

**Abstracts of the Papers
Presented at the
14th European Conference
on e-Learning
ECEL 2015**

**University of Hertfordshire
Hatfield
UK**

29-30 October 2015

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This Booklet of abstracts and other conference materials is provided to conference participants for use at the conference.

Conference Proceedings

The Conference Proceedings is a book published with an ISBN and ISSN. The proceedings have been submitted to a number of accreditation, citation and indexing bodies including Thomson ISI Web of Science and Elsevier Scopus for indexing.

The Electronic version of the Conference Proceedings is available to download from DROPBOX. (<http://tinyurl.com/ECCL2015>) Select Download and then Direct Download to access the Pdf file. Free download is available for conference participants for a period of 2 weeks after the conference.

The Conference Proceedings for this year and previous years can be purchased from <http://academic-bookshop.com>

E-Book ISBN: 978-1-910810-71-2

E-Book ISSN: 2048-8645

Book version ISBN: 978-1-910810-70-5

Book Version ISSN: 2048-8637

CD Version ISBN: 978-1-910810-72-9

CD Version ISSN: 2048-8637

Published by Academic Conferences and Publishing International Limited
Reading, UK

44-118-972-4148

www.academic-publishing.org

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Preface

These Proceedings represent the work of contributors to the 14th European Conference on e-Learning, ECEL 2015, hosted this year by the University of Hertfordshire, Hatfield, UK on 29-30 October 2015. The Conference and Programme Co-Chairs are Professor Amanda Jefferies and Dr Marija Cubric, both from the University of Hertfordshire.

The conference will be opened with a keynote address by Professor Patrick McAndrew, Director, Institute of Educational Technology, Open University, UK with a talk on “Innovating for learning: designing for the future of education”. On the second day the keynote will be delivered by Professor John Traxler, University of Wolverhampton, UK on the subject of “Mobile Learning – No Longer Just e-Learning With Mobiles”.

ECEL provides a valuable platform for individuals to present their research findings, display their work in progress and discuss conceptual advances in many different branches of e-Learning. At the same time, it provides an important opportunity for members of the EL community to come together with peers, share knowledge and exchange ideas.

With an initial submission of 169 abstracts, after the double blind, peer review process there are 86 academic papers, 16 Phd Papers, 5 Work in Progress papers and 1 non academic papers in these Conference Proceedings. These papers reflect the truly global nature of research in the area with contributions from Algeria, Australia, Austria, Belgium, Botswana, Canada, Chile, Coventry, Czech Republic, Denmark, Egypt, England, Estonia, France, Germany, Ireland, Japan, Kazakhstan, New Zealand, Nigeria, Norway, Oman, Portugal, Republic of Kazakhstan, Romania, Saudi Arabia, Scotland, Singapore, South Africa, Sweden, the Czech Republic, Turkey, Uganda, UK, United Arab Emirates, UK and USA, Zimbabwe.

A selection of papers – those agreed by a panel of reviewers and the editor will be published in a special conference edition of the EJEL (Electronic Journal of e-Learning www.ejel.org).

We wish you a most interesting conference.
Amanda Jefferies and Marija Cubric
October 2015

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Conference and Programme Chairs



Dr Amanda Jefferies is Professor of Technology Enhanced Learning in the School of Computer Science at the University of Hertfordshire in the UK, where she leads the Technology Supported Learning Research group. She has directed, evaluated and disseminated several Jisc-supported UK projects including STROLL, EEVS, and iTEAM for managing institutional change when technologies are introduced into Higher Education. In

2011 she was awarded a UK National Teaching Fellowship, in recognition of her long standing commitment to promote an excellent student learning environment and for her associated research into using technology to support blended student learning in universities. She has presented her work at national and international conferences across the UK and Europe and further afield in the USA, China and Australia.



Dr. Marija Cubric is a Reader in E-learning and a member of Information Systems and Project Management subject group at University of Hertfordshire. She is interested in development and evaluation of innovative learning models within the framework of the design science research. Her work is frequently inspired by the design patterns from other domains such as engineering, and business which she collected while

working as a software and system designer in telecommunication industry. She holds a PhD in Computer Science from University of Concordia, Montreal, and MSc in Mathematics' and Informatics from University of Belgrade. In e-learning circles Marija is best known for her innovative use of wiki-supported-collaborative learning and agile practices in learning and teaching.

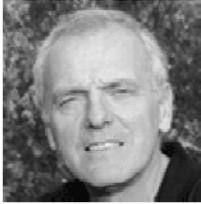
Keynote Speakers



Professor Patrick McAndrew is Director of the Institute of Educational Technology and Professor of Open Education at The Open University. IET is a strategic academic unit carrying out research, supporting the University and offering post-graduate qualifications in online and distance education. IET's programmes include developing learning analytics and learning design to drive quality enhancement processes in the Univer-

sity. In his own research Patrick has led the development of approaches to open and

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Professor John Traxler is Professor of Mobile Learning, the world's first and a full UK professor since September 2009, at the University of Wolverhampton UK. He is one of the pioneers of mobile learning and has been associated with mobile learning projects since 2001 when he was evaluator for m-learning, the first major EU project, embracing Sweden, Italy and UK. He is a Founding Director and current Vice-President of the International Association for Mobile Learning, responsible for the annual mLearn research conference running since 2002. He is co-editor of the definitive book, *Mobile Learning: A Handbook for Educators and Trainers*, with Professor Agnes Kukulska-Hulme.

Mini-track Chairs



Dr Anders Avdic, BSc, PhLic, PhD, is assistant professor in Information Systems at Dalarna University, Sweden. He received his PhD in Information Systems in 1999 from Linköping University. His research focuses on IT and learning and he is currently involved in projects on the Flipped Classroom, Game Based Learning and Learning through End User Development.



Professor Mark Brown is Director of the National Institute for Digital Learning (NIDL). Before taking up this position at the start of 2014, Mark was Director of both the National Centre for Teaching and Learning and the Distance Education and Learning Futures Alliance (DELFA) at Massey University, New Zealand. Mark's main research interests are in the areas of digital learning, blended learning, learning design, effective pedagogy, teaching and learning development, the nature of the student learning experience, and the forces and tensions influencing educational policy.



Dr. Gabriele Frankl is head of the department of e-learning at the Alpen-Adria-Universität Klagenfurt (Austria). In her current position, she provides continuous support to learning communities and work groups. Facing the challenges learners and workers are confronted with every day, she is highly interested in improving solutions for collaboration, e.g. through social media. Her research interests are e-learning, (e-) collaboration, overcoming social dilemmas (she developed the concept of win-for-all), social media and knowledge management. The dissertation (2010) of Gabriele Frankl focuses on benefits for all through collaboration in knowledge management and e-learning. She implemented knowledge management and e-learning-systems for international companies.



Dr Mark Glynn has a PhD in Chemistry, a MSc in e-learning and a certificates in Learning and Teaching in higher education and online assessment. He plays key leadership roles in promoting innovative teaching and learning methods throughout the sector and is considered to be a leading authority in the use of virtual learning environments. Currently Mark is the Head of the Teaching Enhancement Unit in Dublin City University. The main aim this role is to manage the digital learning services for the Dublin City University and encourage and enable staff in DCU to increase their capacity to offer flexible learning.



Dr Daniyar Sapargaliyev is deputy Director of Research Department at Almaty Management University (Kazakhstan). He received his PhD from the Eurasian National University. His research interests include mobile learning, using mobiles and wearables in education. He has written publications in refereed books, journals and conference papers.



Angela Shapiro is a Senior Lecturer in The School of Engineering and Built Environment at Glasgow Caledonian University, Scotland. She applies academic literacies using a blended learning approach to augment the learner experience, especially when embedded in the student's own discipline. She is the Chair of the Gathering the Voices Association; the purpose of which is to educate current and future generations about the impact of the Holocaust on survivors who came to settle in Scotland.

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Wendy Barber is the Director of the B.Ed. Program at the University of Ontario Institute of Technology in Oshawa, Canada. Her research interests lie in Health and Physical Education, and Creating Online Communities. Wendy is a passionate advocate for teacher education, teaches Authentic Assessment and Adult Education, and Psychological Foundations in Digital Technology.

Samsun Basarici works as a lecturer at Yasar University, Izmir, Turkey and is the Head of Computer Technologies Department at the same university. His main research and teaching areas are (medical) image processing, neurosciences, computer graphics and game programming. Basarici holds BSc in Computer Engineering and MSc in Informatics degrees from University of Hamburg, Germany and a Ph.D. at International Computer Institute at Ege University in Izmir.

Thomas Bendsen is a senior lecturer at VIA University College, Denmark, School of medical laboratory technology. He is interested in livestreamed teaching, with particular focus on implementing technology to facilitate better dialogue between teacher and students, and improving the experience of presence with respect to the remotely located students.

Steve Bennett has been a lecturer for over 15 years. He is currently Principal Lecturer in Computer Science at the University of Hertfordshire. His recent research has been in using clicker technology for peer evaluation among students doing technical assignments.

Dan Berger is a lecturer at the University of Hertfordshire, teaching Con & Ad, Jurisprudence and Equity & Trusts. He leads the School's mooting activities and WoW programme. Following his BPTC, Dan pursued research into legal reasoning with an emphasis on Bayesian probability methods. He is an advocate for the use of authentic assessment.

Sheila Bonnard is Instructional Services Librarian at Montana State University in Bozeman, Montana. She holds a MLIS from the University of Arizona and a MEd from the University of Montana. She is involved in a project using web conferencing for library instruction and co-chaired the Innovative Learning Studio visioning group.

Margaret Brown has worked at Glasgow Caledonian University for the last 15 years. Her latest role is within the Glasgow School for Business and Society's Learning Development Centre as an Academic Development Tutor with a specialist role in ICT Skills support.

Barbara Brownie leads online postgraduate study in the School of Creative Arts at the University of Hertfordshire. She lectures in Graphic Design, Fashion, and Illustration, at undergraduate and postgraduate level. She also runs an academic blog, Costume & Culture, which has been syndicated by The Guardian and Vestoj.

Peter Bryant is the Head of Learning Technology and Innovation at the London School of Economics and Political Science. He leads a team of innovative educators, learning technologists and researchers that are using technology as a way of transforming the learning and teaching experience at the School.

Mie Buhl is Professor in ICT, Didactics and Visual Culture. Head of Communication, ICT and LearningDesign (KILD) and Research Lab: ICT and Learning Design, Department of Communication and Psychology, Aalborg University Copenhagen. Research Interests: Visual Culture, Media and ICT with an emphasis on University Education, Teacher Training, Primary School and with the focus on visual learning.

Diana Buzila works closely with management at over twenty EA locations to determine and address the training needs within a global quality assurance organization. She aligns course content, manages teams of subject matter experts to develop con-

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Rosana Capredoni is a Masters student at York University, Toronto, Canada. She graduated Summa Cum Laude in 2014 from Universidad Andrés Bello, Santiago, Chile, with a Bachelor's degree in English Education. She has worked as an EFL teacher in Chile and Argentina, and her major fields of interest are teacher education, teachers' professional identity and the role of technology in the promotion of identity change.

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Mark Childs is a freelance academic, working for several universities and learning organisations. Since 1997 he has worked on nearly 40 technology-supported learning projects as an evaluator, manager and principal investigator, predominantly in synchronous online communication. In parallel to this he has had posts in academic development at Wolverhampton, Warwick, Coventry and Worcester Universities.

Sebastiano Cincinnato is a PhD-candidate from the Department of Educational Sciences, Vrije Universiteit Brussel, Brussels, Belgium. His PhD-research focuses on investigating the relationship between institutional and teacher characteristics on the one hand, and teacher practices in online and blended learning environments on the other; and how this relationship affects student learning outcomes.

Jamie Clarke is senior lecturer and co-course leader of Media Culture and Production at Southampton Solent University. He teaches across a range of academic and production units, with a particular focus on the political economy of film and television. His research interests focus on media production cultures and the student experience.

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Katja Derr worked for several years in the field of media production and screen design. After completing a degree in education at Freiburg University of Education in 2007, she started working in e-learning projects in tertiary education. Since 2012 she is part of the research staff team “Formative e-assessment” in the joint research project optes.

Elizabeth Downs, Ph.D. is a professor in the Instructional Technology program at Georgia Southern University in Statesboro, Georgia. Her research interests include the use of ePortfolios in instruction, variables for online learning, and characteristics of Generation Y learners.

Patrick Doyle has an MSc in Multimedia Systems and over seven years’ experience in researching and embedding technology in educational environments. He has collaborated with academics on projects ranging from medicine to 3D model making and design. An inherent desire to find solutions to academic queries, he has initiated several collaborations between Irish tertiary institutions.

Louise Drumm is a doctoral researcher based in Glasgow Caledonian University’s Centre for Lifelong Learning and Learning Enhancement and Academic Development. Her research is concerned with the role of theory in university teaching using digital technologies. She has worked in higher education as a learning technologist, academic developer and lecturer.

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Sultan Qabous University Students' Attitudes Towards Using Smart Phone Educational Applications

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Abstract: A distinctly 21st century invention, the smartphone is one of the newest technical objects to appear on the tertiary education scene. Smartphones can be used for a variety of educational and non-educational purposes. Smartphone educational applications can play a big role in enhancing instruction and learning process in universities. In this context Sultan Qabous University has begun implementing mobile learning with smartphones. With the university's smartphone app, students can view their course materials, flag and mark posts even when they are offline, and participate in class discussions, gaining required participation points from anywhere, see shuttle times, an event catalogue, create, collaborate, and evaluate questions regarding educational topics, and view the availability of library resources. This study aims at investigating the app didactic use and the potential to enhance student learning in university subjects in ubiquitous environments and exploring Sultan Qabous University students' attitudes towards using the university smartphone apps. The research sample consists of 200 students, 95 female and 105 male, chosen randomly from four faculties: Education, Arts and social sciences, Engineering and Science. This study has been developed through two perspectives; the first being through a descriptive methodology in which the researcher has detailed the university mobile apps students use. The second perspective is a quantitative methodology in which students' attitudes towards the capabilities of smartphones and apps for improving learning processes in university subjects were assessed. A scale has been developed and validated to identify two factors: A) the university mobile apps students use, B) students' attitudes towards the university mobile apps. The study findings showed that (1) there are no significant differences between males and females in using the university mobile apps , (2) students at the final grade use the university mobile apps more than students at the first grade, (3) students at theoretical faculties, Arts and social sciences and Education, use the university mobile apps more than students at practical faculties, science and engineering, and (4) there are positive attitudes towards using the university mobile apps specifically for following university subjects as a new format which both supports and enhances learning practices while also providing not only further opportunities to establish connections and relations with their

subjects, but also fostering collaborative work among students and professors. Therefore, it is recommended that universities continue developing new didactic strategies to connect both formal-informal and face-to-face ubiquitous learning settings and mobile apps.

Keywords: smartphones, e-learning, Sultan Qaboos University, smart phone applications, m-learning

ArcForm as a Notational Foundation for e-Learning Systems

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Abstract: New e-learning systems often innovate by bringing together different content representation forms (multi-modality) and the orchestration of access to the individual representations (workflow). The representation forms themselves (e.g. prose text, algebraic equations, video, concept maps and many others) are the building blocks of new e-learning designs, however most of these representation forms predate the field of e-learning research or even digital media. A less usual approach to e-learning innovations is to design new representation forms. ArcForm (Allsopp, 2013) is a new network notation using nodes, arcs and labels. It uses arcs connecting two nodes to represent transitive statements, but it differs significantly from other network or graph based notations by for example also allowing arcs that point from or to other arcs and thereby supporting recursive composition of complex meanings. The result uniquely combines four areas of notational value: 1) It is similar to natural language - both in its expressiveness and in the way meanings are expressed. 2) It presents separate meanings as separate, though connected, tokens supporting a visuospatially intuitive experience similar to navigating a geographical map. 3) It is based on a simple syntax that allows meaning to be stored as structured data thereby supporting querying, filtering and the dynamic visualisation of content. 4) Finally, it allows individual meanings to be the object of online social evaluation. This notation can be considered as a foundation for a new category of e-learning systems. The idea is that these e-learning systems would allow users on a meaning by meaning (rather than a page by page) level to follow their own paths through available knowledge, to explore only what they find most interesting for their current learning goals, and to configure views that present content that they find relevant. One possibility is that it will allow students to develop and demonstrate reflective thinking independently of traditional essay writing skills. This is explored through an imagined

scenario where a student interacts with one of these systems to create a new perspective using existing meanings.

Keywords: ArcForm, network notations, knowledge representation, visuospatial text, social evaluation

The Flipped Classroom: A Computer System to Diagnose Errors in Solving Equations

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Abstract: This paper presents on a research project being undertaken at the University of Hertfordshire. The aim of this project is to understand the errors that students make when attempting to solve simple linear algebraic equations. In order to achieve this aim a computer system has been developed that is able to separate out and classify errors relating to a lack of understanding of principals involved in solving such equations from errors relating to the lack of the basic mathematical skills necessary to solve them. The software presents students with a set of random equations for them to solve. The system is able to filter out these different classes of errors using a simple interactive dialogue box. The error profile for each learner is stored in a database in the form of a learner model. It is intended that the learner model generated by the system will be used to advise remedial paths for learners depending on the particular knowledge or skill they lack. So far a fully operational prototype system has been developed and has been tested by domain and computer science experts and university students prior to a full-scale test with school students in the near future. This paper presents the findings of our initial study and suggests ways in which the system might be developed and applied in the future.

Keywords: student models, diagnosing errors, student models, individualising learning

Record of Undergraduates' Activities in Virtual Learning Environments

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Abstract: Virtual learning environments (VLEs) have witnessed a high evolution, namely regarding their potentialities, the tools and the activities they provide. VLEs enable us to access large quantities of data resulting from both students and teachers' activities developed in those environments. Monitoring undergraduates' activities in VLEs is important as it allows us to showcase, in a structured way, a number of indicators which may be taken into account to understand the learning process more deeply and to propose improvements in the teaching and learning strategies as well as in the institution's virtual environment. Although VLEs provide several data sectorial statistics, they do not provide knowledge regarding the institution's evolution. Therefore, we consider the analysis of the activity logs in VLEs over a period of five years to be paramount. This paper focuses on the analysis of the activities developed by students in a virtual learning environment, from a sample of undergraduate students, approximately 7000 per year, over a period of five academic years, namely from 2009/2010 to 2013/2014. The main aims of this research work are to assess the evolution of activity logs in the virtual learning environment of a Portuguese public higher education institution, in order to fill possible gaps and to hold out the prospect of new forms of use of the environment. The results obtained from the data analysis show that overall, the number of accesses to the virtual learning environment increased over the five years under study. The most used tools were Resources, Messages and Assignments. The most frequent activities developed with these tools were respectively consulting information, sending messages and submitting assignments. The frequency of accesses to the virtual learning environment was characterized according to the number of accesses in the activity log. The data distribution was divided into five frequency categories named very low, low, moderate, high and very high, determined by the percentiles 20, 40, 60, 80 and 100, respectively. The study of activity logs of virtual learning environments is important not only because they provide real knowledge of the use that undergraduates make of these environments, but also because of the possibilities they create regarding the identification of a need for new pedagogical approaches or a reinforcement of previously consolidated approaches.

Keywords: virtual learning environment, activity logs, digital tools, digital contents, undergraduates

Understanding MOOCs Through Connectivist and Social Constructivist Approaches

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Abstract: During only a few years, MOOCs have been widespread adopted and accepted as part of the educational agenda. The massive aspect, the social networking, and the idea of new student roles where the student is the main responsible for self-organizing her or his participation are main drivers in the learning processes. The current development of MOOCs can be seen as having two distinct directions; cMOOCs, defined by a participative pedagogical model based on the principles of connectivism, which is introduced as a new learning theory; and xMOOCs, developed as extensions of traditional courses, and to a higher degree based on an instructional model. However, as MOOCs have spread globally and developed, this dichotomy is no longer sufficient. From a mapping of UK MOOCs, Bayne and Ross suggest that the emergence of MOOCs gives rise to discussions of central pedagogical questions of What, How and Whom, which are well-known and not yet solved issues in e-learning (Bayne and Ross, 2013, p. 8). We therefore wish to discuss MOOCs from more multiple perspectives and raise issues which emerge from the current reports on practices with MOOCs. A social constructivist perspective on learning acknowledges both the participatory approach to learning and the role of the teacher as an important moderator of students' learning processes. Using this as a pedagogical model for a large scale programme like MOOC is of course challenging. A recent study on students' interaction and collaboration shows that the large scale make students search for other students with whom they share goals, and suggests that scaffolding activities of the teacher may be practiced by adding supportive posts with important learning patterns (Andersen et al, 2014). The scaffolding learning activities (Vygotsky, 1986) based on a culture of discussion and critical thinking draw on insights from the field of it-didactic design, with an emphasis on the students' own design of their learning processes. In a large scale programme, where moderating activities may be distributed to assisting students/teachers, the didactic competence among students may draw on the technologies of connectivity in combination with the pedagogy of social constructivism, where instructions and discussions provide new patterns for understanding.

Keywords: teacher roles, knowledge domains, massive open online courses, connectivism, social constructivism

Flipped Classroom and Learning Strategies

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Abstract: This paper seeks to answer the research question, “How does the flipped classroom affect students’ learning strategies?”. In e-learning research, several studies have focused on how students and teachers perceive the flipped classroom approach. In general, these studies have reported pleasing results. Nonetheless, few, if any, have attempted to identify the potential effects of the flipped classroom approach on how students learn. This study was based on two cases: 1) a business modelling course and 2) a research methodology course. In both cases, participating students were from information systems courses at Dalarna University in Sweden. Recorded lectures replaced regular lectures. The recorded lectures were followed by seminars that focused on the learning content of each lecture in various ways. Three weeks after the final seminar, we arranged for two focus group interviews to take place per course, with 8 to 10 students participating in each group. We asked open questions on how the students thought they had been affected and more specific questions that were generated from a literature study on the effects of flipped classroom courses. These questions dealt with issues of mobility, the potential for repeating lectures, formative feedback, the role of seminars, responsibility, empowerment, lectures before seminars, and any problems encountered. Our results show that, on completion of the courses, students thought differently about learning in relation to more traditional approaches, especially regarding the need to be more active. Most students enjoyed the mobility aspect of the flipped classroom approach, as well the accessibility of recorded lectures. However, a few claimed it demanded a more disciplined attitude. Most students expressed a feeling of increased activity and responsibility when participating in seminars. Some even felt empowered, because they could influence seminar content. The length of recorded lectures and the opportunity to navigate within them were also considered important. The arrangement of the seminar rooms should promote face-to-face discussions. Finally, the types of questions and tasks were found to affect the outcomes of the seminars. In conclusion, we found that, if students are to be active, responsible, empowered, and critical, they have to be informed. They also need to have the opportunities and mandate to influence how, where and when to learn. Finally, they should be able to receive continuous feedback during the learning process. A flipped classroom approach can support such a learning strategy.

