export contribution in many industries using IT, highly knowledgeable workforce and educational system and research, development & innovation investments. Finland is known about a high level of knowledge in many cases, such as bank and other service automation, industrial IT-based systems and mobile computing. This paper highlights key issues of both countries in comparing the data from a large WorldIT Research (www.worlditproject.com), which is one of the largest studies on IT professionals in almost 40 countries (Palvia et al. 2017).

Antecedents of sustainable vocational education and training in ICT in Global South Countries

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Abstract

The topic of sustainability is another component of the complex issue of fostering effective vocational education and training (VET) in information and communication technologies (ICT) initiatives in Global South countries. There is not a workable model of VET for Development, and simple, symptomatic solutions are not suitable any longer. This paper attempts to summarize some drivers that can be considered as antecedents of this issue. They conform part of the big picture that arises when addressing long term, structural proposals. The prism of sustainability has been included as a complementary lens to look at it. Sustain-ability can serve to either shed some light on the issue or, alternatively, add some uncertainty and pressure, with the result of making it even more complex.

Keywords

Vocational education and training, Information and communication technologies, Global South, Sustainability.

The Role of Computer Science Education for Understanding and Shaping the Digital Society

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Abstract

In the omnipresent discussion on the role of ICT in education, the contribution of computer science education is often mentioned, but not always understood. This paper discusses the relation between ICT education and computer science education and the benefits of understanding the fundamental concepts and ideas of Computer Science (CS). Computer science is a dynamic and highly innovative science, whose products make a significant contribution to the development of the so-called "Digital Society." How should computer science teaching be adapted to the continuous technical further developments? Based on the outcomes of several research projects, this paper will outline how innovations in computer science can be taken up in order to improve the teaching of computer science. I.e., the topic of "databases" will in future offer a broader perspective on how to deal with data in the sense of "data management". Agile methods, which are known from professional software development, can support learners and teachers, despite difficult school conditions, to better achieve the objectives in project based teaching. Programmable microcontrollers extend the view of computers as standing on a desktop towards ubiquitous embedded or also cyber-physical systems, which enable new and motivating approaches for the design of computer science lessons in the context of physical computing. As a target perspective, pupils should be able to understand the phenomena of the "digital society", but also to be involved in the design of them in accordance to their needs.

Keywords

Computer Science Education, Digitalization.

The Integration of Web 2.0 in Teaching-Learning in Tanzania Higher Learning Institutions: The Case of the State University of Zanzibar (SUZA)

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Abstract

The emergence of new technologies has brought significant changes in teaching and learning environment in higher education institutions. One among the technologies that is being integrated in teaching and learning in higher learning institutions is Web 2.0. Web 2.0 is defined as "an increased emphasis on user generated content, data and content sharing and collaborative effort, together with the use of various kinds of social software, new ways of interacting with web-based applications, and the use of the web as a platform for generating, repurposing and consuming content" (Franklin & Harmelen; 2007). This paper highlights how Web 2.0 such as Learning Management System (LMS), Google drive, social media that have been integrated in the teaching-learning in the State University of Zanzibar (SUZA). It also explores some findings from students based on their perception of Web 2.0 integration. Finally, it pinpoints challenges encountered during the integration and what should be done to ensure the full integration of web 2.0 at SUZA.

Keywords

Web 2.0, Learning Management System (LMS), Social Media, teaching-learning, higher Learning institutions.

Will the Visualization of Internet Affect Languages of Education?

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Abstract

The impact of digitalization on daily activities has become pervasive, even in the Global South. The dominance of colonial languages in education is both strengthened and weakened by latest technologies. The paper asks whether new technologies could bring native language education available to a larger number of children in the world. The great affordances of new technological innovations could be utilized by school systems, and give students tools to enhance their learning. Mobile and visual technologies such as videos and emoji can empower people and give opportunities for wider communication if policies are enacted to support underprivileged people and grassroots activity. However, intensification of research is needed to outline promising futures for education of minorities, disabled and indigenous peoples.

Keywords

education, indigenous languages, future, emoji, digitalization

The Introduction of ICTs in Chilean Schools – The Various Initiatives Since Enlaces and The Issues Faced by Mapuche Students

Fernando Toro

Abstract

The Introduction of ICTs in Chilean Schools - The Various Initiatives Since Enlaces and The Issues Faced by Mapuche Students The use of Information and Communication Technologies (ICT) in education has for long time now, generated extensive interest as well as being attributed to have an important role in education. Prior to 1990, Chile had a minimal exposure to ICTs in education and thus with the return to democracy the country was also interested in the role that ICTs could have in education. Therefore, it embarked on a major initiative to introduce ICTs in schools and reform the education system. It must be noted that the reforms were implemented on the foundations of a free market model imposed by the previous dictatorial Pinochet regime and the many reforms that have taken place have not been without social and political challenges. This journey of reforms started in 1992 with the birth of 'Programa Enlaces' or 'Enlaces' for short, a pilot program that was first implemented in a small number of school in the capital, Santiago and was later expanded to include the region of Araucania. This region has the highest proportion of Mapuche people, as compared to other regions in Chile, in fact, over 30% of its inhabitants consider themselves Mapuche. It is also one of the poorest regions in the country. The Mapuche are the indigenous people of the south of Chile and Argentina.

Keywords

Information and Communication Technology (ICTs), Education, History of Computers in Chilean Schools, Chile, Educational Policy, Mapuche, Inclusion, Social Capital.