Keywords: flipped classroom, learning strategies, active learning, responsibility, empowerment

Digital Pedagogy and the Social Construction of Knowledge in Physical Education Teachers

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Abstract: This paper is a qualitative case study of the social construction of knowledge in physical education teachers and teacher candidates through digital environments. Physical education teachers normally use ongoing reflection, teamwork and collaboration to improve professional practice, and they do so through daily dialogue and the development of social relationships that extend beyond regular teaching hours. While this is innate and valuable to the unique culture of physical educators, it is limited to those who can meet face to face. In order to expand the knowledge mobilization for physical education teachers and teacher candidates, both nationally and internationally, the authors developed an online professional learning community as an adjunct to traditional physical education teacher education. This community shared knowledge through a blog, twitter, Facebook and weekly videoconferencing meetings. The authors attempted to replicate this distinct culture of knowledge sharing by capturing the innately social nature of physical education teacher knowledge using digital environments. The central research question resides in how to best connect PE teachers and teacher candidates using digital means, in the same way that they would informally connect and learn from daily face to face discussion and reflection. Can online environments be effectively used to replicate this professional PE learning community by bringing together teacher candidates and their mentors in synchronous online Adobe connect sessions? Findings indicated that students found the experience invaluable, as they had the opportunity to have informal talks from professionals at two different universities. The online community provided real time access to the latest developments in Health and Physical Education, including the release of UNESCO's Quality Physical Education Policies, the political challenges faced by the release of the new Ontario Health and Physical Education Curriculum and recent legislation surrounding concussion protocols. This paper suggests practical strategies for using the digital world to mobilize knowledge in Health and Physical education teachers and teacher candidates.

Keywords: social construction of knowledge, online physical education teacher development

Modelling and Motivating High Quality Academic Work With Live Peer Evaluation

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Abstract: On a number of new media related courses led by the authors, significant gains in student attainment and motivation have been witnessed. One factor in this has been the use of EVS clickers for feed-forward exercises, peer assessment and as aids to class discussion. Alongside these courses we have also ran a number of focus groups where students have been asked to share their experiences of these techniques. This paper seeks to share this practice and ponder the principal factors of the live peer evaluation experience which leads to these learning and motivational gains. We believe them to be metacognition, granularity of focus, open communication and self-efficacy.

Keywords: feed-forward, peer evaluation, clickers, self-efficacy, exemplars

Adaptive Guidance for Disciplinary Competencies Self-Learning Using an Educational Hypermedia

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Abstract: Our work is at the crossroads of educational adaptive hypermedia and the competency based approach. Adaptive Hypermedia Systems (AHS) are based on a domain model and a learner model to provide a virtual hypermedia to the learner. To achieve the interconnection between the domain representation and a virtual hypermedia, different techniques are used. We are particularly interested by the technique of direct relationship that allows building the structure of the virtual hypermedia by associating to each concept of the discipline one or more physical pages of the virtual hypermedia in one hand. In the other hand, each of the semantic links between the discipline concepts corresponds to hyperlinks in the virtual hypermedia. The AHS have already proven their usefulness in the context of self-learning of subject knowledge in the case of objective based pedagogies. We propose here to use them in the context of self-learning of disciplinary competencies. Indeed, we suggest an AHS that generates a guide map of the disciplinary competencies with all the other connected concepts to study according to the semantics of the discipline defined

by the domain ontology in the background of the disciplinary knowledge base and the learner's profile. This last is deduced from the learner's model where we put mainly three classes of parameters: cognitive ones that define the state of knowledge particularly the respective performance level for each competency, resolved problem situation..., type of intelligence which defines a learning style, preferences and identification parameters. The disciplinary competencies domain ontology used to generate the AHS domain is designed around these main concepts: disciplinary composed competency, disciplinary elementary or granular competency, contextualized problem situation, potential obstacles, potential instructions ... Also; we have semantic relations including the prerequisite relationship and the composition one. A prototype was developed to test the feasibility of the dynamic generation of the guide map for the case of first level relational databases learning where a knowledge base was generated from the proposed domain ontology. After that, the prototype was tested with a group of students from our university. The results were interesting.

Keywords: adaptive educational hypermedia, competencies-based approach, disciplinary ontology, self learning, guidance

Improving Student Interaction and Engagement in the Flipped Classroom

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Abstract: We present concepts, results and preliminary results from two different graduate courses that were run in flipped classroom format at the University of Stockholm and at the Berlin School of Economics and Law. Both courses involved extensive audio and film material and relied on students teaching each other, similar to the Learning by Teaching method developed by Jean-Pol Martin. The purpose of the two experiments was to investigate whether a design science approach to developing flipped-classroom courses can be recommended and especially whether the design can secure student interaction and engagement. We designed two different courses in order to evaluate most of the relevant aspects of the flipped classroom design. We then collected data via student evaluations, student activities in online systems and student reports. Our findings lead us to conclude that if the goal is to assist students in teaching each other, it is best to base number, extent and timing of these elements on an assessment of student expectations rather than setting them

as a standard for all groups of students and courses. The course design should instead be adapted to the students. These conclusions are consistent with experiences that we made in another similar course in which we opted for a standard approach with fixed timing, extent and number of learning elements. Our major finding is that a design science approach can be recommended for developing flipped classroom courses, but needs to be customised for individual groups using ongoing feedback about course structure, content and delivery methods. This was indicated by successful evaluation results on most of the designed strategies for promoting student interaction and engagement. We cannot argue that our specific designs were better than any other successful design, but we can argue that a design approach creates results that can be evaluated.

Keywords: design science, immersion, interaction, learning-by-teaching, Moodle, storytelling

Nature or Nurture: A Case Study of ICT Competency

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Abstract: As higher education institutions move to include more technology and blended learning they must ensure that the student populace can fully participate and engage. This case study reports the findings from a ten year investigation of new students attending Glasgow Caledonian University (GCU), evaluating their Information and Communications Technology (ICT) competency. The study examines ICT competence in relation to using ICT for basic academic purposes. Further analysis was undertaken to provide information that was specific to age and gender and ICT competence. The information was gathered before or during the first week of their programmes. Following the recommendations of the Dearing Report (1997), GCU instigated a baseline level of ICT competence that was required by all graduates in the form of a non-credit bearing module. The areas identified as being required were as follows: Computer Basics; Email; Word Processing 1 (basic) and 2 (advanced); Searching for Information; Basic Spreadsheets and Integration of ICT Applications. However, by 2006 this provision was reviewed and the requirement for the ICT baseline questioned as a growing body of literature emerged, portraying a stereotypical view of young people born in the 80's who had grown up in a technological rich and intense environment. These cohorts were believed to have the prerequisite skills required to engage with technology and the ICT baseline compulsory requirement was removed. The module, however, was retained for any student who wished to undertake it. The analysis examined students' perception of their competence, if

they were not competent in an area they were considered to have a training requirement. The findings indicated that the requirement for ICT Skills training had remained consistent over the areas outlined and the ten year period of the study. The only area displaying a marked decrease year on year was the use of Email. However, when the results were analysed in terms of age the picture presented was quite different, revealing that the younger the student, the more inclined they were to self-evaluate as being competent. The results in relation to gender analysis indicated that women self-evaluated as being less adept than their male counterparts, for all areas irrespective of age. In view of these findings, higher education institutions must consider strategies in terms of supporting student with ICT deficiencies. The increasing use of technology within higher education and the uptake of blended learning techniques make understanding student needs in terms of ICT training vital.

Keywords: ICT, competency, blended learning, education, employability

In Another Instant: Focus and Interaction in Creative Arts Learning

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Abstract: This paper will look at several aspects of the use of social media within contemporary Higher Education. It will consider projects and attitudes initiated by staff from the School of Creative Arts at the University of Hertfordshire in which the already widespread technology of such media is employed, not just as a mere supplement to the use of orthodox classroom technology within teaching but as a productive resource in its own right. The use of the mobile phone as a teaching/learning device will be considered; the pros and cons of employing such technology in the classroom will be outlined and debated. In particular the instant sharing of photographic imagery will be looked at. Is this a way of opening up common debates or in fact little more than a distraction in the classroom? The use of dual-screen technology within the classroom will also be examined for its potential to expand the possibilities of learning, again considering the positive and negative features of this medium. The paper will also take into account, using a series of informal case studies, the perceptions and practical usage of such technology from the point of view of the student user. Is the user's identity determined by their extensive use of this technology or does it merely play only a minor part in the forming of identity as such? Can the classroom use of such technology expand the possibilities for learning and teaching

into new pedagogical domains, or does it simply enable already-established exchanges to be carried out by other means? How does student familiarity and ease with services such as Twitter, Instagram and Facebook contribute to or effect their sense of self and the possibilities of its development and expansion? Student response and selfhood are complicated issues worthy of further examination.

Keywords: dual-screen, mobile, interaction, instantly, creative

Disrupting how we ‘do’ On-Line Learning Through Social Media: A Case Study of the Crowdsourcing the UK Constitution Project

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Abstract: Social media and higher education pedagogy have enjoyed a chequered relationship, with significant debates about the efficacy of social media as a site of learning, the manager/host of an individual’s learning trajectory and as a tool of facilitating collaborative learning at scale. This paper presents the exploratory findings from the evaluation of Constitution UK, an innovative civic engagement run by the London School of Economics. We argue that some of the behaviours inherent in social media learning (centred on fleeting connections, digital identity and discontinuous engagement) can create the conditions for effective learning and achievement at scale. Through the project we identified a number of challenges that social media as a learning platform and mode of learning itself pose for traditional on-line education including the role of the academic, the transformative effect of harnessing the massive and difficulties in approaching learning design in an unstructured and informal environment.

Keywords: social media, civic engagement, innovative pedagogy, participatory dynamics, digital citizenship, massive scale learning

Blended Learning Promoting new Developments for Nordic Master Programs in Visual Studies and Art Education

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Abstract: This paper presents and discusses a blended course design in the international Nordic Visual Studies and Art Education (NoVA) master's program developed and conducted by four Nordic partners. We examine a particular course - *Visual cultures and aesthetics in digital communication and learning designs (VCAD)* - in which e-activities are targeted to enhance a learning cycle shaped by the practical design experience of ten students. The cycle also includes theoretical reflections (Buhl 2013), and particular emphasis is put on social media, aesthetics, and visual culture for learning purposes (Ejsing-Duun & Buhl forthcoming). The blended learning course VCAD involved a combination of face-to-face teaching with usage of location-based and mobile activities involving i-nigma, Instagram, and Pinterest, which comprised their learning materials and platforms. Furthermore, the course included online activities via the learning management system Moodle and the presentation and video conferencing system Adobe Connect. Studies on design-based research (DBR) approaches (Amiel & Reeves 2008, Dede 2004) inspired the principles for the research design, as teachers made interventions during the VCAD course. The research approach was also moulded by the specific discipline of art education, which is characterized by currents in contemporary art and visual culture, where image-making as the social negotiation of meaning-making and cultural interventions is practiced (Mitchell 2002, Mirzoeff 2000, O'Rourke 2013). Our research focus is how blended, distributed e-activities provide a new approach to the field of visual arts education, which is traditionally based on image-making associated with presence and individual forms of expression in which theory is taught separately. The educational design of the VCAD course is discussed throughout the article. This discussion is supported by the VCAD course evaluation and the ten students' design products and theoretical reports. We argue in favour of a theory-generating practice made operational through a functional learning approach comprising blended e-activities subordinate to the particular objectives of a specific discipline.

Keywords: theory-generating practices, functional learning approach, open resources, mobile learning, design-based research, visual arts education, blended learning

Professional Development of Academic Workers: Creating new Open Course to Enhance English Language Competence of Academic Workers

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Abstract: New developments and trends in information and communication technology, higher requirements of employers and competition at the labour market emphasize the imperative for institutions to be learning organisations and developing their staff by providing opportunities for continuing professional development at the workplace. A great way to retain staff and nurture employees' skills is to promote consistently and actively professional development as well as further education, both formal and non-formal. Encouraging professional growth shows the team that managers support their progress and it might inspire employees' loyalty. Professional development of university teachers is vitally important as they are responsible for creating appropriate environment in which teachers and students benefit from their knowledge and skills. Demands on academic workers are constantly growing as they must be not only good teachers, but also professionals with effective communication skills, both in the mother tongue and foreign languages. The learning process at universities becomes more complex and communication in foreign languages together with digital literacy belong to key competences contributing to personal fulfilment of academic workers. In academic education, there has been a wide interest in using information and communication technologies for educational purposes. The contribution is focused on the process of designing open courses for teaching English based on the academic workers needs analysis, courses description, as well as on teachers and users experience. The teachers of English at the University of Defence Language Centre prepared three different open courses to enhance communication and academic skills in English. Blended learning strategies are implemented in the courses. The face to face courses are supplemented with interactive study supports, presentations, electronic tests, and other materials in the Learning Management System Moodle. The aim of the courses is to increase the academic staff abilities not only to teach in English, but also to assess students work, communicate, and interact with them.

Keywords: professional development, academic workers, blended learning strategies, interactive study supports, English language competence, academic skills in English

Learning English Language Through LMS: Designing a new Course

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Abstract: No university in the 21th century is able to exist without either an open source or a commercial version of a software package which enables teaching and learning online. Learning management systems (LMS) in tertiary education are becoming commonplace and play a prominent role in the education process, creating a new environment by altering existing teaching and learning programmes - from traditional classes, through blended ones, to completely synchronous or asynchronous distance courses. LMSs are the most representative e-learning applications. Some exist as open source software, others are commercially provided. They can be used for distance-learning and as a supplement to in-class lectures, on which course announcements, homework assignments, lecture notes and slides can be posted, for access via Internet (OECD, 2005). The University of Defence is becoming a distance education provider through adopting web-based learning and teaching via Moodle LMS, which enables both on-university students and off-university students – military professionals - to access their courses. The authors' objective was to design courses that combine good technical support and quality content and to examine the possibilities for the implementation of written to spoken word conversion software. The article discusses the viability of using a combination of Moodle LMS and Balabolka text-to-speech (TTS) conversion tool for enhancing English language skills of Czech military professionals in compliance with NATO STANAG 6001.

Keywords: Moodle LMS, TTS program, language skills, course designing, course planning, pedagogical principles

Collaboration in Social Applications: True Story, Case-Study

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Abstract: This paper contributes to the exploration of the virtual environment of social applications for educational purposes in the university setting from students' perspective. Latest results and findings from a repeated research on utilization of social applications are presented. The aspect of real cooperation and sharing study materials among students either on the voluntary basis or on the basis of teacher's instructions forms the core of the research which was conducted last year with full-time students and this year with part-time students. There was a significant assumption that part-time students will be in much greater use of social applications for study purposes and there will be if not enthusiastic so at least sincere willingness to collaborate in virtual space due to the fact that time for physical attendance of classes is limited to two or maximum three afternoon sessions with their lecturer within one-semester. Results brought unexpected findings showing much lower involvement of part-time students into cooperation and collaboration than involvement of full-time students. 70% of full-time students contributed into learning management system on the basis of teacher's instructions but no findings were gained in part-time students respectively part-time students didn't mention any activity and showed no involvement. Another stunning finding applies to future to the potential of social applications for study purposes perceived by students; numbers are lower than numbers showing current use of social application for study purposes. Development of trends in acceptance, utilization and satisfaction with social software applications in higher education on a limited scale of local university was monitored for four years within national educational projects'Evaluation of the modern technologies contributing towards forming and development of university students' competences' and within a follow up Excellence project'The ICT reflection within cognitive process development'. All surveys were run from students' perspective. This current study is conducted within the frame of a new grant project'The influence of social media and mobile technologies on formation of optimal model of teaching'.

Keywords: social software applications, collaboration, potential, education, research

Development of Financial and Language Competences via On-Line Games and Tests

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Abstract: The paper deals with a selection and evaluation of on-line financial simulators and language websites which provide students with diagnostic and training tests. It contributes to the development of key competences in two essential areas of current lives which financial and language competences are. Investment competitions are presented as a beneficial technique for students of the Faculty of Informatics and Management, University of Hradec Králové, who have little or no experience with investing on the stock exchange and over the counter markets and who would like to learn and get improved in this area. The objective is thus to choose the best simulation game in investing in the Czech Republic. The other part focuses on the fragment of so called computer assisted language learning which games on the Internet are; either they perform the testing or the entertaining role. Special attention is devoted to diagnostic tests which are supposed to test students' language skills, improve their score and eventually prepare personalized study plan that is based on their particular area of need. The objective is to analyse two language web portals from the web usability perspective. The content of the paper starts with outlining of current trends in e-learning. Then investment competitions and two language diagnostic and testing portals are described. The ways of evaluation of selected games and websites form the core part. The actual evaluation of individual investment competitions was conducted via decision support system. Principles of usability testing were applied to evaluate selected language websites to measure both ease of use and user's satisfaction. The contribution brings readers inspiration on utilization of games and tests in the process of education. Connecting leitmotif of individually worked out areas of the research are firstly selection and consequently evaluation of games and tests where both researchers selected own approach fitting their goals and reflecting their previous research experience.

Keywords: education, investments games, language diagnostic tests, simulators, smart technologies, web usability

Working the Three T's: Teacher Education, Technology and Teacher Identities

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Abstract: As technology spaces are increasingly envisioned as *learning* spaces, their role in “people shaping” especially in light of the advent of MOOCs, online gaming and social media sites, is more closely being observed. This article starts from the assumption that learning and identity construction are inextricably intertwined, regardless of the spaces that such learning takes place. The paper has two aims: 1) to establish the importance of discussions on the interconnectedness of learning, technology and identity construction, and 2) to report on two studies that we conducted in Chile in the context of an EFL teacher training program to support that discussion. One of our studies involved a 16-month inquiry into the influences of a guided reading program supported by e-readers on the evolving teacher identities and literacy skills of a group of 10 pre-service teachers. These individuals evidenced limited cultural capital in an academic setting, an issue that threatened their future effectiveness as teachers. The second study was student-conceived and conducted in the same context. This latter study sought to determine the influence of peer tutoring, made available partly through a social media site (SMS), on the identities and investment in learning of 12 first-year students in the pedagogy program. These incoming students were struggling with imagining themselves as future teachers. Both studies draw on ethnographic tools within the qualitative research paradigm. These tools help to uncover the subtle yet significant ways that collaborative meaning-making made possible with digital tools served to create conditions for the individuals in both studies to transform their identities from marginalized in these contexts to recognizing their own symbolic resources and value in terms of their potential as future effective teachers. In both studies, we frame our understanding and analysis on social cultural theories to help explain the kinds of identity negotiation and changes in investment in learning that the technology tools supported over the research period among these pre-service teachers.

Keywords: social media, peer tutoring, teacher education, higher education, identity construction, digitally supported literacy, e-readers

Connecting to Reading: Inspiring Young Children to Read Through the Creation of Digital Artefacts and use of Social Media

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Abstract: The AMORES project brings together five schools from across Europe with the aim of identifying whether a love of literature can be encouraged through the creation of digital artefacts. School students make videos, card games, pictures and comics about the books they are reading, and share these with other children in the five schools through the use of social media and videoconferencing. The students' attitudes towards books and reading are surveyed at the beginning and end of the intervention, their online interactions are observed and their reflections are gathered through artefacts such as videos and posts within the social media platform. The key pedagogical theories on which this project builds are that of constructionism, which contends that creating artefacts is itself a trigger for learning experiences, and also that creation is a social activity, and this social activity is also a basis for learning. The second theory is that of experiential learning, particularly encouraging metacognition through reflection and abstract conceptualisation as a result of the creation of objects. The third theory draws on the role of storytelling in motivating and empowering learners. The creation of artefacts has been demonstrated to be an effective means to encourage learning – and evidence shows that creating videos (the type of artefact identified by teachers as being the predominant one to focus on in the AMORES project) is particularly effective. Social media is more problematic, in that it normally facilitates superficial “likes” and “shares” and requires more sophisticated tools and support to create genuine co-creation and reflection within a community. The practice at the schools indicates that they are experienced at creating videos, but less so at maintaining social creation at a distance. The social aspects of learning at a distance may therefore be the most difficult area to encourage within the project, as it is both more problematic to conduct, and is less practised within the schools.

Keywords: constructionism, social media, learner-generated content, experiential learning, storytelling

Learn Something new Today: Developing Students' Self-Directed Learning Capabilities Using Online Video Skills Training

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Abstract: The use of online educational video is becoming central to the digital life-world of what some are calling “the Netflix Generation” (Cross 2014). Recent research suggests that video provides a powerful and engaging learning experience for students, whether they are using it to develop their digital capabilities or improve their independent learning skills (Leonard 2015). Digital applications featuring online educational video such as Lynda.com are designed to foster student independent learning in a format that, it is believed, chimes with the student’s existing extra-curricula consumption habits. This paper aims to test these assumptions. The paper focuses on a case study that follows the first cohort of media students with access to Lynda.com from the beginning of their course in 2013 through to the culmination of their second year. The paper reviews the strategies used by the teaching team to encourage the uptake of Lynda.com. The qualitative findings presented in this research are based on two focus groups with students who were part of the pilot. Preliminary findings suggest a need to think carefully about students’ approach to independent learning, and confirm that applications such as Lynda.com cannot be seen as a panacea in terms of fostering engagement. We trust the paper will be useful for teaching practitioners who are interested in how applications can be successfully embedded in the curriculum and how different approaches alter (or did not alter) student independent learning and eventual performances.

Keywords: Lynda.com, self-directed learning, student experience, resistance, interactivity, video skills training

Student Data: Data is Knowledge: Putting the Knowledge Back in the Students' Hands

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Abstract: Learning Management Systems are integral technologies within higher education institutions. These tools automatically amass large amounts of log data relating to student activities. The field of learning analytics uses data from learning management systems (LMSs) and student information systems to track student progress and predict future performance in order to enhance learning environments (Siemens, 2011). The aim of this paper is to describe a project where we utilized a system developed in Dublin City University to use information about student engagement with our LMS, Moodle, to create a model predicting pass or failure in certain modules. The project is divided into three distinct phases. An initial investigation was completed analyzing Moodle activity for the last six years. The purpose of this exercise was to determine automatically if “trends” could be identified linking Moodle engagement with student attainment. This was done by training a machine learning classifier to map student online behaviour, against outcomes. Once the classifier was trained, several modules were identified as suitable for building a predictor of student exam success. Ten modules were identified for semester 1 with a further seven identified for semester 2. The second phase involved analyzing current students’ engagement with these modules and sending students information about the predictions of their attainment for the module, based on their Moodle engagement. At this stage concerns were raised within the university that the data that we share with the students could actually have the opposite effect to what we are after, i.e. the student may look at the data and think that there is no point in putting in more effort as ‘I’m too far behind already’. Dietz-Uhler and Hurn refer to this as “instead of being a constructive tool, feedback becomes a prophet of failure” (Dietz-Uhler, 2013). This contention was addressed by conducting an online survey with students in an effort to explore their experiences of being provided with feedback regarding their engagement with the LMS. The third and final phase of this project was the development of a dashboard for lecturers to enable monitoring of their students’ engagement with their module on Moodle. This enables lecturers to have an overview of how students are engaging with their course on Moodle and quickly identify students who are not engaging with the LMS and who are potentially at risk of failure or non-completion. There are numerous examples of the use of learning analytics in higher education. This study focuses on the provision of data obtained through learning analytics to the student and qualitative analysis that was conducted in relation to this data. This re-

search adds to the existing research into learning analytics being used for student retention.

Keywords: learner, student-retention, learning analytics, data-mining, VLE

Using Test Data for Successive Refinement of an Online Pre-Course in Mathematics

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Abstract: Prior knowledge in mathematics has repeatedly been found related to study success in engineering, making its lack a variable to identify “at risk” students. Not all secondary school graduates are equally prepared to meet the demands of an engineering programme; different school types and mathematics curricula lead to broad differences in basic knowledge. As a remedy, universities offer pre-courses or bridging courses in mathematics, more and more frequently employing e-learning or blended learning programmes. The paper describes the development of an online course for study preparation in mathematics. The design process is accompanied by a research project that analyses both quality of the learning material and performance of the participants. In a multiphase research design repeated evaluations of test results, questionnaire data and statistical information are used to revise and successively improve the programme. The overall goal is to build a pre-course that meets the demands of the group of prospective engineering students. The main research interest is to build a consistent data model that relates students’ personal and demographic backgrounds, prior knowledge in mathematics, and learning outcomes in the pre-course. In the first design phase, or pre-study, the most relevant issues that should be addressed in the further course of the project were identified, applying qualitative methods to question (or confirm) quantitative outcomes. Based on these results, learning material and quantitative tools were modified, and re-evaluated. The final data model for the main study is based on three quantitative sources: pre- and posttest performance, personal questionnaire, and evaluation questionnaire. The results so far reveal a highly heterogenic learner group regarding cognitive and metacognitive variables. While many students are able to close minor gaps via self-study, others lack the ability to self-regulate and need support structuring and monitoring the learning process. Thus different learning scenarios, from self-study to blended learning to online tutoring, were provided and evaluated in 2014. In the arti-

cle examples for the use of learning analytics in the developmental design process and the latest version of the programme are given. The pre-posttest design's reliability was increased based on statistical analyses of students' test results. Test results then could be related to known predictors of mathematics performance, e.g. school grades, or attitude towards mathematics. Analytics were also made accessible for students by relating individual results to the peer group's overall score. Finally, pre-test results were used to cluster students with similar results and assign them to matching learner groups. In the further course of the project the data collected in the pre-course will be related to external datasets, like first year exams in mathematics, and overall study success. It will be investigated if and how these correlate with learning progress in the pre-course and predictive variables like prior knowledge, type of secondary school, or attitude towards mathematics. Findings are incorporated into a joint research project funded by the German Federal Ministry of Education and Research (www.optes.de).

Keywords: e-assessment, design based research, self-study, mathematics, STEM

Wearable Technology in the lab: A Useful new Perspective?

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Abstract: Video is being used everywhere in higher education these days, and the discipline of science is no exception. Examples include the use of 'flipped classroom' approaches where students can access video in advance of interactive classroom sessions; student-generated videos where students themselves create videos explaining key scientific concepts; and lecture capture sessions where cameras are integrated into learning spaces so that traditional lectures can be recorded and replayed on demand. This list is by no means exhaustive as video creation and platform technologies continue to evolve. Research so far indicates that presenting instructions and explanations directly to camera is the most common video production style being used in universities. This frequently involves head-and-shoulder style videos featuring academics speaking to the camera about the chosen topic and possibly demonstrating aspects of a technique or approach that they wish to explain. In some cases, video production teams with specialised expertise are employed to record and produce such video resources. However, there are problems associated with adopting this approach in a laboratory context. Firstly, there are obvious cost issues involved with engaging specialised expertise for this type of work, putting it beyond the reach of many university budgets. Secondly, there are physical limitations with

the space available in laboratories - tripods and other video equipment take up valuable space in a busy lab, and there are possibly health and safety risks to consider. Thirdly, and perhaps most importantly, there is no independent evidence that a video format where we see the lecturer completing a series of steps is the best way to teach an experiment through the medium of video. At the Biomedical Diagnostics Institute at DCU, Ireland, a pilot project was run to create wearable camera-recorded video in a laboratory setting and evaluate its potential effectiveness as a learning tool. Two videos were created by an academic using a head-mounted wearable camera. One of these was developed to demonstrate and record the steps involved in performing an enzyme-linked immunosorbent assay (ELISA). This video was subsequently edited down to approximately 10 minutes in length and was shared with separate cohorts of undergraduate and postgraduate students. Students were asked to provide feedback on their experience of the video via a Moodle-based questionnaire. This case study sets out to explore students' reaction to the wearable camera-created video and in particular, their comments on the Point of View (POV) angle employed. This is a topic that has not received significant attention in the literature to date.

Keywords: wearable technology, wearable camera, laboratory teaching, video, POV, point of view

Preparing In-Service Teachers for K-12 Online Schools: A Case Study

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Abstract: The certification process for preparing teachers to teach in face-to-face K-12 classrooms in the United States is well established. Most certification occurs at the college or university level. However, licensing and preparation to teach in K-12 online schools is a relatively new field. Some of the preparation is taking place within the K-12 online schools. Georgia Southern University's Instructional Technology programme has a state of Georgia three-course approved endorsement to prepare in-service teachers for online classrooms. The students in the final course of the endorsement programme completed their field placement in the K-12 Georgia Virtual School. These students spent 16 weeks working with mentor teachers who guided their professional development. The mentor teachers provided the practicum students with complete access to their courses. At the beginning of the semester, the mentor teachers were interviewed by the practicum students so they could establish

an understanding of the expectations of teaching online. The practicum students were expected to explore the online course syllabus, course content, and course tools. The practicum students were given various topics throughout the semester to explore with their mentor teachers. This case study describes the online field placement of a class of in-service teachers who completed a practicum in the Georgia Virtual School. The case study describes the experiences of the first group of Georgia Southern University candidates to complete the field experience in an online classroom. Findings indicated that the field-experience participants had a positive practicum experience. However, students had mixed reactions regarding their futures as online K-12 teachers.

Keywords: field experience, in-service teachers, K-12 virtual schools

Using Padlet to Increase Student Engagement in Lectures

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Abstract: One of Coventry University's core aims for Teaching and Learning is "to ensure that teaching is designed to inspire and engage students...through a range of techniques which encourage lively, interactive learning". Traditional lectures tend to be primarily focused on conveying information to students, providing insufficient opportunity for interaction and engagement. Feedback given by final year Business undergraduates revealed that some students considered lectures to be "boring". In an attempt to address this, a social media tool called Padlet (an online "wall" onto which students can post comments) was trialled in lectures. The aim of introducing Padlet was three-fold: to reduce the barriers to students contributing to class discussions to make lectures more interesting by introducing student generated content. to determine if Padlet helped increase participation amongst international students whose mother tongue is not English The trial was evaluated following a goal-orientated approach using a paper-based questionnaire. An analysis of the 43 completed questionnaires revealed that using Padlet made lectures more interesting (83%), reading suggestions posted by other students enhanced students' learning experience (79%) and students were more likely to contribute to a class discussion via Padlet than verbally (43%). However, the findings revealed no significant difference in students' preferences for using Padlet according to their English language proficiency.

Keywords: technology enhanced learning, student engagement

Transforming the First Year Experience (HE) With Digital Literacy via Techno-Social Engagement and Evaluation

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Abstract: A competent level of digital literacy is rapidly becoming an expectation of a university graduate in the global market (Sheridan-Ross et al, 2012). This paper evaluates the concept of digital literacy through the transformation of a first year module from a traditionally delivered university lecture/seminar approach to a technology enhanced discursive approach that aspires to transform the way students learn, in order to lead them to higher level digital skills. Digital skills from the user perspective focus on their effective use of digital resources and the skills in the use of online technologies. In this module, students are guided to evaluate and assess the tools and information they use online and consider the privacy of their identity. We posit that an understanding of such digital skills and advanced online behaviour will support future employability and that such a digital skillset is a core graduate attribute that will be expected by employers. This paper shares the process of redesigning the curriculum to embed experiential digital skills and the insight to online behaviour. The redesign of the curriculum works to enhance and support the first year experience, building in more personalisation and individual attention than can be achieved in the traditional version. Based upon Salmon et al (2008) curriculum design process, and using JISC's (2014) seven elements of Digital Literacy model, this research will share how the redesign was undertaken by the module team working collaboratively with a learning designer and former students to support, develop and enhance digital literacy skills throughout. We will consider the pedagogy of business education in terms of graduate attributes and employability and how to embed digital employability skills within a blended learning design for first year students in higher education.

Keywords: digital literacy, employability, first year experience, curriculum design

Balancing Social Dilemmas to Foster Collaborative Learning With Social Software

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Abstract: Education does not only need to foster and support the acquisition of information and knowledge, but should also train higher-order skills which are neces-

sary to engage with social and technological change and contribute to life-long-learning. Since learning is a participatory, social process, one of the most important, but rather complex higher-order skills is the ability to participate in a constructive way within communities. Hence, in our fast changing society with highly diversified life trajectories and a shortening half-life of knowledge and skills, interacting with people and improving competence with the help of peers and experts is an increasingly important asset. However, we still lack knowledge on how to collaborate successfully, respectively, on how to lay the ground for beneficial collaborations. Obviously, this is a barrier to use the full potential of social media. Indeed, the expansion of social media tools has created massive opportunities for the sector of higher education, in particular for interaction and collaboration. Even though most students are familiar with social media, they do not always use the collaborative potential of social software spontaneously for educational purposes. On the one hand, students have not yet experienced successful collaboration in an educational context. On the other hand, social dilemmas hinder prosperous collaboration. The objective of this paper is to highlight how social barriers to collaboration can be tackled with the concept of Win For All. The focus is in particular on one fundamental barrier for a successful collaboration: social dilemmas. A social dilemma is a situation in which a group of N -persons ($N \geq 2$) has to choose between maximizing selfish interests and maximizing collective interests. Problems arise when something is beneficial for the individual but detrimental for the group and vice versa. Thus, processes of learning together might be negatively influenced, for instance, through free-riding or social loafing. The concept of Win For All (or: winn), which was developed by the author, might be an approach to overcome the fundamental tension between the individual and the group by harmonizing various sets of interest. In a Win For All-constellation, all n participants regard the benefits of all other participants as an essential element for their own benefit. For learning purposes, Win For All implies that each learner is not only responsible for his/her own learning progress and success – a situation which is normally forced by the educational systems in western societies -, but should also support his/her colleagues' learning progress and success as well as the learning progress and success of the class or the group as a whole. Benefits for all are the result. Single group members as well as the group in its entirety shall be able to optimally learn, to develop their performance potential and to act responsibly. Thus, Win For All can be regarded as an all-purpose pattern of thought for group processes with the aim to optimally balance individual and group needs. The paper shows how Win For All can contribute as a theoretical and practical foundation within educational contexts to foster successful collaboration with social media.

Keywords: collaboration, social software, benefit, win, social dilemma

Reading Classic Novels Might be Supported by Wiki-Based Collaborative Activities

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Abstract: This study reports on an experimental learning activity carried out at a higher secondary school in Prague, which tried to show students that reading, writing and collaboration might be interesting, useful and self-rewarding. In particular, the study focuses on learning outcomes and overall experience concerning the development of collaborative skills and reading and writing skills through the use of a wiki. Although the main objective of this activity was to enhance reading of English classic novels, an inevitable part of it was to implement wiki tools into the learning process. Moreover, the experimental learning activity was designed to show the extent of students' efforts at collaboration while reading activities set on a wiki. To support the idea, that wiki-based activities might stimulate students' learning skills, the study includes the outcomes and findings from English language and CLIL Social Science class wikis. The study examines the contributions of 30 students, who worked on both English language and CLIL Social Science class wikis simultaneously. The first part of the study deals with the various aspects of implementing wiki-based collaborative activities into learning processes. In the second part, research questions and research methodology are introduced. The final part of the paper deals with the research findings and summarizes their beneficial contributions to a wiki-based pedagogy. Reflecting the teacher's subjective feedback, the analyses of class wikis, plus post-reading questionnaires, as well as the focus-group discussions, show that wiki-based while reading activities might not only motivate students to read, write and collaborate, but also improve their reading and writing skills. The study also reveals that there are a few students who resist doing any activities on wikis or reading classic novels.

Keywords: wiki-based activities, reading and writing skills, collaboration, peer-review

Blended Assessment -4- Blended Learning

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Abstract: This paper is a reflection of over 25 years experience in teaching; from a purely classroom based learning environment, through the development of e-learning to a fully engaging blended learning environment that I provide my students today. Coming from an industrial background a driving force behind all my developments has been efficiency; helping students to develop their knowledge and understanding, their skills and attributes as quickly and effectively as possible, but at the same time acknowledging that my time is precious. In my early teaching I was heavily influenced by Honey and Mumford, recognising that we are all different and prefer to learn in different styles. As such I adapted my teaching styles to suite the students' preferred learning style. Later I became one of the pioneers of e-learning, helping to develop a virtual learning environment to support the students' learning outside the classroom through the internet. This naturally extended to the use of e-assessment and computer aided marking. More recently I have been advocating the use of Electronic Voting Systems to encourage greater engagement by students in the classroom through both summative and formative assessment. Whilst I have been a proponent of "Blended Learning" since before the phrase became popular, many students often see the variety of learning opportunities as "alternatives", opting out of anything they do not particularly like. Whilst this may lead to an efficient learning process in the students mind, it can also lead to an ineffective learning experience with students underachieving. Like it or not, assessment drives learning (Gibbs & Simpson, 2004), however by using a variety of appropriate assessment methods students are encouraged to actively engage in all the learning opportunities we offer them. If you want to change student learning then change the methods of assessment (Brown, Bull & Pendlebury, 1997). The key to this is selecting assessment methods that will not bury the academic in unassailable mountains of marking. This paper charts the development of my initiatives in teaching, learning and assessment, with tips and warnings coming from my experience for anyone wishing to adopt any of my methods.

Keywords: learning styles, blended learning, virtual learning environment, computer aided assessment, peer assessment, electronic voting systems

Evaluating the Early Adoption of Moodle at a Higher Education Institution

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Abstract: Higher education institutions, the world over, are integrating different learning management systems (LMS) to enhance teaching and learning. A key factor for delivering a successful LMS is the extent to which the users accept or adopt the system. Consequently, the rationale of this research study was to examine the factors that determine the early adoption of a Moodle-based LMS in the university context. Various external factors were incorporated into the original Technology Acceptance Model (TAM) to investigate the early adoption of the LMS by first-year students. The extended model was tested using a survey methodology. The data was analysed using Partial Least Squares (PLS). One of the key findings in this study were that the quality of the information content in the LMS has a strong effect on the users' perception of the usefulness of the LMS, which translated to a positive attitude towards the system. Other factors, inclusive of 'System Quality', 'Technical Support' and Computer self-efficacy impacted either directly, or indirectly, on the users' 'Perception of the Ease of Use' of the LMS. This in turn had a positive effect on the attitude of the users' towards the system. Interestingly, in contrast to previous studies, only a weak effect was evident between the 'Perception of Ease of Use' and the 'Perceived Usefulness' of the LMS. Furthermore, a positive attitude towards the system did not necessitate greater usage of the system. The results from this study shed light on the role that the investigated external variables have to play in the adoption of an LMS. It also calls for a focus on the impact that lecturers have towards students' adoption of this technology. Therefore this study contributes towards more effective utilisation of the extensive functionalities that the Moodle-based LMS have to offer, which will contribute toward the development of pedagogy.

Keywords: learning management system (LMS), technology acceptance model (TAM), Moodle, partial least squares (PLS)

The Affordances of Blended Learning in a Higher Education Flipped art Classroom

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Abstract: In this paper the author reports on the conceptualization and implementation of the flipped classroom, integrating located, online and virtual world learning environments to support the collaborative lived experiences of a group of students and the educator participating in a higher education undergraduate art unit, Navigating the Visual World. A qualitative narrative methodology, A/r/tography, incorporating both image making and textual recording is used to explore and identify interwoven aspects of the artist/ researcher/ educator relationship in the creative artistic process of exploring concepts of identity within inquiry based art practice. Selected student examples, including a collaborative group assessment project demonstrate effective student engagement with experiential blended learning within the flipped classroom.

Keywords: flipped classroom blended learning, experiential learning, located, online learning, multiuser virtual worlds, art education, visual literacy, collaboration, community

Getting Them Fresh: How to Cultivate new Teachers Into Becoming Self-Regulated Learners in Their Role as Teachers

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Abstract: Research matters more than teaching when it comes to tenure and positions, which makes it difficult to engage faculty in developing their teaching practice. In this paper we raise the question of whether we are able to engage our faculty in professional development; if we intervene when they are new as teachers (Lueddeke, 2003), and if we use the sustainable feedback approach (Carless, Salter, Yang, & Lam, 2011). Our goal is not only to engage faculty but also to turn them into lifelong self-regulated learners who will later seek advice and pursue further development when needed. The sustainable feedback approach, with dialogue at its core, has been used in a part of a new teacher program involving mentoring. The mentor has observed and videotaped one or more teaching

sessions, which can later be accessed by the participant at any time. We have used a survey to explore these issues. Our results are inconclusive, but we believe there are still preliminary insights to be gained. We have not previously seen studies where the sustainable feedback approach has been used in professional development, and we think there is more research needed before it can be concluded whether this is a fruitful approach. Further research should also take into account questions regarding motivation, the duration of a new teacher program and the involvement of Departments.

Keywords: professional development, sustainable feedback, self-regulating learners, scholarship of teaching, changing instructional practices, new teacher

Designframework for an Adaptive, Hybrid MOOC: Personalized Curriculum in Teacher Professional Development

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Abstract: The research project has developed a design framework for an adaptive hybrid MOOC that complements the MOOC format with blended learning. The design framework consists of a design model and a series of pedagogical design principles that can be used to design courses for teacher professional development. The project is methodologically inspired by Design Based Research.

Keywords: adaptive learning, personalized curriculum, MOOC, blended learning, design based research

Dynamic Models

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Abstract: Use of modern technologies in education is not only a question of support and development of the existing teaching methods, but also the question of how to innovate the content taught, how to set new types of problems to pupils, how to achieve a situation in which pupils gain new types of knowledge. The paper focuses on one specific way of the use of computers in mathematics classrooms – the dynamic models. What is characteristic for dynamic models is the use of a new dimension – movement. The use of movement and its recording enables not only to present new problems to pupils but also to deepen and extend their existing knowledge. While working with pupils and students, the author tried to identify and subject to further study the areas where the use of dynamic models is of benefit to pupils and the kind of new knowledge pupils may gain thanks to the use of dynamic models. The author of this paper focuses primarily on knowledge that pupils would hardly gain if computer technology were not used. The paper characterizes four types of problems in which dynamic models introduce efficiently new knowledge that could be hard to visualize using traditional means and that would probably have to be derived analytically. These are: Emphasis of invariants – Dynamic models allow us to emphasize elements that are invariant even when parameters change, e.g. intersection points of straight lines or relative position of points on a circle. Discovery of shared properties – Dynamic models may help us discover regularities in elements whose behaviour changes. Discovering the limits – These are situations in which the properties of the model change considerably. Step change – The last type of observation using dynamic models is observing step changes in objects. In some cases a radical change in the model's behaviour points at secondary solutions that are hidden in the place of the sudden change. Results indicate that dynamic models are suitable for development of mathematical thinking. We managed to identify several areas in which dynamic models may develop or extend understanding of different concepts. They bring new knowledge that would be hard to gain using traditional means, all this in an illustrative, visual and clear way. Results from experiments show that the knowledge pupils gain through the use of dynamic models is transferrable also to situations when pupils solve problems using traditional methods, as they support pupils' skills to visualise and their creativity.

Keywords: model, dynamic schema, dynamic geometry, GeoGebra

Innovative Experience in Teaching Staff Review: Case of Nazarbayev Intellectual Schools in Kazakhstan

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Abstract: Our paper dwells upon an innovative experience which is unique not only for Kazakhstan, but for the whole Central Asia region - the network of the Nazarbayev Intellectual Schools. Our main objective is to describe new approaches in improving the quality of teaching and solutions for more effective teacher performance review.

Keywords: teaching, review, quality, Kazakhstan, Nazarbayev Intellectual Schools

Spatial Learning Strategies in Mobile Learning

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Abstract: The paper describes the theoretical background, methods, goals and specifications of a mobile educational application which is designed for school excursions in the Ostrava Zoo in the Czech Republic. The application uses spatial learning strategies, namely nonlinear knowledge representation using dynamic semantic networks. Activating teaching methods and group classroom forms of instruction in an authentic environment are applied in the teaching with this application. The application serves as a navigator within the educational exhibition, a tool of visualization of dynamic semantic networks, multimedia and interactive electronic information boards, electronic worksheets and a tool for testing the knowledge. Better contextualization of knowledge and long-term retention of educational content are the anticipated educational effect of the application. The application was tested with students from elementary schools in mobile learning outside the classroom. The article also contains the results of the research, which was focused on the understanding of educational content in context.