Digital Literacy Enhancement Status in Kenya's competency-based curriculum

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Abstract

Digital literacy (DL) is a one of the competency recommended for educators to be embedded in the Kenyan Competency Based Curriculum (CBC) in preparation for learners for the 21st century skills. The Ministry of Education deployed devices to lower primary at a ratio of 1 to 1. The aim of the research was to determine the level and frequency of embedding the digital literacy abilities after the teachers and school leaders in a 3-day preparation and 8 weeks of implementation with virtual support through Communities of learning.

The methodology was a self-administered survey which evaluated the seven abilities based on the level and frequency of implementation. The dot product of level and frequency were determined as a percentage. The analysis explored the average percentages and the relationship between level and frequency of implementation.

The findings revealed that there was a correlation between the level and the frequency of implementation. All abilities where at developing stage on average. The mode and mean on levels and frequency were on average similar apart from few cases where it was above. All the abilities had a bell curve on implementation with access, integrate and evaluate skewed to the right

It can be concluded that despite the deployment of devices there is still very low implementation of DL and there is a significant relationship between the level and frequency of implementation. There is need to interrogate possible factors to low implementation beyond devices and educator preparation with virtual support.

Keywords

Digital Literacy, Teacher Preparation, Competencies.

The Innovation Cycle for Sustainable ICT Education

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Abstract

Usually, the cycle of innovation is sold as a great progress in Education. However, in Education, the cycle of innovation does not exist as we might expect. Innovation is cyclical by itself. Each step of the structure can be modified, improved and complemented without waiting for a whole process that shows logic in other areas (engineering, logistics, and psychology, for instance) but that, in education, seems to be a luxury. This position paper shows why and how to perform a dynamic innovation cycle that enhances learning and teaching experiences, Worldwide, including North-North, North-South and South-South approaches, supported by initiatives by UNESCO, the International Council of Distance Education, Open Education Consortium, the European Commission and others.

Awareness of Open Education Resources (OER) in Higher Learning Institutions: Perspectives from undergraduate students from the State University of Zanzibar (SUZA)

Dr. Maryam, J. Ismail, Ms. Mwanajuma,S. Mgeni, Mr. Said. A. S. and Ali A. Abdulla
The State University of Zanzibar

Abstract

The Higher learning institutions are striving to provide effective learning experiences to address the needs of university students in crowded classes with limited printed teaching and learning resources. Open educational resources (OER) have emerged as a savior and have been quickly adopted in higher education in Zanzibar like elsewhere. OER are digital learning objects that are "offered freely and openly for educators, students, and self-learners to use and re-use for teaching, learning, and research(Goldberg and LaMagna,(2012,p.334).Since the 1990s, OERs has entered the world of academia and has inspired innovation in education, yet awareness of OER in higher education remains very low in Tanzania.

Findings obtained from the baseline study conducted at The State University of Zanzibar (SUZA) to explore the awareness of students on OER/MOOCs learning materials show that there is a serious gap in OER knowledge and a number of structural barriers toward the adoption of OER awareness. 352 first year undergraduate students (randomly sampled) out of 713 in the academic year 2014/2015 from three campuses participated in the study. Online questionnaire survey was employed in this study. Data were analyzed quantitatively and through the use of descriptive statistics. The results revealed that more than 40% of students are not exposed to OER/MOOCs offerings. Overall the data revealed that the use of OER at university is low, however, there is potential for growth of OER as many students have mobile and are using ICT. Most participants cited limited access, limited connectivity, and affordability to be significant barriers to wider adoption of OER in higher education in Zanzibar. There were also concerns about the limited ICT infrastructure at SUZA and the need to build the capacity of academics on OER integration.

Keywords

OER integration, MOOCs, Higher Learning institutions

Toward Pedagogy Driven Virtual Reality Learning Space Design

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Abstract

This paper argues for a need to develop Virtual Reality (VR) learning spaces based on pedagogy rather than implementing pedagogy in a general-purpose VR application. In doing so, the paper summarizes the challenges in using an immersive virtual reality application to unite together primary school children across national, regional, and political boundaries in the same learning space in order to promote natural learning. Data was collected through observations during the activity sessions among children from a Finnish and a Bangladeshi primary school. Furthermore, we collected data using semi-structured interviews and focus groups with teachers, heads of schools, and children from these two schools. The data analysis revealed three types of challenges: design, technological, and pedagogical. These findings guide us in designing and developing pedagogy centered learning spaces using virtual reality.

Keywords

Virtual Reality, Learning Environment, Pedagogy.

Student's Acceptance of Learning Management Systems: A Case Study of The National Open University of Nigeria

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[2] The University of Sheffield, Sheffield, UK

Abstract

This research examines the key factors that influence the acceptance of learning management systems (LMS') by students of the National Open University of Nigeria (NOUN). To achieve this, the constructs from previous studies on eLearning acceptance were adopted to develop a conceptual model. Based on the model, structural equation modeling (SEM) was applied to the da-ta obtained from 384 students. The results indicated that instructor quality is a determinant of learning value and perceived usefulness; system quality is a de-terminant of perceived ease of use and perceived usefulness; perceived ease of use, facilitating conditions, learning value, and perceived use-fullness are significant predictors of behavioral intention. Also, facilitating conditions and behavioral intention significantly predicted the usage of the LMS by the students. Contrary to expectations, the following relationships were found to be non-significant: course quality to learning value and perceived usefulness; and social influence on behavioral intentions. The conceptual model used in this study attains an acceptable fit and explains its variance for 67% of the student sample. This study contributes to the formulation of policies and guidelines to improve student's acceptance of learning management systems in developing countries. The paper also adds to the existing body of technology acceptance literature.

Keywords

eLearning acceptance, Nigerian universities, students, LMS

Notes

Booklet photos by Anni E Laitinen

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