Keywords: dynamic semantic networks, educational exhibition, mobile educational application

E-Learning for the Reform and Expansion of Teacher Education in Nigeria

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Abstract: Nigeria was introduced to the formal system of teacher education in 1859 by the European Christian missionaries. (Fafunwa, 1974). Through the times, the nation's teacher education programme has been reformed to be offered only at the tertiary education level; the University, Polytechnic and College of Education. The College of Education system, which was established in 1962, solely to meet the nation's demand for well trained teachers, has since, been increased to 101. Despite this, the system is yet to fully fulfill its mandate, as a result of which, many of Nigerian primary and secondary schools still make do with untrained teachers. Furthermore, it has been projected that Nigeria would need up to 7.2 million trained teachers to replace retiring ones this year 2015, while the nation's 101 Colleges of Education currently produce an average of only 64,000 teachers annually, (Junaid,2012). Till date, the nation's teacher education institutions remain glued to the traditional face - to - face method of training. This paper therefore attempts to examine the E-learning option of education as a vista towards the expansion of Nigeria's teacher training and retraining programmes. The paper also highlights e-learning application options for rapid development of teacher education in Nigeria. It recommends on way of surmounting the challenges of establishing an enabling infrastructure for effective e-learning programmes in a developing nation like Nigeria by the provision of e-learning applications for the development of teacher education in Nigeria. adequate info-tech facilities to all institutions of higher learning in the country,. The training and retraining of teachers and school administrators in Nigerian schools in information and Computer Technology (ICT) skills, the reduction of tariffs on info-tech hardware/software to make them more affordable, and the licensing of more Internet Service providers to allow for the reduction of cost internet access. Government is to also attend more seriously, to all on-going power projects on hydro and solar powered electricity projects for the regular supply of power that will be regularly needed for this project.

Keywords: apprentice teacher, grade advance teachers' college of education, sandwich programme, distance learning, teaching practice

The Role of ICT in Raising Student's Motivation to Learn English as a Foreign Language: Two Case Studies

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Abstract: Motivation and students' engagement are undoubtedly the key issues in any learning, including the learning of foreign languages. Therefore teachers all the time look for new and innovative methods of teaching in order to meet students' specific needs and expectations and in this way to stimulate them to learn. One of such approaches is to implement information and communication technologies (ICT) as an effective support to traditional, face-to-face teaching since ICT are nowadays part and parcel of everyday life. Especially young people cannot imagine being deprived of them. For them ICT are as natural as breathing. Therefore they are also widely exploited into the traditional teaching, in which the teacher is not the authority in the class anymore. He is a kind of facilitator, advisor or mentor in this technology-enhanced instruction. In fact, the teacher's role is to activate and develop students' creativity. However, the technology should not lead; the teacher should teach/ navigate his learners how to process and form scientific knowledge and enquiry. Thus, the purpose of this article is to explore the role of ICT in the learning process with respect to learners' motivation. Firstly, the issue of motivation and the examples of using ICT in the foreign language learning are discussed. Secondly, the authors provide two specific examples/case studies of the ICT implementation in foreign language classes in order to raise students' motivation to learn a foreign language, in this case English. These examples are based on two international projects carried out in the Czech and Slovak Republic and at Philippines. Findings confirm that the use of ICT in language classes has a positive and stimulating impact on students' learning. However, these ICT devices be carefully chosen to suit a particular teaching situation and to meet specific needs of students because not all ICT tools are relevant for teaching or learning situations.

Keywords: foreign language learning, ICT, motivation, students

The 21st Century Tutorial

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Abstract: The main challenge for Open University (OU) Tutors using online Tutorial approaches is the need for a good level of interaction with and between students. Currently Blackboard™ Collaborate branded as OULive is the tool used by the OU to allow students and tutors to engage in 2 way (synchronous communication) online activities. Online Tutorials built around a “whiteboard” centric tool lack the range of visual cues between Tutor and Student group which are available in a face to face Tutorial situation. The lack of visual and to an extent aural cues require the Tutor to take a different approach to the organisation of the Tutorial and to look for ways to replace the cues that are lost in the online world. This paper seeks to explore how online tutorials are utilised on the Open University course TU100 My Digital Life to encourage student engagement in the tutorial activity and will discuss how the authors’ use the OULive Tool to engage students in online learning activities. The paper aims to discuss the solutions developed through experience of delivering synchronous tutorials over a number of years and tries to provide some guidance to fellow practitioners. The paper will conclude by identifying that good preparation is essential, that problem solving activities in breakout rooms engage students and that there is a need for staff development to link theory with practice.

Keywords: e-learning, distance learning, synchronous communication, breakout rooms, problem solving activities

Digital Literacy and Subject Matter Learning

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Abstract: It is generally agreed that learners need to acquire digital literacy in order to act as competent citizens, employees and entrepreneurs in a digitalised environment. It is also generally agreed that digital literacy is the responsibility of educational systems that are themselves increasingly digitalised. Studies show that while students’ digital production is a powerful driver for learning, a lack of digital literacy among teachers and students is an equally powerful barrier. There is no shared conception, however, of the meaning of digital literacy that may mean both *bildung*

(general education) and a wide range of specific skills and competences: from basic computer skills, to source criticism and multimodal analysis, to social norms in online environments. Therefore, learning designs that are aimed at learners' acquisition of digital literacy, including related learning objectives, appear to be what Feltovich and colleagues call *ill-structured* (1996). In this paper, we present approaches that are embedded into everyday school practise and combine the acquisition of digital literacy as both *bildung* and a set of specific competencies. Accordingly, digital literacy need not necessarily be a course on the curriculum. These approaches rest on findings stemming from a large ongoing project within Danish primary and lower secondary schools, in which students worked with digital production of subjects and cross-disciplinary learning objects that were aimed at other students. These learning designs appeared to produce arenas in which students challenged and developed their digital literacy. The empirical data were produced through a mixed-methods approach whereby action research—one of the mixed methods—was combined with a series of interventions that supported iterative improvements to (and changes in) the learning designs and practise throughout the project's life cycle. The findings thus far are that digital production facilitates students' learning processes and qualifies their learning results in both digital and subject matter literacy when executed within a teacher-designed framework that empowers student agency. At present, the project's findings and practises are being implemented in the participating schools and at teacher educations. Because the findings are published elsewhere (together with a presentation of our learning design theory and research methodology), this paper emphasises the theoretical side of the suggested approaches based on Allan Martin's conceptual model of digital literacy, which we expand with Manuel Castells' *self-programmable* individual and Margaret Boden's concept of creativity. To conclude, we point to areas of interest for future development and research in the field.

Keywords: digital literacy, design for learning, learning objectives, *bildung*, general education, mixed methods.

Comparison of the Traditional With a Flipped Classroom Approach in a Psychology Module

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Abstract: In this investigation, we studied whether a flipped classroom approach increases students' learning and satisfaction compared to a traditional teaching approach. Two teachers introduced first year psychology students to social and clinical psychology. All the 384 first year psychology students had the opportunity to be involved in the two teaching approaches consecutively over the academic year 2014-2015. At the end of the semester 1 the students evaluated the module expressing their views on the two different approaches. In this investigation the teachers discussed the difficulties that they faced in teaching a large number of students by following either the traditional way or a flipped classroom approach. In order to make the distinction of the two approaches to students, the teacher who followed the traditional teaching approach covered the topic of social psychology over the first five weeks of semester one (academic year 2014-2015), while the other who followed the flipped classroom approach covered the area of clinical psychology over the other five weeks of the semester one (academic year 2014-2015). In social psychology, the teacher A presented the topic in a lecture theatre by using PowerPoint presentations. A relevant with the lecture topic reading list was uploaded on the Virtual Learning Environment for students to read it at their own time and space. In clinical psychology, the teacher B followed a blended learning approach where students were given reading and activities prior to the session and they were asked to use these as a basis for discussions in the face-to-face class environment following a flipped classroom approach. Weekly online quizzes, discussions, reading and seminars were the main components that supported the flipped classroom activities, before, during and after the lecture time. The teacher B did not have any previous experience in a flipped classroom approach. At the end of the first semester, 231 students evaluated the module on several aspects. Students thought that the flipped classroom approach helped them to develop their understanding more than the traditional lecture approach. They also enjoyed the reading materials for the flipped classroom more than for the traditional approach. The survey provides preliminary evidence of the student's engagement in different learning environments and the results are discussed in terms of teachers' perspectives and the two approaches' challenges for teaching.

Keywords: flipped classroom, social and clinical psychology, virtual learning environment, pedagogy, higher education, active learning

Towards Active Learning Spaces and the Flipped Classroom Model

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Abstract: It has been acknowledged that the traditional didactic lecture does not always provide the ideal learning and teaching experience (Bligh, 1998). Over the last ten years, individuals and institutions have been exploring the pedagogical possibilities of providing more active and engaging alternatives. One model in particular has been influential in sparking change. The use of Active Learning Spaces (ALS) combined with team-based learning (Fink, Michaelsen & Knight, 2004) has been successfully used in initiatives such as TEAL (Technology Enhanced Active Learning) and SCALE-UP (Baepler, Brooks & Walker, 2014). This approach has proved popular in North America, and has attracted growing interest in the UK. The key benefits demonstrated have been improvements in: class attendance; retention rates; levels of conceptual understanding; pace of learning (Beichner, Saul, Abbott, *et al.*, 2007). This ongoing comparative study set out to establish the key drivers and barriers to the development of ALS and the future landscape for classroom pedagogies that are being adopted within these innovative spaces. A mixed methodology has been adopted to triangulate the needs, expectations and opinions of three key stakeholders: students, academics, and policy makers. A series of focus group interviews were conducted with students and lecturers, and an online questionnaire completed by senior managers representing a range of UK Higher Education Institutions. The analysis of the results so far point to a burgeoning awareness amongst students and staff of the positive educational impact of newer pedagogies such as the ‘flipped classroom’ and ‘inquiry based learning’, alongside an intensifying impatience with the status quo. From the institutional perspective, aside from the financial implications, a formidable hurdle is the pressure on physical space, and thus, room occupancy rates. ALS typically reduce room occupancy by 25-30%, however previous studies have indicated attendance at lectures rarely exceed 60% of the cohort (Dobkin, Gil & Marion, 2007), and a recent evaluation of learning spaces at one HEI demonstrated a room utilization rate of just 27%. There is now a clear rationale for the creation of teaching spaces that effectively support technology enhanced pedagogies which attract, engage and retain students across the whole academic cycle. In this paper we will discuss the current results of our study in relation to critical questions around ALS and

the flipped classroom, and more broadly the strategic decisions around estate management versus the demands and expectations of students and staff.

Keywords: flipped classroom, active learning spaces, social constructivism, interactive pedagogies, technology enhanced learning

Content Related Rights Transmission With MPEG-21 in the Educational Field

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Abstract: One of the main issues affecting educational content distribution and sharing is to ensure that the terms and conditions defined by the content owners are respected by the others, such as distributors and consumers. Authorship and the content integrity are the most basic rights that authors want to preserve in the educational field. To ensure that content and associated rights are protected, cryptographic techniques and mechanisms are applied to content, rights, protection keys and related metadata that are packaged in a digital object. ARMS is a new platform that was developed to preserve author rights in the educational field applying the MPEG-21 standard concepts. A web based services interface is established with the educational Academic Management System of the Academic institution in order to verify the user eligibility in this domain. After obtaining the usage license the user can send the license to other users, if that privilege has been granted. Our proposal uses MPEG-21 concepts in order to enable rights transmission among the main participants in the educational environment but with a mechanism where the inheritance rights established by the author are uphold. Through the integration between ARMS and the Academic Management Information System hosted in the educational institutions, user academic data can be retrieved in order to verify his eligibility.

Keywords: DRM, content protection, security, intellectual property, educational content

Does an Open World Need new Pedagogies or can Existing Pedagogies Suffice?

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Abstract: Some proponents of open education argue that, if the potential of open educational resources is to be fully realised, a radical shift is required towards more open pedagogic models. In contrast, others suggest that openness enables teachers to re-examine their existing pedagogy and adopt the aspects of openness that fit within it. This paper explores the relationship between these positions by presenting findings from a small-scale investigation at a leading UK university, addressing the question “Does openness entail a radical change in an institution’s pedagogic approach, or can it co-exist with the current approach?” The university has a research-informed teaching approach, in that students’ learning is directed by staff actively involved in research and scholarship. The researchers conducted semi-structured interviews with 14 academics, selected either for their involvement in open practices or for the recognition they had received for excellence in their teaching. The interview schedule was derived from a literature survey focusing on open pedagogic models. Aspects discussed with interviewees included the “flattening” of the teacher-student relationship, students’ assumption of responsibility for their learning, and learning as (or in) a community. Interviewees recognised the above aspects in the University’s existing pedagogic model, but felt the teacher retains the advantage of deeper knowledge and longer experience. Some also observed that the dialogic elements of learning predate the “open” era by several centuries, but that technological innovation and open access to resources have served to broaden the knowledge base available to students. In interpreting the research findings, the paper suggests that, for this institution, open educational approaches can be accommodated in the prevailing pedagogic model without compromising its integrity. However, openness can enhance the specifics of that pedagogy. Possibilities include aligning research-informed teaching with emergent open practices in research and fostering in students a new understanding of the nature of knowledge, as well as the skills for living and working in an increasingly open world. The potential benefits of this work for other institutions are also discussed.

Keywords: open education, OER; research-informed teaching, higher education, pedagogy

When Education met Innovation met Employability: The Birth of Employability Plus

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Abstract: Although 96% of full-time students at the University of Northampton were employed or completing further studies six months after graduation, only two-thirds of these jobs are at 'professional' level (HESA, 2015). In addition, as the Number 1 University in the UK for Social Innovation as evidenced through our 2013 designation as the first AshokaU Changemaker Campus in the UK, all areas within the University were tasked with embedding social innovation at the heart of student experience. These two imperatives converged with the birth of Employability Plus (E+), our new extracurricular employability offer that delivers a blended, personalised, student-centric approach to the development of student employability. Employability Plus was developed by the University Centre for Employability and Engagement (UCEE) under their remit to improve graduate employability. The service was delivered through the adoption and adaptation of a strategy known as CAleRO (Creating Aligned Interactive educational Resource Opportunities), widely used in curriculum (re-)design at Northampton; combined with the iterative design-centred approach typified in the Spiral of Social Innovation. Employability Plus seeks to deliver long-term scalability and sustainability, incentivises engagement through the allocation of E+ points and feeds directly into Section 6.1 of the Higher Education Achievement Report (HEAR) detailing a student's extra-curricular university achievements. It intentionally draws on blended learning design cycles through ensuring active student engagement with tasks that make sense of employability-related content, working individually or collaboratively and discussing with their peers and E+ advisors either online or face-to-face. Students undertake regular online audits of their employability skills and are directed to events/interventions designed to encourage deeper engagement with and individual responsibility for their own employability development. Less than six months after launching, E+ had seen over 8,500 students engaged for more than 45 minutes with online activities, or through workshop attendance - a 10-fold increase on the previous year. More than 2,000 students had completed the initial self-assessment and over 1,800 had participated in a 1:1 session. More than 1,000 were participating in voluntary community action and social learning. Subsequent development of E+ is taking a number of directions. Most importantly, the service is part of a project to embed employability into the curriculum. Blending curricular and extracurricular employability skills development in this way allows students to demonstrate their growth and employability potential to future employers by drawing on experiences gained from across the full breadth of their life experi-

ences. This paper offers an empirical evaluation of the redesign approach adopted for this development, specifically considering: how effective this dual approach was at delivering a unified service that would be blended, relevant and scalable; and whether it is appropriate to use the language of higher education (learning outcomes, learning activities and assessment) in the context of extracurricular employability development. The paper also considers the importance of the student voice in the curriculum design process and presents some wider issues for consideration by course designers to ensure students can act as co-creators of curricular and blended learning, thereby improving student engagement and attainment. It is, however, too early to evaluate the effectiveness of the redesigned service in improving professional-level employability for Northampton graduates.

Keywords: e-learning design, employability, social innovation, co-curricular, student voice

Innovating for Learning: Designing for the Future of Education

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Abstract: Teaching has moved online as the world has moved online and learning is losing its sense of physical location with the availability of many different options from mobile to MOOC (Massive Open Online Course). The impact of online learning is not confined to distance learning; when a student attends a campus university they are now as likely to meet with their fellow learners virtually as face to face. The education sector has yet to fully adapt to what this means, and indeed there strong signs of a built in resilience from providers, employers and students themselves which may mean an apparent evolution is more likely than a revolution. At the same time, there are some quiet changes underway that mean we should be preparing to innovate for the revolution to come. Some of those changes are considered in work undertaken at The Open University that has been disseminated in a series of Innovating Pedagogy reports. These reports allow the academic authors to be more speculative than is usual practice and engage in considering the future, while remaining based on a view of what is happening in the sector. In particular they adopt a position focused on pedagogy that balances technology-based futurology that can dominate yet fail to resonate with those actually involved in the teaching process. The annual Innovating Pedagogy reports cover 10 topics each, with some deliberate overlap from year to year and development of themes that show innovations moving into teaching prac-

tice. This is illustrated by two cases, the impact of MOOCs and the application of learning design and analytics. The development of MOOCs demonstrates the value of reviewing pedagogy that aligns with technology. While the use of learning design and learning analytics demonstrates how improvements in the way we describe our learning processes and the way we understand learner behaviour is helping determine how choices in pedagogy impact on student satisfaction, progression and success.

Keywords: innovation, learning design, learning analytics, MOOCs, openness

Telepresence With iPads: A Matrix for Collaboration in Lower Secondary School

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Abstract: Distributed learning is a growing issue in education following the mainstreaming of technologies for videoconferencing. However, though distance and distributed learning have been common in adult education and business since the 1990s little is still known about the use of videoconferencing in elementary education. This paper draws on ongoing research in three rural schools in Denmark where videoconferences are used as part of the teaching in lower secondary schools as a means of collaborating between schools. The research focuses on how students learn from videoconferences that are both one-to-many and peer-to-peer and that are meant to strengthen relationships between teachers, learners and external experts across schools. Videoconferencing, conceptualized by the schools in question as telepresence, is performed in a unique combination of desktop interaction through mobile devices (iPads) and auditorium-based large screen lectures and interaction. The paper discusses how relationships between desktop interaction through mobile devices such as iPads and videoconferences through auditorium-based large screens can support learning in rural lower secondary schools. As many schools have invested in several generations of technologies the potential for using multiple technologies to support learning increases. However, technologies are to a large extent still seen as isolated actors in learning, not as involved in relationships with other devices or resources that may benefit learning. Understanding relationships, connections and differences between technologies in learning may therefore provide new perspectives on how technologies work in practice. In the project data have been collected through multi-sited ethnography, which has contributed to mapping relationships

between schools and studying their collaboration through telepresence. As collaboration between schools is built into the project, multi-sited ethnography has followed telepresence as a phenomenon that emerges within these collaborations, i.e. the idea is that looking at it from one locality is only seeing it partially. Preliminary results of the project suggest that schools need to work more on organizational frameworks for collaboration and that synchronous connections could be extended through asynchronous communication to support the potential of collaboration via the telepresence with iPads matrix.

Keywords: learning through telepresence, iPads in elementary schooling

Mobile Devices for Teaching and Learning in Higher Education

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Abstract: Early in 2011 the School of Civil Engineering and Geosciences (CEG) introduced the PEARL project: Pioneering Education: Advanced Resource for Learning to recognize the need to innovate the delivery of teaching material. It aimed to closer align with developments in student's interest and approach to learning. The modernisation of teaching methods was recognised as essential to help foster the development of new pedagogical approaches and to improve the student experience. Initially, the PEARL project researched into the delivery and distribution of electronic-only teaching materials via mobile devices, principally tablet computers and their way of integration into a HE establishment as a main medium to access lecture handouts etc. Since the AY 2012/2013 all incoming students to the CEG have been provided with an Android based tablet to enable them to access T&L material on a 24/7 basis. The use of mobile devices in higher education has eased with the development of mobile device friendly teaching support apps, such as Blackboard Mobile, Recap, Responseware and the Newcastle University app to access the timetable, maps, library and PC availability across the Newcastle University campus. With the developments of mobile devices over the last three years, the suitability of such devices has improved and students have accepted the devices and confirmed that it enhances their university experience. It will show how the students learning has changed using mobile devices and that the need for the paper handouts is not required anymore to facilitate the students learning. Furthermore the paper describes the student perception of using tablets and discusses issues and concerns based on the change of the teaching delivery. It analysis several student questionnaires to understand how stu-

dents accepted and adopted the mobile devices. It confirmed that mobile devices and e-learning have become central to the students learning and their peer-support structure.

Keywords: e-learning, mobile devices, apps, higher education

E-Learning Using Video Game for ADHD Children

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Abstract: Neurofeedback shows great promise for children who suffer from ADHD. Unfortunately, there isn't enough research that looks at the increase in academic performance due to neurofeedback. This project will attempt to design and develop a mathematical video game that can be used in neurofeedback and will attempt to answer the following question: Will use of neurofeedback in conjunction with an academic video game (catered towards children with ADHD) result in improvements in academic performance in the classroom? This paper will develop the game using data collected through surveys and interviews about ADHD children.

Keywords: e-learning, ADHD, neurofeedback, video games, computing, MUSE

A Digital Tool Supporting Goal-Oriented Teaching in Classrooms

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Abstract: This paper presents a newly developed tool for supporting goal-oriented teaching and develops a framework for discussing design intentions when developing such tools. The tool was developed in relation to a recent curriculum reform for the Danish primary and lower secondary school system, which transformed the national curriculum into a number of competences that were further divided into pairs of knowledge and skills. Together with this curriculum reform, there is a government initiative to promote goal-oriented teaching and a complementary need to support teachers' more concrete plans and objectives for their teaching; these form a challenge and a basis for developing a digital tool for mediating between curriculum and pedagogical practice. The motivation for revising the national curriculum and developing digital tools that support teaching is partly based on evidence that the previous national curriculum was not used to any particular extent by teachers (Danish Evaluation Institute 2012). Hence, the curriculum has been rebuilt based on recent trends in school development and curriculum research suggesting the importance of a competence framework, learning goals, and the aggregation of classroom data for efficient teaching (Earl and Fullan 2003). Learning goals are supposed to support the students' pace and sense of progression, inform classroom decisions, structure teachers' planning, and support the dialogue between teachers, students, and parents (Hattie 2009). Based on these concerns, we have developed a technology called "The Goal Arrow." The Goal Arrow aims to support teachers in creating lesson plans, setting associated situated learning objectives, relating these to the national curriculum, and specifying indicators of learning and progression. The objectives and specific indicators are used when teachers and students assess how the individual student performs in relation to the goal. Data for each student are collected over a certain period in relation to several goal arrows, making it possible to sketch out a student achievement profile, a class profile, and a profile of the curriculum areas covered in

the period. These profiles provide an overview of student progression in relation to curriculum levels. The tool has been tested with approximately 100 teachers and 2,000 pupils. In the paper, we outline the design of the tool and the curricular structure it builds upon. Furthermore, we discuss how the design of the tool tries to accomplish a balance between teachers setting up their own learning objectives and choosing between a set of predetermined goals. We conclude with a number of questions to be addressed empirically regarding teachers' use of the tool.

Keywords: curriculum technology, classroom tools, goal-oriented teaching, visible learning

A Serious Game to Give Students Careers Advice, Awareness and Action

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Abstract: The university Careers Service seeks new ways to reach out to students and help them to prepare for their entry into the job market. Working with the Careers Service, we designed an online web-application to *gamify* the students' learning of a range of knowledge, skills and experience related to career development and employability. The aim was to help students to learn new skills, and make them aware of their need for them. It took the form of a game which students would play weekly in class. The students were able to play the game outside class as well, in their own time. Those who appeared to be more engaged did so. The tasks were a mixture of in-game actions, as in any other game, and also real-world actions, like sending emails to develop networking skills. The tasks were co-designed with the help and expertise of the Careers Service staff. Students got in-game feedback for some of their in-game actions, which gave them a personalised experience through indirect communication with careers staff. We found some fair engagement of the students with the game, but it was not strong in all cases. The enhanced levels of careers support was not sufficiently valued or appreciated by the students, it seemed to us. In other ways, it was a beneficial exercise. Within the game, students were given fairly interesting tasks to perform, and some informally said that they were occasionally very useful and instructive. The game was partially successful, in our assessment, and we intend to use it again in future. However the gamification was not perfect, and we believe it suffered from some common issues, showing that gamification is not

easy to get right. The more innovative aspects of the game remain interesting and worthy of future development.

Keywords: serious games, employability skills, e-learning, augmented reality games, gamification

Student Creativity in Serious Games for Employability Skills

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Abstract: Students are generally slow to realise the importance of preparing for their entry into the graduate job market. In this case-study of a coursework assignment to final-year Honours students, teams were asked to design video games to inform students, in early years of study, about the need to improve their own employability skills. This was in order to see if engaging the creativity of students to inform others about employability would improve their own awareness as well. In a course on video-game design, the students were assigned coursework to design game concepts and prototypes for a handful of real or potential clients. One of the real-world clients was the university's own internal Careers Service, who required game concepts to interest and inform university students, in early years of study, about the importance of preparing a curriculum vitae (CV) with care. University staff represented the Careers Service, including the head of the service herself, by sitting in on classes to review the student teams' pitches for their concepts. The game prototypes were well-received by the client, who went so far as to commission and fund a team to make a similar game for later publication on the university website. These were for two games, to collect materials for a CV, and to exercise interview skills. In this way, the coursework assignment contributed to student employability in several ways: by developing a game to make students in first years at university more aware of key employability skills; by exercising the students who made the game in their own awareness of the same; and by actually employing the students for short-term Summer work, that made valuable additions to their own CVs. The initial assignment proved to be effective, in the sense that the client reacted so positively as to fund further work from the students. That also significantly improved the employability of the students thus commissioned. The reactions of the students was somewhat ambivalent, however, in their appreciation of the opportunity offered to them, which to our surprise was not altogether enthusiastic. The game itself has yet to be installed on the university web-servers. We conclude that such coursework interventions are potentially very valuable to students, whether they quite realise it or not. Students later

reported that they have drawn significantly on the experience in applications forms and interviews.

Keywords: serious games, e-learning, employability, creativity

Use of Electronic Resources in Content and Language Integrated Learning (CLIL): Pre-Service Teachers' Perspective

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Abstract: The paper presents a qualitative research study conducted with pre-service teachers of mathematics. The study is based on questionnaires given to future teachers of mathematics who enrolled in the course of teaching mathematics through Content and Language Integrated Learning (CLIL), i.e. teaching mathematics in English to non-native speakers) and joint reflection with all students. The aim of the study is to find out what online and electronic materials future CLIL teachers find useful, how they propose they should be used and modified for the needs of CLIL classrooms. The items in the questionnaire and the joint reflection focused on the selection of online resources, the students' vision of their modification for the specific environment of CLIL lessons, on the differences and commonalities when planning a CLIL lesson with and without e-learning support. In the paper, the authors analyse the students' answers and comments and also suggest how to work with pre-service teachers to make them more sensitive to the selection of online materials.

Keywords: CLIL, e-learning, online material adaptation for CLIL, teacher training, CLIL course

Putting the Programming hut Online; Self Learning for the Net-Generation

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Abstract: Programming is a core subject in most Computer science programmes at university level but research studies indicates that students face difficulties with the understanding of theoretical concepts as well as practical code construction. The Digital natives or the Net-generation are now enrolling university programmes and they are the first generation that has used computers and online tools since childhood. Programming education has a tradition of programming huts, where students in introductory programming courses get exercises to explore fundamental programming concepts with instant feedback. To provide quality feedback in the traditional form requires experienced facilitators and costly venues for today's large course batches. At the department where this study has been conducted there exists a tradition of a weekly lab hut for general Computer science but an online environment with 24/7 access would be an enhancement. This study has explored the potential of an online environment for programming exercises in the Python programming language named MyProgrammingLab. The aim of the study is to describe and discuss how an online programming laboratory might support the learning of programming concepts in introductory university courses. The research strategy has been a case study where data has been collected by an evaluation questionnaire, informal discussions and an analysis of students' study patterns in the virtual learning environment. Findings indicate that students have different learning styles and that some students have worked thoroughly with most of the material in MyProgrammingLab, but that the majority only have used the environment for the initial exercises on fundamental programming concepts. Some learners also mention that they got stuck in the online environment and that they lack the feedback that they can get in tradition face-to-face sessions. Conclusions are that the evaluated online environment can be a valuable extra tool for self-learning, but to reach a larger part of the course participants with their various learning styles there is a need for a closer alignment to the course content which would need a different course outline.

Keywords: online learning environment, e-learning, blended learning, programming education, technology enhanced learning

Islamic Education in Nigeria From Rote Learning to e-Learning

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Abstract: Right from the advent of Islam in West Africa, there has been rising interest in studying Islamic education. Various methods have been explored to teach the subject. But with continuous changes and civilization in the globalized world has had positive impact on the course. Hence the adoptions of E-Learning such as the use of internet, computer, audio and video tape have positive impact in learning the course positively. Therefore, this paper examines the role and impact of E-Learning on the students in learning Islamic Education. This paper argues that because of the multi-dimensional benefits of E-Learning such as low-cost, effective and learning friendly environment on teaching Islamic education, a concerted effort is necessary among all stakeholders in education sector in the task of promoting the effective provision of E-Learning in the schools

Keywords: Islamic education, rote learning, e-Learning, western education, traditional Quranic school, Arabic learning

Analysis of Students' Behaviour in eLearning Course "Educational Technologies"

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Abstract: The use of information and communication technologies in education makes study materials and aids easily accessible and offers the possibility to study anywhere and anytime. The educational environment used for making study materials accessible and for the computer support of the education process (learning management system, LMS) often enables recording of students' activity during their studies, work with study materials, test results, etc. The analysis of the data offers the information about students' behaviour in the eLearning environment and makes it possible to find out their usual daily or weekly study time, the actual use of study materials, etc. Extensive courses taken by large and quite heterogeneous groups of

students are suitable for the analysis of students' behaviour in the eLearning environment. The "Educational Technologies" course is intended for the students of the "Teaching for elementary schools" study program. Every year, the course is taken by approximately 400 students of both full-time and part-time study. Students' behaviour is influenced by the form of study, the structure of the course, and the study materials. In the 2014/15 academic year instructional video tutorials were added to the "Educational Technologies" course for the first time. The paper analyses the changes in students' behaviour and actions within the scope of the "Educational Technologies" course related to the use of instructional video tutorials. The results are specified for both forms of study – full-time and part-time. With regard to the number of students in the course, the acquired results refer to the general principles of students' activity and behaviour in the eLearning environment.

Keywords: educational technologies, eLearning, students' activity, students' behaviour

Note-Taking Activities and Student's Reflections Upon Their Learning Efficacy During a Blended Learning Course

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Abstract: In addition to improving learning behaviour, note-taking activities may affect various aspects of participant's emotional efficacy, such as learning satisfaction. To examine this behavioural improvement and study its effectiveness, the relationships between participant's evaluations of their own self-efficacy and their note-taking activities was analysed. The contents of notes students took during the course were lexically evaluated. The number of valid participants was 27. Four indices of note-taking activities were extracted from the lexical analysis. Correlation analysis was conducted, and according to the provisional results of the correlation analysis between the four indices of note-taking and the student's characteristic of their own degree of self efficacy, there were some significant relationships between note-taking indices and some self assessment indices, such as word rates in their notes and the degree of out of course study, and between content coverage of notes taken and self understanding.

Keywords: note-taking, student's reflection, blended learning, text analysis, causal analysis

Assigning Problems Online and its Impact on Pupils' Choice of Solving Strategy

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Abstract: The paper focuses on mathematics problem solving with special attention on assigning problems using a web link. It is one of the outcomes of a large research project focusing on the impact of solving problems using heuristic strategies on development of pupils' creative approach to learning mathematics and to problem solving. Unfortunately, pupils are often given little chance to be creative when solving problems. Moreover, their will to use of creative such strategies is influenced by their mathematical knowledge and other factors. Offering pupils suitable environments for working in a more creative way when solving problems helps them in situations when they do not find a solving algorithm in their repertoire of knowledge and have to look for suitable heuristic strategies for the solution. The main goal of the paper is to show if and how assigning a problem using a web influences pupils' choice of solving strategies. To be more specific the research question is the following: What impact does assignment of a problem through a web link have on the pupils' solving procedure, i.e. what happens when pupils solve the problem on their own outside of school and can use any tools? The importance of this question is underlined by the fact that problem solving is the basis for successful mathematics education. Any use of technological devices is appropriate when it brings benefit, opens new possibilities or considerably supports the solver's creativity and independence. The design of the study was the following: The authors conducted and analysed an experiment with 21 pupils aged 13-15. The pupils were assigned 5 problems in the form of a web link. The assignments were available to the pupils during the whole experiment. The problems were solved individually outside of lessons of mathematics. The pupils could use any electronic resources and technological tools they found useful for the solution. The most important change in comparison with problem solving in regular lessons was in the number of different solving strategies that the pupils used. The results of the experiment are illustrated by examples from pupils' work.

Keywords: problem solving in mathematics, heuristic strategies, algorithmic approach to solving problems, electronic environment, attitudes towards school mathematics

Simultaneous Class-Based and Live Video Streamed Teaching: Experiences and Derived Principles From the Bachelor Programme in Biomedical Laboratory Analysis

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Abstract: The Bachelor Programme in Biomedical Laboratory Analysis at VIA's healthcare university college in Aarhus has established a blended class which combines traditional and live broadcast teaching (via an innovative choice of video conferencing system). On the so-called net-days, students have the choice of either attending teaching sessions in the traditional way or working from home via the Internet. The education was motivated to expand the use of technology-supported teaching, by offering a flexible study programme, thereby increasing the recruitment base. The analysis described in this article sheds light on the pedagogical challenges, the educational designs possible, the opportunities and constraints associated with video conferencing as a pedagogical practice, as well as the technological, structural and organisational conditions involved. In this paper a participatory action research project is presented. The objective of the project was to identify potentials and barriers from an ICT-supported learning perspective; to develop robust educational designs and teaching scenarios, and to qualify teaching staff in teaching activities which involve the use of the blended class model, thus ensuring the anchoring of the project. Data was collected through video recordings, "the question of the day" to the students, focus group interviews with the teachers and a Pedagogical Day workshop. The analysis focuses on the experience gathered as seen in relation to four quadrants of study activities. From here a number of general principles and perspective were derived for the specific program which can be useful to contemplate in general for similar educations. It is concluded that the blended class model using live video stream represents a viable pedagogical solution for the Bachelor Programme in Biomedical Laboratory Analysis at VIA. However, full implementation of the concept will

require re-design of some teaching activities as well as competence development among teaching staff.

Keywords: Live video streams, blended learning, hybrid teaching models, University College, action research

Structured Approach to Project Based Learning using a new type of Learning Management System

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Abstract: Project-based learning (PBL) is now widely adopted by instructors for enhancing learning outcomes and provides a compelling learning environment for engaging students. PBL is a way for students to practice domain specific knowledge through projects, to fine-tune their creativity skills and to realise their motivation in the pursuit of appropriate academic recognition. Teaching through PBL, particularly in large classroom environments in higher education, can be a significant challenge eased somewhat through the use of learning management systems (LMS). Existing LMS’s facilitate PBL by allowing instructors to share project specifications using simple document sharing and also providing online tools such as Wikis and Blogs. The key challenges faced by instructors include how to define and structure project specifications, how to monitor the interim progress of projects online and how to assess individual student engagement. The key challenges faced by students include how to adopt a professional approach to project implementation, how to collaborate in project teams outside of class time and how to access instructor advice as issues arise. This paper presents a new type of project based LMS that facilitates instructors in structuring projects based around lists that are easier to follow and implement by students. Three university-based test cases outlined in this paper demonstrate that there is significant potential for improving learning outcomes and student engagement when using a structured approach to project based learning delivered through a new type of LMS.

Keywords: project based learning, learning management system, creativity relevant skills, project management, innovation management

Challenges in Analyzing Unstructured Learner Generated Qualitative Big Data

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Abstract: As the amount of educational data grows, a necessity is occurring to define characteristics of Unstructured Learner Generated Qualitative Big Data (ULGQBD), and develop a conceptual framework to analyze these data sets. According to the author there are three main challenges in analyzing ULGQBD. First one is related to qualitative big data itself. There is an ambiguity of definition and methodology of analyzing ULGQBD. The answer of the question *How much amount of qualitative data is big?* is blurry. Therefore, there is no a simple, straightforward, specific methodology to overcome the struggles originated from seeking the meaning within such a big amount of unstructured data. Second problem is absence of conceptual frameworks for analyzing ULGQBD. Third problem is related to Qualitative Data Analysis (QDA) software. Traditional QDA software is not ready to big amount of data, and cloud based text analytics tools do not have enough language support for stemming for agglutinative languages such as Turkish. In this paper, author shares her experience of analyzing ULGQBD. The data set, which she worked on, contained 13000 responses to an open ended survey whose main purpose to get feedback about the courses from the customers to improve educational effectiveness. She provides a framework for structural coding of ULGQBD and brief road map for researchers, who deals with ULGQBD.

Keywords: learner generated data, qualitative data, big data, challenges, analyze

The ups and Downs of BYOD: A Sociocultural Perspective

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Abstract: This paper reports on the first two years of a Bring Your Own Device (BYOD) initiative in a New Zealand secondary school, using data derived from a series of surveys of teachers, parents and students. In this paper we present the data gathered from these surveys, which includes not only quantitative data but qualitative data

from free text responses, giving insights into the challenges faced by teachers, students and parents in moving to a BYOD classroom, and the potential benefits for teaching and learning, and preparing students for a digital world. We frame our analysis from a sociocultural perspective that takes account of structures, agency and cultural practices and the interactions between these domains over time. We find that there are some tensions in these relationships, with contexts and practices having to be renegotiated as the BYOD classroom and the structures within which it operates evolve. Our findings also suggest that students perceive their digital skills as developing rapidly, while teachers are more circumspect. From our interpretations of our qualitative data, we suggest that this is because members of staff are considering the development of their skills in the context of transformations of classroom practice, which demands a more extensive skill set than student use of one-to-one devices. On the surface, it appears that many of the changes to cultural practice are substitution or augmentation of previous activities, for example using one-to-one devices for researching and presenting material. However, when we look deeper, it is evident that apparently straightforward adoption of digital media is having a more profound impact on structure and agency within the classroom. If there is an area where agency may be problematic, it is in the responses of parents, who may feel increasingly alienated from their children's learning activities if their own digital skills are lacking. These findings will be of interest to anyone who is engaged in BYOD projects, particularly those who are planning such initiatives or in the early stages of implementation.

Keywords: BYOD, mobile learning, sociocultural structures

Blended Learning in Practice: Tracking Students' Performance

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Abstract: Exploited as a tool supporting the face-to-face form of instruction, the blended learning started to be implemented in the process of instruction two decades ago. The information and communication technologies provide a wide range of tools and strategies each student can choose from and learn efficiently. The result is the student is positively motivated and able to develop the possibly highest level of knowledge in the shortest time period spending least efforts. To reach such a level in the real process of instruction, the requirement for optimizing the teaching/learning process arose, particularly the call for improving the flexibility of the process, mainly

by applying the individualized approach. Reflecting this situation, step-by-step the blended learning in practice has become the subject of research at Faculty of Informatics and Management. The process was monitored, feedback collected from both the students and teachers/tutors and data were analysed. Instead of others, the latest three-year-long research focused on students' preferences in learning styles within the ICT-supported learning environment. Considering this requirement, following questions should be answered: Do students learn more, if the blended process of instruction is tailored to their learning preferences? Either the answer is yes, or no, how does the process run? What can help students show what they know? The main objective of this research was to answer the above mentioned question, i.e. whether students learn more if the blended process of instruction is tailored to their learning preferences. The pedagogical experiment following the pretest – blended instruction – posttest structure was applied. The blended process covered the face-to-face instruction in the subject 'Library services – Information competence in education', been taught 90 minutes per week and supported by time/place/pace-independent autonomous study in the online course to fix and practice the learning content, develop new knowledge and be able to apply it in practice. The sample group consisted of students of University of Hradec Kralove. Nearly 400 respondents started the pedagogical experiment but only 324 finished it, from various reasons.

Keywords: experiment, e-learning, blended learning, research, tracking

Comparing a Shorter Flexilevel Test With a Full Length Standard Computer Based Test

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Abstract: The Flexilevel Test is a form of Computerised Adaptive Testing that presents items in an objective test based on the performance of examinees. Previous studies by the authors provide support for the notion that the Flexilevel test provides comparable results to standard Computer Based Testing tests (CBT). Moreover, previous studies by the authors support the notion that this relationship exists when shorter Flexilevel Tests are presented. The work reported here represents a continuation of this work to investigate the extent to which shorter tests using the Flexilevel Tests are comparable to full length CBT tests. The motivation for using the Flexilevel test is to provide tests that are tailored to the performance of students in both formative and summative assessment contexts. The motivation for providing shorter tests is the potential they may offer for embedding formative assessments in a broader

range of formative assessment contexts, in particular mobile assessment contexts. In the study reported here a summative assessment for a Level 4 Computer Science module, Platforms for Computing, was administered to 57 students. The test was comprised of two sections, one a Flexilevel Test section that contained 15 items and another, a standard Computer Based Test (CBT) section that contained 25 items. The sections were presented in random order and were not identified as being different sections. A Pearson's product moment correlation was performed on the data. The results of the calculation showed that the relationship between students' performance on the CBT and Flexilevel sections were correlated ($R=0.6232$) and that this was significant at $p<0.01$. This result is consistent with the notion that Computerised Adaptive Testing (CAT) can provide shorter tests without disadvantaging students and also with previous work conducted by the authors. The results provide support for the idea that the Flexilevel Test may be a good candidate for the provision of assessments in a broad range of educational contexts, but particularly mobile learning contexts.

Keywords: Flexilevel Test, e-assessment, computerised adaptive testing, mobile learning, mobile assessment

Individualized Learning Through Non-Linear use of Learning Objects: With Examples From Math and Stat

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Abstract: Our aim is to ensure individualized learning that is fun, inspiring and innovative. We believe that when you enjoy, your brain will open up and learning will be easier and more effective. The methods use a non-linear learning environment based on self-contained learning objects which are pieced together by a Hyperbolic Graph, or by the students themselves. This learning system makes it easy for students to find a path through the course material which suits his/her personal learning style and which makes learning more motivating, and efficient, and which leads to better learning. The methods have been tested in two case studies. One was a continuing education course in statistics for a global medical company, and the other was a "big" - both in terms of the number of students and in the number of ECTS points - introductory course in mathematics at a major technical university. The continuing education course made it possible for the company's employees, from many different parts of the company and from all around the world, to learn from the same course. For the university course we started with a pilot project where our methods were used

during only one course week. The pilot was a success and we then used the experiences from it to reshape the entire course. This course has now been running for 5 years and consistently receives very good evaluations, both from students and teachers. A clear finding from the test cases is that our learning method creates more motivation and makes the students use more time on the course and prepare better for the lectures. An important discussing point is how much "free choice" is best for the learners. We believe that the possibility to follow your own learning style by choosing between different types of material is important and ensures better learning and more motivation for all students, and that for the best students it also gives courage to go beyond the curriculum.

Keywords: individual learning, learning objects, non-linear learning, hyperbolic graph, continuing education course, university mathematics course

The Effectiveness of Flipped Lectures in Improving Student Engagement and Satisfaction

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Abstract: The purpose of this study was to investigate the impact of the flipped classroom model on student engagement within a university course. The courses were taught in a traditional lecture format for the first half of the semester, and then were switched to a flipped lecture format for the last half. The flipped lecture combined out-of-class online video presentations and in-class formative collaborative activities, summative assessment, and inquiry-based learning activities. The study compared students' cognitive, behavioral, and emotional engagement and satisfaction in the flipped lecture, compared to the traditional lecture, style activities. Seventy-five male and female students from Sultan Qaboos University participated in this study. The Classroom Survey of Student Engagement (CLASSE) and Student Course Satisfaction Survey (SCSS) were used to collect data about student engagement and satisfaction over the course of 3 years. The results show that a flipped classroom environment promotes students' cognitive, behavioral, and emotional engagement within the lecture and improves their overall satisfaction with interactions and discussions, classroom time management, and overall classroom environment learning.

Keywords: active learning, flipped classroom, student engagement, student satisfaction

Reasons for Doing/not Doing Online Homework: Insights From EFL Students

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Abstract: Despite the inconsistencies in research findings over the value of homework, it is still an important part of learning, which can considerably help students reinforce the skills and knowledge covered in the classroom. This study investigates the motivation of EFL students for doing online homework, particularly the different reasons for doing so, as well as the extent to which motivation affects students' academic success. To assess the EFL students' perceptions of their motivation, a modified version of the Self-Regulation Questionnaire (Ryan and Connell 1989) is utilized. Then, there is an analysis of the relationship between what the undergraduates indicated about their motivational tendencies and their class performance. Identifying the reasons behind their reluctance to complete their homework helps shed light on effective approaches and practices for increasing students' intrinsic motivation. The outcomes of this preliminary investigation provide a basis for practical implications concerning curriculum modification and improvement in online instruction.

Keywords: learning motivation, English as a foreign language, online learning, homework, academic achievement

On Flexible Multiple Choice Questions With Parameters

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Abstract: Flexible multiple choice questions with configurable random answer options are a common feature in advanced e-assessment systems. Variable parameters can be used to create different versions of an exercise, each time a student looks at it. The approach can be applied to parameterize complete choices of an item as well as particular values appearing in the question and individual answers. However, plain uncontrolled randomization may result in a loss of exercise quality. In fact, writing good multiple choice questions is an established subject of research in classical test theory and item response theory, both subfields of psychometrics. In particular plausible distracters play an important role for measuring the learning outcome of stu-

dents. A distracter is considered as plausible, when it is based on a common misconception about the task. In this context the quality of a distracter can be measured by evaluating how often the distracter was selected. Distracters that are selected too infrequently (e.g. < 5%) are called non-functioning distracters. They are regarded to be ineffective and they should be removed from the item. On the other hand, one can assign a difficulty to a distracter, depending on its selection frequency. The more often a functioning distracter is selected, the more difficult it appears to be. This paper presents how we can use the concept of parameterizing multiple choice questions inside the e-assessment system JACK to design exercises with good distracters. In particular it is our aim to obtain a pool of functioning distracters with different levels of difficulty. This enables us to parameterize the distracters of an exercise depending on the context in which the exercise is used. We give a case study of a distracter analysis for an exercise that was used in a preparation course for mathematics at our university. We show how we can identify and remove non-functioning distracters from the exercise. We can group the remaining distracters by their level of difficulty and achieve promising progress towards adaptivity through this approach.

Keywords: e-assessment, multiple choice questions, learning analytics, adaptivity

Action Experiments and an Industry Partnership Influencing a Flipped Classroom Approach

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Abstract: Despite many efforts from both industry and academia to prepare students for professional practice, the disconnect between what industry would like students to know and the quality and adequacy of the skills with which students graduate still remains. In an attempt to address this disparity, a flipped classroom approach and a strong liaison with an industry partner have been implemented in two consecutive second year Information Systems courses since 2013. A design science methodology, implemented through a theory of coherent practice, was used to guide the design of the curriculum for this approach. As part of the evaluation of this approach, each course was executed as an action experiment. A set of carefully designed interventions to foster an interactive and integrated pedagogy, where students actively participated in their own learning, constituted the elements of these experiments. Interventions, such as quizzes, exercises, discussions, polls, projects and more, were structured to ensure that students experience the three learning stages of knowing, understanding and applying. It was a dynamic and ongoing process of fusing practical

experience with theoretical concepts. It further helped to determine what level of competency students have reached and guided their growth to the next level through enhanced skills, experience and deep approaches to learning as well as through changes in attitude. An additional advantage was that students already started to prepare for their careers during the early stages of their studies. The paper will report on the outcomes of the four specific action experiments and the rationale behind their design. Concept maps were used to evaluate the feedback from these experiments, illustrating the benefits and the limitations in each one of the three learning phases. The reflections on and lessons learnt from each action experiment helped to conceptualise new interventions and adapt existing ones. The nature of the involvement of the industry partner will also be highlighted and further improvements will be proposed.

Keywords: flipped classroom, coherent practice, active learning, stages of learning, action experiments

The Opportunities and Challenges of Working With Students

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Abstract: As we move towards an ageing population, quality education and lifelong learning for all has been acknowledged as being a key element in UNESCO's mission (2008-2013). Irina Bokova, Director-General of UNESCO (2014, p4) further stated that; '...Global Citizenship Education must also be considered crucial elements for well-rounded educational systems.' Over a billion people are annually on the move globally, with approximately 40 million being refugees or internally displaced (UNHCR, 2014 cited in UNESCO, 2014). Therefore there are challenges in that all educational institutions need to assist the immigrants in the integration process and in facilitating the acceptance of the immigrants by the population of the host countries. Higher Education has a key role to play in this process. The concepts of citizenship and employability can be included in the programmes, but it can be challenging for students who may feel that citizenship has no relevance to their programme of study. But as stated previously, we are living in a global society and students are required to have transferrable skills and citizenship is key to global participation. This paper proposes that the inclusion of citizenship and employability can augment the learner experience, especially when embedded in the students' own disciplines. In

the 20th century, the adult learning experience focussed on face to face contact, but in the 21st century learners want and expect pedagogical approaches that encourage interaction using blended learning. These approaches can assist in engaging the learner in critical thinking that enhances citizenship and employability. The paper will demonstrate how lifelong learning has adapted to the meet the learning needs of students in the 21st century; including citizenship and employability and focuses on the blended learning approaches to explain how these enhance and seek to develop the students' learning experience by encouraging critical thinking and independent learning. The paper considers a case study that demonstrates the inclusion of teaching about citizenship and inclusion among students in the School of Engineering and Built Environment at Glasgow Caledonian University. The interventions employed recognise that the students are digitally engaged and the Real World is one that affects their learning in the 21st Century.

Keywords: independent learning, citizenship, blended learning, employability

75.000 Views and Growing: Creating Vidcasts for YouTube With no Budget

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Abstract: Teaching research methods, and encountering that students across different institutions, disciplines and levels of study had the same issues with the topic, led to the creation of a YouTube video on 'Writing a Methodology Chapter'. The video subsequently has more than 85,000 views (to date) and is the highest ranking video under this topic. This case study explores how, a video created without prior experience or any available budget, could obtain such a high impact. YouTube analytics, in triangulation with additional data such as comments, and online resources that share the video, can offer insights into viewer behaviour, and the learning ecology this content element was embedded into. Issues with YouTube analytics are highlighted as well as suggestions for future analysis and developments.

Keywords: Vidcasts, YouTube, teaching, research methods, postgraduate students

E-Testing in the Czech Military

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Abstract: The democratization process in Central Europe in the early nineties of the last century brought about profound changes that also extended to language teaching and testing in the Czech military. The implementation of NATO STANAG 6001 examinations meant a breakthrough in language testing and, subsequently, it resulted in positive washback effect on teaching. The advent of e-learning and its massive implementation into teaching languages led to blended learning and gradually to e-testing. In the military, several types of tests are required – placement tests, achievement tests, as well as high-stakes proficiency tests. Since the testing by the above mentioned types of tests can be considered as large-scale assessment, e-testing came into play as an instrument making tests more time- and cost-effective. Both supervised and unsupervised (proctored and unproctored) e-testing has been applied in the language teaching and testing system in the military. This article will provide insight into the implementation of e-testing and present the conclusions of a study comparing the results of supervised and unsupervised e-tests, using both quantitative and qualitative approaches. Further development of e-testing will be suggested, highlighting its possible advantages and disadvantages.

Keywords: supervised, unsupervised, washback, e-learning, e-testing, standardized tests

Assessment for Learning to Flipped Classroom Using Clickers

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Abstract: The flipped classroom is currently the popular trend in education where content delivery is assigned as homework or pre-classwork and assignments are completed as classroom activities in-class as well as after-class activities. Clicker technology when used for assessment for learning has the powerful potential to flipped the classroom in a pedagogical approach. To investigate whether assessment for learning using clicker technology could flipped mathematic course. Participants were enrolled for flipped undergraduate mathematics II course at a study university of technology in South Africa. In order to establish the changes in students' academic performance, Technology Engagement Teaching Strategy (TETS) was used in the classroom and weekly clicker continuous assessments were conducted. A semester test results were used to established the significant difference between clicker test and semester test. Finally, a survey questionnaire was administered. Students' perspectives and their experiences of using clickers in a flipped mathematics course were also surveyed. The results showed that assessment for learning to flipped classroom using clickers tends to enhance students' mathematical communication skills, and help to develop the skills needed to write as well as read mathematical proofs. This suggests that clicker assessment activities have the ability to assist students to grasp the content and enabled them to apply it in practical situations. An advantage of a mathematics flipped classroom was that students who understand mathematical content are neither likely to guess nor memorise the subject but strive to understand. It is recommended that higher education institutions support the flipped classroom approach as well as assessment for learning and provide appropriate technology for positive outcomes.

Keywords: flipped classroom, clicker technology, assessment for learning, student-centred approach and just-in-time teaching

Learning ESP in Engineering Education Through Mobile Devices

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Abstract: Reflecting the latest trends in technical and technological development, mobile devices have become standard didactic means both in foreign language and other subjects' instruction on all levels of education. The use of wireless, mobile, portable and handheld devices is gradually increasing and diversifying across every sector of education in both the developed and developing worlds. The mobile learning currently exploits both handheld computers and mobile (smart) telephones and other devices that work on the same set of functionalities. The use of handheld computers is obviously relatively immature in terms of both its technologies and its pedagogies, but it is developing rapidly. This study focuses on the use of mobile devices within teaching/learning English for specific purposes (ESP) in technical (bachelor) and engineering (master) higher education in Informatics and Management-related study programmes. Mobile devices were understood to be very small items which users carry anytime anywhere without the electrical supply been required. The research was conducted at the Faculty of Informatics and Management (FIM), University of Hradec Kralove, Czech Republic, monitoring what mobile devices students use for personal and education purposes. Running more than 250 online courses in LMS Blackboard in 2013/14 at FIM, since 2013/14 the Blackboard Mobile Learn™ version 4.0 for Apple and Android devices has been available and piloted. Totally in 21 ESP courses mobile-assisted language learning (MALL) principles were applied. The full versions of courses run traditionally within the LMS, and they were available on mobile devices in the limited extent as well. In other words, the blended learning model is applied which combines the distance form of study in online courses and personalized approach through mobile devices which satisfies the individual time/place preferences and bridges formal and informal learning. Three research questions were set to be researched. Are students sufficiently equipped with mobile devices? What purposes do students use the mobile devices? What is the students' feedback after the MALL? These questions resulted from the background of the FRAME (Framework for the Rational Analysis of Mobile Education) model by Marguerite L. Koole. The model can/should be used to design a more efficient mobile learning process, as it takes into consideration the technical characteristics of mobile devices as well as social and personal aspects of learning and it places more emphasis on constructivism.

Keywords: e-learning, engineering education, language education, m-learning, mobile devices

Emerging Collaborative Writing Strategies in Digital Environments

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Abstract: This paper focuses on students' collaborative writing processes, with technology as a non-human actor. The paper is based on an ongoing research project, *Students' digital production and students as learning designers* (2013–2015), funded by the Danish Ministry of Education. The project concerns primary and lower secondary schools and focuses on learning design frameworks that involve students' agency and participation regarding digital production in different subjects and cross-disciplinary projects. The productions are designed as learning objects aimed at peer students. Within these teacher-designed frameworks, the students perform as learning designers in two ways: as learning designers of their own work and learning processes, and as learning designers of their learning objects. The project shows that digital production facilitates students' learning processes and qualifies students' learning results when executed within a teacher-designed framework that provides space for and empowers students' agency. The teacher's frame design embraces both opportunities for the students' independent processes and teacher-initiated scaffolding to qualify the process. The collaborative writing process requires that the students use reflective reactive writing strategies as an overall and general strategy. In relation to this strategy, they develop different strategies through which the work is organised in different ways in interaction with the technological actors and the material performance of the technology. The technology supports, facilitates and provides overviews of the students' writing processes. The students and the technologies are taking multiple roles that are constantly changing. The students act as writers, peer consultants and reviewers. The teacher takes the role of facilitator and initiates processes of evaluation in which students have to review each other's texts. The technologies have a facilitating role for the collaboration, production and reflection. The extent of students' communication depends on students' collaborative and cooperative strategies. The students' communicative and reflective skills are increasingly elaborated the more they work collaboratively.

Keywords: collaborative writing processes, teacher-designed framework, students as learning designers, writing strategies, writing roles, writing and communication

Designing and Evaluating a Flipped Signals and Systems Course

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Abstract: Traditional lectures have long been criticised for making students passive listeners instead of active participants. In spite of many strong arguments in favour of active learning most engineering courses are still based on lectures that only contain few elements of active learning. In flipped classroom teaching, traditional lectures are replaced by a combination of 1) on-line videos to be watched at home before the class and 2) classes dedicated almost entirely to active learning. A key advantage with the flipped classroom is that students can engage with the material at their own pace prior to the class such that class time can be dedicated to higher-level cognitive learning. However, even though the flipped classroom has received considerable attention over the past decade there are relatively few studies evaluating this pedagogical method in engineering education. In this case study, we report on the implementation and evaluation of the flipped classroom approach in a master's course on sensor fusion and nonlinear filtering at Chalmers. The course design was inspired by the 5E model (Bybee et al., 2006) in that we used the videos for engagement, exploration and explanation whereas the classroom sessions focused on elaboration and evaluation. The students' perceptions of the flipped classroom approach were probed through a survey containing both closed and open-ended questions. The vast majority of the students were either positive or very positive to the flipped classroom approach. For instance, 74% of the students strongly agreed with the statement that flipped classroom teaching leads to improved learning, 96 % stated that they preferred video lectures with quizzes to live lectures, and 87 % found the practice sessions useful. As the course contained both traditional lectures and flipped classes, we could compare how the two methods affected students' learning. From a teacher's perspective, flipping the classroom was both extremely rewarding and very demanding. Flipping the lectures required a significant amount of work, but when the material was developed, teaching was more stimulating and less demanding than in a traditional course. Although it was challenging to design the problems for the practice sessions, these sessions were the most exciting and rewarding parts of the course.

Keywords: flipped classroom teaching, engineering education, video lectures, active learning, peer instruction, collaborative problem solving

Basics of Finance and Results From Examination in Selected Groups of Students

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Abstract: The aim of the paper is to evaluate and compare students' study results in the subject "Basics of finance". This subject is taken in the second year of the study at the University of Hradec Králové at the Faculty of Informatics and Management. Four-point grade system is used for evaluation of students' performance in final examination. Students' results in examinations from two academic years are compared and presented. The sample of students is divided into two groups consisting of full-time students and part-time students. Full-time students have weekly two face-to-face classes and can immediately discuss the topics with their teacher. Part-time students have only two six-hour meetings with their teacher. New training modules were created in LMS Blackboard for part-time students of Financial management and Tourism management studying subject "Basics of Finance". These training modules include lectures, links to interesting websites, calculators or simulators in MS Excel etc. There are no exercises, but the links can motivate students to a deeper understanding of individual topics from real life and show nice examples from the real life. By studying materials, students can revise knowledge via tests that are aimed at various topics. The tests serve as a control mechanism. The whole course is built on the philosophy of constructivism and methodology of adult education. The introduction to the topic and the literature review form the first part of the paper. The main part of the paper covers two areas. The first one is based on the introduction of the subject "Basics of Finance" at the Faculty of Informatics and Management. The other part is focused on the examination results of all student's groups. Final recommendations are presented at the end of the article. The hypothesis is stated and then on the basis of gained results it will be confirmed or rejected in the paper. It is expected that part-time students who use LMS Blackboard with all support materials and tests will have better results in the examination. A detailed research together with the analysis and critical assessment of accessible materials will enable to identify the main objectives in the field of study. The analysis of the initial state will consequently enable to identify the key factors and knowledge

Keywords: comparison, constructivism, education, effectiveness, examination, results

Digital Literacy and Effective Learning in a Blended Learning Environment

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Abstract: Leveraging the capabilities of the web, which has become hugely popular among university students since its inception in the 90s, blended learning has been promoted as an alternative to classroom learning. A hybrid of classroom learning and online learning, blended learning offers flexibility in the way students learn – when, what, where, and how to learn. The easy availability of mobile devices (e.g. smartphones, tablets, etc.), coupled with web-based services (e.g. digital library, learning management systems, etc.), has further fuelled blended learning. Universities see online learning as complementary to classroom learning so as to give students a better learning experience, and students like the learning flexibility. As blended learning expects students to know how to use digital technology to access the web, to search for and to use information from different sources both online and offline, as well as to be an independent learner, it seems reasonable to presume that to be an effective learner in a blended learning environment, students need to have a certain level of digital literacy. Thus, there remains a question: Do students require digital literacy to be effective in learning in a blended learning environment? Answering this question helps universities to understand if high digital literacy is a prerequisite to more effective learning in a blended learning environment. If it is, universities can provide students with workshops to help raise digital literacy among them. Following a quantitative approach, this study conducted an online questionnaire survey to answer the question by examining the relationships between four digital literacy constructs; i.e. underpinnings, background knowledge, central competencies, and attitudes and perspectives; as conceptualised by David Bawden in his 2008 book chapter entitled “Origins and Concepts of Digital Literacy,” and effective learning. This study developed a 5-item scale to operationalise each of the four digital literacy constructs and, using the revised Bloom’s taxonomy as a point of departure, a 6-item scale for the effective learning construct. To collect responses from the students who were taking subjects in a blended learning environment at a local university, the students were invited to fill in an online questionnaire. Responses were then analyzed using partial least squares. Exploratory factor analysis resulted in the four digital literacy constructs being reduced to three. Subsequent confirmatory factor analysis proved that the three digital literacy constructs each had a statistically significant relationship with the effective learning construct.

Keywords: blended learning, online learning, digital literacy, effective learning, higher education, partial least squares

Mobile Learning as a Condition for the Evolution of Competencies in the Alternative Periods of Study

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Abstract: In this paper, the technique of using mobile learning technology to confirm the professional competencies of students in alternative training periods and diploma (professional) practice is investigated. There is some discrepancy between the professional competencies of the graduates in university and specialists working in the production. It is especially noticeable in the area of information technologies. The proposed method is to improve the level of professional competence by using the programmable application "Counting Grades (goals) of Students' Competencies" during a period of their professional practice and advising leaders who assess graduate students' performance in distance learning by remote control. Students also have the parallel tests of professional competencies during this period. The students' supervisor reveals some inconsistencies in the application "Counting Grades (goals) of Students' Competencies" and provides an adjustment of their mistakes. Evaluation of the students' assessment is formulated and summarized according to their scores in "Counting Grades (goals) of Students' Competencies". This grade is also taken into account in the process of assessing the degree project. The paper presents the method of using the application, the algorithm of the method, providing the model of training competency and adjustment of alternative periods.

Keywords: mobile learning, evaluation of professional competence, advising students, the model of training competency

Encouraging Students to Learn Non-Core Subjects in Health Education

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Abstract: This paper presents an intervention in nursing education designed to enhance nursing students' motivation to participate and acquire transferable

knowledge within nursing education. A specific part of the curriculum entitled; Organization, administration and management, is of low immediate interest of the students. The students generally regard this topic as irrelevant for their professional development as nurses. In order to motivate the students a range of different IT based pedagogical designs were implemented with the intent of scaffolding the students' learning. The study, that this intervention is part of, was designed as a 2-year action research project. A variety of data-sources were utilized to document the process, including students' and teachers' experiences as expressed in interviews, observations of teaching and learning related behavior and data logging. This paper focuses on how integrating an IT based design affects the students' learning processes. The research question was; how can students utilize the opportunities for learning in pedagogical designs that include; IT, video-clips, simulations, role playing and collaborative activities? To explore this we used a didactic model developed by University Colleges in Denmark: the study activity model. One of the main objectives for the study activity model is to look beyond traditional didactics and strengthen the awareness of the study activities that the students carry out themselves. The learning opportunities provided by the pedagogical design in this intervention seemed to engage a smaller group of students while a large group of students were frustrated. Our analysis suggests that the students viewed the flexible learning environment and the IT based designs as optional rather than sequential stepping stones towards the learning objectives. The aim of our pedagogical design was to include all students in reflective learning. In order to work with the content on a taxonomically appropriate level a substantial group of students needed more scaffolding and feedback. To respond to the heterogeneity of the student population in nursing education teacher presence and guidance is crucial. Our results suggest that the pedagogical design should support students at different levels to allow them to work and learn in such a way that the learning content can be put to use in a practice environment. The study also suggests that it takes more than one pass of a new pedagogical design to fully understand how to learn in a changed teaching environment.

Keywords: IT didactics, transfer, motivation, nursing education, taxonomy, feedback, employability

Pedagogical Innovation in Teacher Teams: An Organisational Learning Design Model for Continuous Competence Development

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Abstract: This paper presents findings from a longitudinal design-based research project examining how to enable reflection and pedagogical innovation in teacher teams. The article identifies and analyses the teachers' learning trajectories and innovative strategies when working together in the IT-pedagogical Think Tank for Teacher Teams (after this: ITP4T) (Weitze, 2014a), a competence development model, which was developed in an earlier phase of the research project. By using theoretical lenses from innovative knowledge development frameworks to examine the teachers' utterances, interactions and new learning designs, the research aims to clarify what kind of knowledge is being developed and shared in the teacher teams, and how this contributes to the organisational learning process. The context is Global Classroom, an innovative synchronous hybrid videoconference concept, where adult students can choose between participating in class on campus or from home via videoconference on a daily basis. The ITP4T model is a response to the needs and challenges the teachers and the organisation at VUC Storstrøms' Global Classroom have been experiencing in this new teaching environment. The teachers find that they need to be pedagogically innovative when teaching in this learning environment, particularly when aiming to create equal learning conditions for the students in class and at home; in other words, they need to reframe their learning designs. The ITP4T model thus aims at creating a continuous practise for the teachers to be able to create their own competence development in teams in which the manager participates. The use of this new practice inside the school empowered the teachers in the organisation and created a new organisational learning design, which can innovate, help unravel complex questions, create new organisational knowledge and anchor new knowledge and practises. The teachers became both their own and the organisation's continuous competence developers when working in this learning design/innovative model.

Keywords: pedagogical innovation, competence development in teams, video conferencing, synchronous hybrid campus- and home-based education

Social Media and the Student Experience

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Abstract: The static paper-based School noticeboard is a thing of the past. There is no longer a need, or desire, for small groups of students to congregate around a central location. Advertised events are no longer printed on to poorly reproduced paper flyers and then pinned on to wall-mounted cork boards next to the School's administration office. However, the need and desire to stay plugged into the student social community has not disappeared; but has been transformed by modern developments in the way students interact with each other. As the educational landscape inevitably shifts towards a more flexible, cost-effective model of providing academic course elements on a distance learning basis, the opportunity for students to interact with each other outside of their immediate social or workshop group is dwindling. This leads to a general lack of cohesion in the student cohort, which therefore impacts on student experience. Social media platforms, such as Facebook, Twitter and non-proprietary online blogs, such as Wordpress, are an inherent part of the modern student's life, and the apps which provide the link between these parent sites and the student's mobile phones, tablets and laptops create an unprecedented immediacy in the way that messages are communicated between users. *'The ubiquity of social media is no more apparent than at the university where the technology is transforming the ways students communicate, collaborate, and learn'* (Tess, 2013: 60). However, as Roblyer et al (2010: 135) observe, platforms such as Facebook have *'the potential to become a valuable resource to support their educational communications and collaborations'* with academics. Until now, social media has been primarily used as a separate entity, albeit importantly, to the 'at university'/offline student experience, perhaps as a means of promoting special events, such as social activities or extra-curricular lectures, or to raise general awareness for a type of regular practice, such as creating specialist groups for online discussions of certain aspects of university life. We see this as a missed opportunity. Correa et al (2010: 248) define social media as providing *'a mechanism for the audience to connect, communicate, and interact with each other and their mutual friends through instant messaging or social networking sites'* but which has *"that has little to do with traditional informational media use'*. The problem is that the designated 'social' areas of university-branded and operated managed learning environments, such as The University of Hertfordshire's 'StudyNet' system, and university-run online social media groups on non-proprietary platforms, have tended to be regarded by students as almost a 'sub-class' of online social interaction. Many students either opt-out of receiving regular notifications from these

groups - thereby negating the benefits of compiling a seemingly large membership - or allow regular notifications, but having their effect minimised as students become inured to the constant stream of information. Although education providers deem this information potentially useful, students acknowledge that is not personally targeted and therefore easy and beneficial to mentally and physically filter it out completely. However, with some modification to the way that social and educational online communities are created and administered, it has been proved that the 'grey area' between total immersion and total denial of university-led social media can be achieved. This balance will enhance learning, improve social interaction between students in all programmes and years of study, and create healthy, largely unregulated communities aimed at improving the student experience. With these issues in mind, the research hypothesis addressed in this paper is *'Despite the general resistance of students towards university-run online communities, social media platforms can be used to improve student engagement, thereby enhancing the student experience'*. The authors' findings, supported by evidence of enhanced student engagement, conclude that huge steps toward optimal implementation of working online communities have been demonstrated.

Keywords: social media, legal education, student engagement, student experience, managed learning environment, online groups

ELCARE: A Novel Approach for Educating Caretakers of Elderly

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Abstract: Elderly care, or simply eldercare, is the fulfillment of the special needs and requirements that are unique to senior citizens. Elderly care emphasizes the social and personal requirements of senior citizens who need some assistance for daily activities and health care, but who desire to age with dignity. With the improvements made in health technologies, the life expectancy in EU is increasing and more than 80 million people are aged over 60 in Europe today. Experts believe that the increasing number of elderly people who need help with basic tasks, but have been left to struggle by an unprecedented withdrawal of state-funded social care, create a huge problem; lack of nurses/caretakers for the elderly. This paper discusses an e-learning system for elderly care that simply educates/trains the people who want to take care of the elderly; either those who want to become professional caretakers or those who are volunteers or social workers. The novel system inherits web and mobile apps and will be deployed multilingual. The main goal of the system is to increase the social, intellectual and cognitive abilities of the target group like increasing the patience, devotion, physical endurance etc. The system is buildup of modules that have a linear character, i.e. user has to pass a module successfully in order to proceed to the next one.

Keywords: elderly care, e-learning, collaborative learning, linear learning

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Usability and Effectiveness Evaluation of FEAT (FEedback Automated Tool) on Undergraduates' Project Proposals

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Abstract: This paper presents a study that aims to empirically evaluate the usability and effectiveness of a newly developed auto-formative feedback computer-assisted assessment (CAA) Web-based application named FEAT (FEedback Automated Tool). The main goal of FEAT is to continuously communicate formative feedback on project proposals for final year undergraduate students before the submission of the final version for review. As a rule, the project supervisor, who provides either verbal or written formative assessment on how to improve the submitted project proposal, assesses undergraduate students' final year project proposals. The development of CAA tools has proven to be a potential aid both to ease assessment and to provide innovative and powerful summative, as well as formative, modes of assessment. In FEAT, we aimed to provide an easy-to-use tool that would be effective in enhancing the students' study behaviour by motivating them to improve the quality of their proposals within the existing Learning Management System (LMS). The USE (Usefulness, Satisfaction, Ease of Use, and Ease of Learning) questionnaire was employed as a quantitative data collection technique to measure the students' experiences and the usability of FEAT. Then, a think-aloud study was conducted, along with pre- and post-interviews, to collect data on the effectiveness and impact of the knowledge-enhancing elements implemented through FEAT on students' study behaviours. Statistical tests were applied to the quantitative data gathered from the USE questionnaire. Content analysis followed the collected qualitative data from the think-aloud study and the interviews. Overall, FEAT proved to be a valuable resource for aiding students with their project proposals. Results were encouraging, in that students found FEAT straightforward to use and found that it aided learning. Students were highly satisfied with FEAT, stating it was very useful and had the potential to become a valuable resource in communicating continuous feedback as well as comprehensive formative feedback on project proposals. In addition, results showed that the English Language, Plagiarism Detection, Sections Feedback, and Relevant References elements of FEAT, which comprised the knowledge-enhancing components, had a significant positive impact on students' study behaviours through motivation to improve the quality of their project proposals. In summary, the study conveys a simple yet powerful message that FEAT provides ease of use and is a formative learning CAA tool. In addition, it has a positive effect on students' study behaviours, allowing the

receipt of continuous and detailed formative feedback to enhance the quality of their final year project proposals as part of the LMS.

Keywords: project proposal, computer-assisted assessment (CAA), formative feedback, FEAT, usability, effectiveness

What's the Matter? (Re)Considering the Materiality of Social Software in Educational Practice

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Abstract: This paper examines the potential of the 'materiality of learning' as a new lens through which to understand and improve social software use in educational contexts. More specifically, it explores how online learning is bound with the material forms and spaces through which humans act and interact online. The paper concentrates on the video conferencing application Skype and pulls together different approaches to materiality that have not been looked at together in the education literature, and that draw attention to the literal, performative, social and distributed aspect of social software. Applying concepts from humanities and science and technology studies to education, this paper attempts to offer a broadened understanding of technology and its relation to education, and suggest how online educational processes can become engaging, adaptable, and more experimental.

Keywords: materiality, online learning, Skype, social software

Is There Theory Behind Practice? Theorising University Teaching With Digital Technologies

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Abstract: This ongoing doctoral research project is concerned with theoretical understandings of university teaching using digital technologies. Lecturers are adopting a range of tools, both in-house and external, for the purposes of teaching and learning but the rationale and influences behind their choices has been largely underexplored. This research considers how theory could be employed to understand technology use

and identifies where there are gaps in our knowledge. The project places an emphasis on how factors such as discipline, institution, policy contexts and personal attitudes contribute to these teaching practices. As technologies develop and become more pervasive in all areas of life, it is important that the expanding use of digital technologies in teaching is underpinned by scholarly appraisal of the educational and socio-cultural theories behind these practices. By addressing this question in a range of disciplines across two national contexts, Ireland and Scotland, this research contributes to knowledge on how best to support and develop academic staff in their use of technology for teaching whilst also counteracting technologically deterministic approaches which assume the presence of digital tools ensures quality teaching and learning. This is a qualitative research project which explores how lecturers report their practices, attitudes and experiences. 25 lecturers from multiple disciplines have participated in semi-structured interviews. Participants have been drawn from two universities: one in Scotland and one in Ireland. Lecturers have been selected on the basis of having some experience using digital technology for teaching purposes in any of the following modes: face to face, blended or distance learning. The research employs rhizome theory (Deleuze & Guattari 1987) as a theoretical lens to examine how lecturers operate in a complex and dynamic environment. This paper will present some initial observations from the data.

Keywords: digital pedagogy, learning theories, theories of teaching, socio-cultural theories of technology, rhizome theory

Empirical Evidence to Support the Quality of Learning Experienced With the use of Web 2.0 Technologies: An Enhanced Model to Achieved Increased use of Web 2.0 Technologies for Learning Activities

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Abstract: Existing literature reveals scarcity of, and inadequate, empirical evidence to support the quality of learning with the use of Web 2.0 technologies. Thus, this paper reports on a research that contributes to this empirical evidence as well as unveiling the factors that would affect the adoption of these technologies in a learning environment. Primary research applied mixed method by using open and closed ended questions in a questionnaire administered to 181 students in five UK universities and an observational studie with a discussion forum. Their views on using social collabo-

rative tools such as blogs, discussion forums, Facebook groups, google doc, podcasts, and Wikis in their learning activities were analysed. The findings indicate that the students' learning was improved in the areas of feedback, collaboration and critical thinking skills. In addition the research reveals that adoption can be enhanced with management support, planning and setting implementation goals, educating staff, promoting the benefits and evaluating the progress of Web 2.0 use on teaching and learning. The paper also indicates areas for further investigation.

Keywords: quality of education, higher institutions, learning, Web 2.0 technologies

The use of Microblogs for Organisational Learning in Small and Medium Scale Enterprises (SMEs)

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Abstract: Communication and information sharing are no longer restrained by borders as we are more reliant on Web based technologies in our daily lives. The purpose of this research is to gain useful empirical evidence associated with the applicability of microblogs to determine or investigate whether it has the potential to facilitate the concept of organisational learning in small and medium enterprises (SMEs). The investigation will also help to know the reasons why small and medium enterprise are unwilling to adopt microblogging tool in their enterprise. The issues referred to in this work predominantly relate to environmental factors such as behaviour, internal dispositions or attitude that hinder the use of microblogging tool such as twitters and yammer for organisational learning in a small and medium enterprise.

Keywords: learning organisations, microblogs, reflective practice and SMEs

Maths and Mobile Technologies: Student Attitudes and Perceptions

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Abstract: Approaches that advocate the contextualized teaching of mathematics have been around for years but the ubiquity of mobile devices together with the potential to bridge classroom learning to real-world has added a new angle to contextualizing mathematics learning. The goal of this research was to examine how the use of mobile technologies affected students' attitudes towards mathematics as well as student perception about the use of mobile technologies. The study was a month-long mixed methods design and utilized the Micro, Meso and Macro (M3) Level Evaluation Framework. Participants were Primary 6 and 7 students from two Scottish primary schools ($N = 48$). Students participated in four sessions of mobile-supported, collaborative learning activities that covered topics on geometry and data handling. Students evaluated each session using a semantic differential scale. Student evaluations of the activities were positive ($M=3.96$, $SD=.26$). On the semantic differential scale, they rated the activity useful, stimulating and innovative as opposed to irrelevant, distracting and dull. Students were asked to separately rate the activity and the use of the mobile device but no significant difference were found in the ratings. Gender difference in the rating of the activities was present in the first session, with higher ratings from male students on questions relating to user satisfaction, but this did not re-occur in later activities. In the student interviews, students related that the activities were fun, helpful and in some ways, connected the maths topics with their everyday life. There was no significant difference between pre-test and post-test scores in mathematics attitudes but resulted in small effect size in the subscale factors of self-confidence ($ES = .20$) and mobile use ($ES = .26$). These results indicate that students have a positive perception on the use of mobile technologies. However, its effect on students' attitudes towards mathematics needs further investigation.

Keywords: mobile learning, tablets, mathematics education, student attitudes

Teachers' Feedback to Secondary-Level Statistics Course Innovation: Computer-Based Education Pilot in Estonia

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Abstract: Mathematics is very powerful and important for solving problems in real life, yet many students find the school subject disconnected from the world around them. One probable reason is the way mathematics is taught at our schools, where it mostly means teaching calculation by hand. This method, however, does not mirror the application of math in real life, where it is more important to be able to define the problem and discuss the obtained results. The one-sided and narrow approach in the classroom has resulted in mathematics being one of the most difficult and boring subjects for students. How can we change this and bring a new technology-driven approach into our mathematics classrooms? Estonia has decided to fight the current situation by being the first country to build a new secondary-level probability and statistics course within the mathematics curriculum in co-operation with the software company Wolfram Research. This paper gives an overview of the philosophy and methodology of the statistics innovation project (the so-called Wolfram project) in Estonia and focuses on the teachers' feedback and emotions, gathered with surveys and interviews. The new computer-based study materials were piloted in the spring of 2014 with more than 1000 students from 31 schools. Teachers praised the practical and creative real-life assignments, various visualisation possibilities, and the opportunity to get instant feedback to be shared with the class. Results showed that 86% of the teachers would prefer the Wolfram curriculum or a combination of the Wolfram and the existing curriculum, rather than just the existing one. The preference for the new computer-based curriculum was especially high among those teachers who piloted at the lower-secondary level (75%). As this was the first pilot, there were quite a few technical problems that many teachers mentioned (43%). Another big issue was the lack of graded assignments. Based on teachers' feedback, the Wolfram materials are currently under improvement along with the development of required assignments with the necessary assessment criteria.

Keywords: computer-based, statistics, mathematics, secondary level, teachers' feedback

Practicing in Mathematics Using a Tablet

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Abstract: Frequent practicing in mathematics is one of often used forms of teaching. For basic mathematical operations, we talk about the drill. This work compares two different forms of drills, which is carried out by using a tablet and a suitable application, and conventional counting on the paper worksheet. The aim is to compare the speed of the solution, error rate and pupil motivation. The experiment was performed on two groups of pupils. It was found that at least 60 percent of pupils had higher motivation for practicing and errors were almost completely eliminated. The increased speed of practising on iPad was reflected most strikingly in case of the pupils whose results on paper were the worst. Using the iPad for drills in math produced better results than working with traditional paper worksheet.

Keywords: drill, math, tablet, iPad, worksheet

Exploring a Blended Learning Model to Teach First Year Mathematics Education Students Trigonometry at a UoT

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Abstract: The study was performed on first year mathematics education undergraduate students using a Blended Learning Model (BLM). The students are digitally literate, mobile, flexible and socially collaborative in their learning process. A BLM is learner centred, shapes the resources and approaches to the needs of the learner. The model provides discovery learning with students constructing their own knowledge as autonomous learners. The National Senior Certificate (NSC) examinations in mathematics show that candidates perform poorly in trigonometry. Diagnostic reports outline errors and misconceptions for mathematics at secondary school level. The grade 12 mathematics scores indicate that these students had average scores. All the students were exposed to a Traditional Learning Model (TLM) at secondary school. The BLM through discovery learning will help the students to diagnose their own errors and misconceptions in basic trigonometry concepts. The activi-

ty theory framework was used. A group of 40 students were randomly selected to use a BLM to form the experimental group. A second group of 40 students were selected randomly as a control group. This group was taught using traditional teaching methods. Both groups were given the same learning content material. The pre-assessment and post-assessment scores were quantitatively analysed for both groups. Further the BLM students were clinically interviewed and their protocols were analysed qualitatively. Results indicate that the BLM students exhibited better results quantitatively. The qualitative analysis indicated that errors and misconceptions were minimised in the BLM group. The BLM group performs better than the control group.

Keywords: trigonometry, errors and misconceptions, diagnostic tests, blended learning model

iPad as a Tool Used to Reduce the Time Needed for Preparing a Lesson Plan

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Abstract: This paper deals with the question whether it is possible for language teachers without any iPad skills to reduce the time needed to prepare a lesson. Several studies recently dealt with the topic of using an iPad as a new ICT tool in teaching. Their goal was to describe the possible improvements this tool can bring to students. Schools regularly face the following problem: general public, parents and students require iPads to be used in class. To motivate the teachers to do so might be difficult. Giving them a proof that using an iPad might increase students' efficiency is obviously not sufficient. Based on many interviews with teachers I came to a conclusion that it is rather time efficiency that would make them motivated. They would see an iPad as an improvement if it could shorten the time they need to prepare a lesson. I used the opportunity that I participated in a project which aimed at introducing iPads at schools. During the period of 5 months I taught 102 teachers of a foreign language (mostly English) to use iPads as a teaching tool. The rules of the project required the participants to have no or limited iPad skills and a majority of them were actually forced to take part by their principal. After a brief initial training the participating teachers were given a task to prepare two specific lesson plans with the same given criteria. Both lessons were supposed to aim at teaching new vocabulary, however, they differed in topic. The goal was to prepare one lesson using an iPad and to prepare the other without it. In both cases, the time needed to prepare

the lesson was measured and then compared. The results were rather surprising even to the participants themselves as approximately two thirds of them were able to prepare the lesson in shorter time using an iPad. During the following interviews, these teachers claimed that this fact would motivate them to use an iPad to prepare such lesson, however, many of them said that they often do not make such a complex lesson plan as the one they were asked to prepare. I am going to be in contact with all of the participating teachers and try to monitor how many of them will use an iPad to prepare lesson plans in the following several months. This should validate their claim that the time efficiency presents a sufficient motivation.

Keywords: iPad, tablet, vocabulary, efficiency, lesson plan, time consuming, preparation

Technological Changes at the University of Botswana: Academics and Blended Learning

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Abstract: Current world education systems are undergoing tremendous transformation. Many universities are embracing the rapid changes stemming from the combined forces of information and communication technology (ICT), globalization and internationalization of higher education. The University of Botswana (UB), like many other academic institutions in the world, is undergoing transformative changes in response to internal and external influences on higher education. One such change is exemplified in the attempts to integrate ICT into the entire education process in order to enhance the educational experience of students. UB, like many other institutions of higher learning, views the use of ICT in teaching and learning as an important tool in facilitating reforms in the education system. The purpose of this paper is to discuss blended learning (a Learning Management System (LMS)) as one of the technological changes that took place at UB. It has been widely argued in the literature that incorporation of the blended learning approach into teaching practice offers conveniences and efficiencies, freedom for students to express thoughts, and ask questions without limitations at the same time meeting their different needs and learning styles. This paper presents reflections on the progress of the infusion of blended learning within a developing world context and highlights some of the critical success strategies in implementing blended learning programs in tertiary institutions. Based on the literature review, the paper identifies the following factors as

determinants for the successful implementation of blended learning: users' training, organization commitment, management support, attitude of users, consultation, manpower and support from other departments, infrastructure, clarity on the strategic imperatives for technology use and, monitoring and evaluation. The paper is informed by the researcher's PhD research thesis titled "The influence of technological change on organizational commitment: the case of academics at the University of Botswana". The paper contributes to the literature on institutions of higher learning in Botswana. More broadly, the paper will contribute to the literature in developing economies and addresses the gap identified by several researchers, that studies of educational settings have been concentrated in the western world.

Keywords: blended learning, blackboard, success factors, academics, University of Botswana

In Search of new Metaphors: E-Learning as Hypertext

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Abstract: People use metaphors in their daily communication to explain complicated matters and express meanings and understandings. Metaphors define our everyday realities and guide our thoughts and actions. Traditionally, specific metaphors have been related to teaching and learning: a teacher is often spoken of as a gardener, a guide, or even as a sage on the stage. Similarly, the metaphors of learning as acquisition and the learner as an almost empty vessel are very common concepts in relation to lecturing. Learning is also often understood as participation and collaboration, and these metaphors indicate that teaching and learning are seen as activities that take place when the teacher and the students are together. However, when the use of technology and access to a ubiquitous Internet become a part of everyday teaching and learning, new metaphors are needed if we are to speak adequately about this changed instructional place. Technology shapes the ways in which we teach, learn, and collaborate, and both teachers and learners now have the potential to be present in more spaces simultaneously both inside and outside the classroom. The empirics for this paper stem from a PhD project that was undertaken during a physiotherapy degree programme in Denmark, where e-learning was being introduced for the first time. Guided by a symbolic interactionist approach, one of the research questions concerned whether and how teachers and students in the programme felt that teaching and learning had been changed by e-learning technology. To answer

this question, emphasis was placed on the linguistic images, concepts, and metaphors that were used in relation to the e-learning setting. Data were collected from participant observation of teaching, focus groups with the e-learning students, interviews with the teachers, and participation in e-learning design workshops. The findings showed that teaching in relation to e-learning was oftentimes understood through the metaphor of hypertext with hyperlinks leading to podcasts, videos, and other resources on the Internet, which the students accessed from home and which were referred to in the classroom. Moreover, the space of teaching was found to be widened by technology, and learning was sometimes spoken of as a constant selection of links or paths through a landscape of resources and information. This paper will discuss the use of metaphors in relation to teaching and learning generally and to e-learning specifically. On the basis of the empirical material from the PhD project, it will present and discuss the new metaphors that were used in this particular physiotherapy e-learning programme.

Keywords: e-learning, metaphors, teaching, hypertext, physiotherapy degree programme

Impact of Different Blends of Learning on Students Performance in Higher Education

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Abstract: This study concentrates on the differential impact of alternative learning environment designs on student outcomes, in the context of the same higher education course: a flipped classroom design, a blended learning design, a face-to-face learning setting and a completely e-learning set-up. Two key design components - lectures and collaborative work (group discussions) – were manipulated in four alternative instructional designs. Besides learning performance as a key dependent variable, the present research focuses on the related impact on student variables (self-efficacy beliefs, intrinsic motivation and perceived flexibility). Participants were third year undergraduate students (n=106), enrolled in the “Animal and Human Physiology” course of the School of Education at Can Tho University (Vietnam). Participants were randomly assigned to one of the four experimental conditions. Analysis of covariance (ANCOVA) was applied to explore the influence of learning in the four conditions on learning performance, considering the impact of particular student variables. The results reflect significant differences. Students involved in the Flipped Classroom setting attained significantly superior learning outcomes as compared to stu-

dents in the face-to-face learning and/or fully e-learning. In addition, another blended learning design was found to result in significantly higher learning outcomes as compared to e-learning. No significant impact could be observed on student variables. Only significant differences in perceived flexibility were observed. The present findings indicate that both blended learning approaches - and the flipped classroom in particular – are promising pathways to promote student learning. Future research is necessary to clarify the unexpected weak interaction effect of related student variables.

Keywords: flipped classroom, blended learning, e-learning, face-to-face, web based lecture, learning performance

Motivational Profiles of Adult Learners in Online and Blended Learning

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Abstract: Having the necessary skills to succeed in an educational program does not ensure that learners will achieve positive outcomes. Learners also need the motivation to learn in order to use their skills and engage in the learning process. This is especially true in online and blended learning (OBL) environments, which offer learners flexibility and autonomy to shape their own learning process. Since adult education in general and particularly OBL in adult education attracts a heterogeneous group of people, there is diversity amongst adult learners with regard to their motivation to learn and their reasons for choosing OBL. The purpose of this study is to examine whether motivational profiles exist amongst learners in the specific context of OBL in adult education. To achieve this objective, we conducted a survey with 180 learners in adult education. We administered the academic motivation scale questionnaire (AMS; Vallerand et al, 1992), targeting learners enrolled in an OBL program in adult education. Finally, we have performed cluster analysis of the participant scores taken from the survey. Our results indicate the presence of three motivational profiles amongst adult learners. These motivational profiles may be viewed as contributing to our understanding of how individuals participating in OBL in adult educa-

tion are or are not motivated to learn. This information can be used by institutions and teachers to develop their educational curriculum to match the profiles of their learners and to take into consideration of their learners' motivation. In turn, researchers can use the results as a starting point for further research into the relationship between motivational profiles and learning outcomes. In this way, deeper understanding can be made acquired into how motivation enhances intent-to-persist and success in OBL.

Keywords: adult education, online and blended learning, motivation, learner profiles

The Potential for Using Artificial Intelligence Techniques to Improve e-Learning Systems

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Abstract: There has been significant progress in the development of techniques to deliver more effective e-Learning systems in both education and commerce but our research has identified very few examples of comprehensive learning systems that exploit contemporary artificial intelligence (AI) techniques. We have surveyed existing intelligent learning/training systems and explored the contemporary AI techniques which appear to offer the most promising contributions to e-Learning. We have considered the non-technological challenges to be addressed and considered those factors which will allow step change progress. With the convergence of several of the required components for success increasingly in place we believe that the opportunity to make this progress is now much stronger. We present a description of the fundamental components of an adaptive learning system designed to fulfil the objectives of the teacher and to develop a close relationship with the learner, monitoring and adjusting the teaching based upon a wide variety of analyses of their knowledge and performance. This is an important area for future research with the opportunity to deliver significant value to both education and commerce. The development of improved learning systems in conjunction with trainers, teachers and subject matter experts will provide benefits to educational institutions and help commercial organisations to face critical challenges in the training, development and retention of the key skills required to address new, emerging technologies and business models.

Keywords: adaptive learning systems, evaluation of intelligent tools, adoption of e-Learning by teachers and learners, education and career training, artificial intelligence

Technologies and new Teaching Methods in Science Courses at Basic School

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Abstract: The study is aimed at the use of both chosen teaching methods and available technologies to improve teaching in science courses. It is based on innovation factors within the educational process when teaching in basic schools. These factors support students' interest in studying by using innovative sources, particularly information technologies. The current interest of students in science courses is declining, as are their grades. The research question is whether teaching, with the use of information and communication technologies, can increase the interest in science courses and improve the achieved results. In a basic school, which has modern measuring kits for labs in physics, chemistry and biology, some of both approaches, known and less widely used teaching methods, have been tested. A methodology has been developed and will be applied in specific classes. Teachers and learners try, whether the current situation is improved. For this purpose an empirical research is developed.

Keywords: information and communication technologies (ICT), science courses, teaching methods, basic school

Non Academic Paper

The LEARN Tool: Enabling Students to Self-Identify Training for Their Career Goals

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Abstract: The challenge: With a myriad of educational resources offered to professionals through training vendors, open courseware initiatives, and learning and development programs offered by their own employer, it is becoming increasingly difficult for a person at the starting point in their career to choose a learning path relevant to their career goals. The sheer volume of information available is daunting, and unless individuals are aware of what is available and pertinent to them, the information goes largely unnoticed or unused. The organization is confronted with the challenge of ensuring that shared training and knowledge is utilized, known, and professionals understand what portions are applicable to their career and time. The training needs of professionals can be grouped into numerous categories (soft skills vs. hard skills, tool specific training, team specific training, organizational change training), which can overwhelm a professional's decision on what courses they should invest time in. Understanding which of those courses contribute to their long term professional goals, is an important factor in these decisions. It becomes the responsibility of the organization to help define that and direct them to pertinent training for their role and future career goals. Delivering this guidance assists the organization in facilitating the effective use of time and cost overhead in training individuals participate in. In order for a professional to determine what training is applicable to them or pertinent to their career direction, experience is required to know the value of training offerings. With a majority of our company's new hires between 19 and 23 years old, much of our staff do not have defined career paths or goals. They do not have the experience to evaluate training or development options available to them and prioritize appropriately where to focus their attention. They are interested in understanding what their career options are, and would like guidance with the knowledge required. The solution: In order to aid our staff's understanding on what topics are applicable to professional tracks within the QA organization, or the company as a whole, the Quality Assurance Organization's Training Program has developed a Flash-based tool called LEARN (Learning and Education Adapted to Role Needs). This tool offers an interactive, engaging, and fresh insight into the recommended resources, courses, and websites/forums that a professional in a specific role is expected to have completed, or be aware of. Most importantly,

this tool is available anytime through our Learning Management System, and is continually updated as courses are developed and resources identified. Professionals can access this tool at any time, select their current role or view other roles, and clearly identify what training or development is specifically recommended to them. The design of LEARN is graphically engaging so people find it accessible and easy to understand. This is an alternative to static communications such as Excel sheets, PPTs, and SharePoint. The tool is a representation of a stylized house with several rooms, which students can visit by selecting with a mouse. Each room is dedicated to a role within our company and has a unique style that offers interactive elements: a book shelf that opens up has a list of recommended books to read, a stack of magazines generates a list of websites and forums specific to a role, and a computer displays a list of online courses that role is expected to complete. The introduction of this internally award winning tool has exponentially increased the professional's perception of their employer's expectations. We have broadened interest in learning and development and encouraged exploration of different disciplines and career tracks. We have also empowered managers with a clear recommendation to training and knowledge for their staff to complete.

Keywords: career goals, tool, track, professional

**Work
In Progress
Papers**

Your Device, Your Classroom: Creating Library Spaces That Support Teaching Innovation

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Abstract: At Montana State University Library, it's BYOD - or bring your own device - to use the recently opened Innovative Learning Studio, the first space of its kind on campus. The library, in collaboration with teaching faculty and campus IT, created a wireless, flexible, bright and colorful, technology-enriched teaching space designed to support faculty as they integrate new technologies and pedagogical models into their teaching. This space is pushing the boundaries of library services, incorporating evolving technologies in a way that is bringing faculty, who have increasingly been using library services online, back in to the physical library. The Innovative Learning Studio was not envisioned as a finished product but as one that would continue to be refreshed as new technologies emerge and the needs of teaching faculty evolve. This article will illustrate how the space was designed, implemented, and assessed. It will also highlight ways academics in various disciplines are engaging creatively with the library community and are enhancing their teaching as they are freed from the limits of traditional classroom spaces.

Keywords: instruction, classrooms, teaching and learning, innovation, technology, library

Teacher and Institutional Characteristics Affecting Teaching Practices in OBL: A Self-Determination Approach

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Abstract: In Flanders (Belgium), the rising popularity of online and blended learning in adult education requires a scientifically validated approach to the issue of quality of online and blended learning. In this research, we will focus on the teaching process in these environments, and how teacher and institutional factors affect teaching practices. Based on the Self-Determination Theory (SDT), we aim to analyse which

and how these factors affect teaching practices within an online and blended learning (OBL) context. Furthermore, we add to the SDT conceptual framework a selective number of control variables such as perceived ICT competence and institutional innovation orientation in order to gain further insight into the teaching process. More specifically, we aim at answering the following research questions: (1) How is the satisfaction of psychological needs and motivation of teachers related to teaching practices?, (2) How is the institutional support related to the satisfaction of needs and motivation of teachers?, (3) Are there differences in the teaching practices of teachers in OBL and non-OBL environments?, and (4) How can these differences be explained? Data is collected by means of a cross-sectional survey among teachers in formal adult education. Research instruments have been selected from the SDT-literature with items on motivation, need satisfaction, need support, and teaching practices. Analyses will consist of (M)ANOVA, multivariate regression, exploratory and confirmatory factor analysis, and structural equation modelling. The findings will, firstly, help us direct our future research efforts. Specifically, in future studies we will investigate which and how specific teaching practices affect learner outcomes. In this respect, knowledge on potentially confounding factors is important. Secondly, findings will help to identify key teacher and institutional factors that affect teaching practices. As such, it can inform teachers, educational leaders, professional development designers and others on enhancing the quality of online and blended learning through teacher- and institution-level intervention.

Keywords: self-determination theory, blended learning, teacher characteristics, institutional characteristics, teaching practices

Making Non-Textual Formative Feedback Useful

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Abstract: Non-textual feedback plays an important role in formative assessment. In art and design education, there is an established tradition of using tutor or peer ‘critiques’. Participants use sketches, annotations and verbal comments, to record feedback. Subsequently, through a process of reflection and iteration, students have opportunities to revise and improve their work. NSS data (HEFCE, 2014) indicates that feedback is the area that least satisfies students. Formative non-textual feedback frequently takes place in informal contexts and may not always be recognised by students. Capturing this feedback and subsequently making it available to students may facilitate recognition. Current technologies have the potential to do this but

there has been limited use in an academic context to date. This project aimed to investigate sustainable strategies for capturing non-textual feedback minimising workload for the staff involved. The acceptability of different feedback capture methods, desired distribution methods and the availability of devices and technology were investigated with staff and students. Preliminary development activities centred on students' capture, storage and reflection on feedback. However, it was recognised that staff control of captured and stored feedback in a recognised university system was preferable. These investigations identified that capture methods used must be widely available; tolerated by participants; unobtrusive; have ability to store formative feedback locally; be able to distribute feedback to other digital systems; have ability to integrate feedback with student work and have the capacity for digital note taking, voice recording and image capture. As modern smartphones and tablets allow the integration of these features, a mobile application was developed. This application allowed feedback to be distributed using a number of methods and stored to facilitate reflection. During trials, the university email system was the most frequently chosen method of distribution. Preliminary testing in a classroom situation indicates that the application has potential and further development into a more extensive and integrated system is being undertaken.

Keywords: non-textual feedback, reflection, digital recording, formative assessment

Enhancing the Dialogue in Simultaneous Class-Based and Live Video-Streamed Teaching

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Abstract: The bachelor programme in biomedical laboratory analysis at VIA University College in Aarhus has established a blended class concept which combines traditional and live broadcast teaching. 1-2 days a week students have the choice either to attend teaching sessions in the traditional way or to work from home via the Internet. In live video-streamed teaching classes teachers tend to choose one-way communication instead of dialogue. We know from our early findings that technology issues are one of the main reasons for this, since the same teachers use dialogue and discussions in traditional teaching. This paper describes a work-in-progress pro-

ject focused on developing possibilities for a more dialogue-based approach to live video-streamed teaching. We present our new setup and argue for educational designs which this is believed to support, and we outline the research design for collecting and analysing data. The first analysis and interpretations will be discussed at the ECEL 2015 conference poster session.

Keywords: live video-streaming, blended learning, hybrid teaching models, University College, dialogue

Using TPACK to Examine Teacher Professional Development for Online and Blended Learning

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Abstract: Given the current rise of educational technology, more and more teachers are able to deliver their courses partially or fully online. This demands a new way of looking at teaching and learning, and raises many questions (e.g. how to become an online teacher). Therefore, many institutions and professionals try to meet such demands by offering professional development initiatives, aiming to provide teachers with new knowledge, skills, and attitudes towards teaching in an online setting. The technological, pedagogical, and content knowledge (TPACK) framework provides meaningful insights into teachers' necessary knowledge requirements for technology integration. Using the TPACK framework, this paper presents an overview and first analysis of the emphases placed by different teacher professional development approaches. This study will investigate the teacher professional development approaches of research articles by conducting a content analysis of each article, and by comparing the teacher professional development approaches. The analysis consists of sorting the textual data into different categories, and identifying different patterns and themes, which will be held against the TPACK framework. This is done for each individual study (within-case analysis) and between the studies (cross-case analysis). Furthermore, the initial results of this study will be discussed and the first recommendations for future research and practice will be formulated. Moreover, the results can be beneficial for practitioners involved in teacher professional development with regard to online and blended learning, to guide the design, development, implementation, and evaluation of a professional development approach. Therefore, the findings of this article can be of use to teachers, institutions, and professionals who wish to gain more insight into the current trends of existing professional devel-

opment approaches, and provide them with a more thorough understanding of the initiatives that support teachers to become effective in online and blended learning. Further research could investigate if there is a link between the addressed TPACK elements in a teacher professional development approach and the retained results.

Keywords: online and blended learning, teacher professional development, TPACK, technology integration, online teaching

Abstracts Only

Optimising the Learner Journey; Balancing Student Satisfaction, Grade Output and Pass Rate

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Resource Development International (RDI), UK

Abstract: The paper reports the findings of a project that is designed to evaluate the impact of various evolutions of a Learning and Teaching strategy used within an e-learning environment. This includes an enhanced engagement strategy and automatic registration for assessment (ARA). The research data is taken from an Independent HE provider that has delivered Higher Education products for 25 years to students from 150 countries. Performance related data is collected at numerous stages of the Learning & Teaching cycle, however the organization finds itself being data rich but analysis poor, therefore, this report is designed to provide commentary on a mixed methodological approach that will seek to form the basis of an ongoing monitoring project. The output will contribute to Resource Development International's (RDI) strategy formulation, ensuring that students continue to have the optimum experience during the programme of study. RDI is an On-Line Distance Learning (ODL) provider based in the private sector. The cyclic nature of education often proffers scant opportunity for reflection, however, having gained Taught Degree Awarding Powers (TDAP) in 2014, RDI sees it as a prudent time to reflect upon learning & teaching strategies currently in place and to consider how best to evolve these strategies to meet the demands of all stakeholders. A triangulated approach will seek to provide balance between quantitative output (grades achieved by students on modules and mean pass rates through the programme) as compared to qualitative (student satisfaction results). Hammersley (2007) talks of the trade off between greater precision and breadth of description. This research aims to ensure that the trade off is favourable. Thus, statistical tests in general will not be employed, however the use of mean averages to enable some degree of precision (in its broadest sense) and comparison will be utilised. A combined methodology will be employed: Sharrock & Hughes (1997) note that a combined approach is common, for philosophical and especially epistemological issues to be regarded as the preliminary ones to be addressed in order that sound methods of enquiry can be laid down in advance of the empirical work itself. Research findings will seek to identify the sweet spot or point of optimum compromise between student satisfaction, grade output and velocity through the course. Potential audiences who may gain benefit from this paper include educators in private and public sectors, e-learning and face to face facilitators. Initial findings, indicate that the algorithm appears to be effective and does highlight some interesting initial themes. Correlations between student satisfaction and grade output / pass

rate are emerging, and this will help to inform the RDI Learning and Teaching Strategy.

Keywords: e-learning, retention, student satisfaction

Teachers, Stories About Assessment and Building Professional Communities in Online Collaborative Spaces

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Abstract: Many regard this as an especially difficult time in the history of public education. Kohn (2002) points out the challenges created in an educational context dominated with talk of accountability, standardized testing and standards. In many educational sites teachers feel alone as they sort through the complexity of these demands. On the one hand they are dealing with standardized assessment where the approach is often determined by others outside of the classroom. On the other hand, they are using formative or assessment for learning strategies which is not predetermined by others, nor is it one that unfolds in a mechanical step-by-step process. Instead, it requires professionalism grounded in the realities of the classroom at-hand. Educators benefit from opportunities to work with colleagues in a mentoring framework and in communities to develop professional expertise. However, working together in contexts such as professional learning communities (PLCs) have the potential to assist teachers in understanding assessment issues in the context of their classroom reality. Teacher collaborative groups can lead to an in-depth knowledge and develop a sense of what Fullen (2005) calls engaged peers. According to Beckett, Valante and Drake (2010) a powerful way to build capacity in the profession is to listen to teacher s stories of best experiences and to use them as a source for developing deep understanding. Using online communities as a place to have educators effectively share stories means they have the potential to may become effective sites for professional development. This research is exploratory in nature. Participants were eighteen educators who participated in the discussion forum with the expectations to engage in deep conversations moving from general sharing of stories of experiences to knowledge building about assessment FOR learning. Qualitative methods were used to analyze participants stories and conceptualizations drawing on data from transcripts of the online discussion forums. The preliminary analysis suggest an overarching theme that sharing stories rooted in classroom and professional contexts created a rich site for professional development. Participants identified they generally lack time and opportunity to support each other through challenges and opportunities. Discussion forums provided a meaningful place to share stories and learn to

gether. For example, they explored the value of formative assessment for supporting each child in the classroom. Stories were told about the public/political pressures faced related to accountability. In conclusion, story telling about professional experiences shared in online discussion forums offers a rich site for professional development. The online forum opens the doors for collaborations with others living and working in different situations. International, remote, rural and urban teachers separated geographically have an opportunity to engage in deep reflection together. Assessment policies often fail to consider the complex and diverse school environments and instead focus on a larger standardized vision. Online professional learning communities offer potential as sites for teachers to grapple with these complex issues if established in a manner that encouraged the engaged peer to delve deeply into stories of experiences.

Keywords: professional learning communities, online PD

Re-ExAM: A Repository of Real Examples of Assessed Material; a Resource for Developing Academic and Assessment Literacies

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Abstract: Self and peer marking activities have long been understood to be powerful drivers for learning (Boud and Holmes, 1981; Boud, 1989; Boud, 1995) and what is now generally thought of as the development of assessment literacies (ASke, 2012; HEA, 2012), the complex multi-faceted process by which students engage with and understand their engagement with assessed work and the process of being assessed. There is much to commend such practices, not least of all that they provide opportunities for students to engage with the complex nature of academic tasks. Such complexity cannot simply be provided for by a skills-based approach in which students are taught how to approach assessed work, but rather requires active exploratory engagement in structured formative academic and assessment literacy development activities (HEA, 2012). The ReExAM project aims to explore the usefulness of providing an online repository of Real Examples of Assessed Material (examples of student work) to form the basis for self-access and structured teacher-led formative assessment literacy activities, aimed at developing students assessment literacies, providing insights into the meaning of assessment criteria and developing their understanding of academic writing conventions, criticality and level-ness. As part of a student-staff partnership (Healey, Flint and Harrington, 2014) project in collaboration with

the Department of Computing and the wider student body, the ReExAM team are currently working with a small team of student developers to implement a working prototype and others who are conducting a survey of student expectations and requirements in terms of functionality. A survey is also being undertaken to determine staff attitudes and concerns. As part of the repository, a set of tools are envisioned via which students and staff will be able to access assessment criteria, markers comments and also comment and share insights about the examples of work themselves via social media, thus providing scaffolding for future engagement with the material by others. An MVP (minimal viable product) prototype is expected to be developed during the summer, with the aim to evaluate its usefulness to support student learning as part of structured and self-access activities in the 2015/16 academic year. This work in progress paper reports on initial findings about student and staff expectations about the ReExAM repository along with initial thoughts about required functions, technical solutions, issues relating to metadata and ethical considerations surrounding the use of student work and staff marking, as well as the benefits of the student-staff partnership approach.

Keywords: formative assessment, self-access, student assessed work, assessment literacies, academic literacies

Student-Staff Partnerships; Using Technology to Address Power Relationships in Learning

Rebecca Rochon

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Abstract: Partnerships, where students and staff work together towards a common goal, are an increasingly important characteristic of higher education in the UK. This is evidenced both by a growing body of literature and by publications and guidelines issued by key organisations including the Quality Assurance Agency (QAA), the Higher Education Academy (HEA) and the National Union of Students (NUS). However, while partnership features at policy and institutional levels, the views of students and staff are relatively less explored. This work in progress will present the findings from two focus groups, capturing the views of students and staff on partnership projects. Findings will be contextualized within e-learning, as there is a particular synergy between student-staff partnerships where technology is involved. Technology is arguably the only platform that has the potential to neutralize power relationships that may interfere with effective partnerships; this is suggestive of the potential for technology-related projects to increase collaboration with students in educational settings. Moreover, the implications of student-staff partnership have a particular rele-

vance to e-learning in the growing area of technology co-design: this is a type of partnership where a group of mixed participants identify a problem or area for enhancement, and work together to realize a technology-based solution

Keywords: co-design, partnership, e-learning, collaboration, university

Working in the Third Space With Mobile Technologies

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Abstract: Working in the Third Space with Mobile Technologies Teaching and learning is likely to need to change quite extensively to satisfy the changing contexts and requirements of society. With a view to preparing students for a future in which new technologies are emerging and students are interacting extensively through social media, the design of learning opportunities and learning spaces needs to be revised. Learning tasks need to be reimaged and optimized to take advantage of the different ways that students seamlessly learn across different physical and virtual spaces. In this presentation, we will draw on notions of Third Space from the teacher education literature (e.g. Ikpeze et al., 2012; Zeichner, 2010) and develop these notions to conceptualise the spaces that might be utilised for learning. We provide a conceptualisation of the Third Space that aligns with 21st century ideas on teaching and learning with technologies. We draw on the notions of Third Space to develop ideas on mobile and contextualised learning, discussing how handheld technologies might mediate students learning in emerging, learner-generated contexts. The presentation examines a pedagogical framework we have developed, the Mobile Pedagogical Framework (Kearney, Schuck, Burden & Aubusson, 2012) that focuses on the pedagogical affordances rather than the technical affordances that mobile learning might offer to learning in the Third Space. The Framework considers learning from a socio-cultural perspective. We consider signature pedagogical constructs in new learning contexts (personalization, authenticity and collaboration) to discuss and envisage the learning spaces appropriate for students in a mobile age. The presentation concludes with implications of learning in the third space for students preparing for a 21st century workforce. We suggest ways that teachers and teacher educators can use the concept of the third space as a bridge between traditional education binaries such as formal and informal learning. We offer directions for contemporary learning task designs that acknowledge the ubiquity of mobile learning and of inter-

actions across spaces, to provide relevant, situated, seamless learning that privileges student agency.

Keywords: third space, mobile learning, learning futures, technology-enhanced learning, pedagogical framework, learning spaces, seamless learning

Competition Abstracts

Experiences with a Remote Photovoltaic Laboratory

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Loughborough University runs a successful MSc in Renewable Energy Systems Technology for full-time and distance learning students. Distance learning students use e-learning to access course materials and to interact with tutors. Software has been used to simulate real experiments. A remote photovoltaic laboratory experiment was developed to enable students to work on real hardware albeit at a distance via the Internet. The rig enables students to control a number of experimental variables which are important to learning about how light and temperature affect the performance of photovoltaic cells. The rig is designed so that students can set light levels, temperature levels and change the photovoltaic cells through the use of a Virtual Instrument with a graphical visual display, including a camera. They can run experiments with set values to see the effect on photovoltaic cell performance and are encouraged to enter their own values as well. Students can then download their data. As this experimental rig is unique, only one person at a time can use it. A booking and logon system has also been developed to facilitate this. The hardware was part paid for from a Loughborough University Teaching Enhancement Fund. However, the development was carried out by a small team of enthusiastic staff and students. Student experiences have been evaluated. These are positive and students, as stakeholders, have made suggestions for improvements. As well as being used by distance learners, full time undergraduates have also used the experimental rig to help reinforce learning they gained from the on-campus experiment. Interest has also been shown with students performing the experiment from the British University in Egypt. The remote photovoltaic experiment demonstrates how e-learning is possible with real hardware. Further developments will take place to improve the learning experience. The ambition is to develop further remote experiments.

Building an Online Faculty Development Opportunity: The Approach Taken and the Feedback Received on the 12 Apps of Christmas @ DIT Initiative

Frances Boylan

Dublin Institute of Technology, Ireland

We have moved well beyond the point where we use our mobile devices to access information only. Instead we are using them increasingly to create content whether we realise it or not. The connected world we now live in provide learners of all ages with the opportunity to learn all of the time, wherever and whenever they want facilitating authentic learning opportunities. Tablets and smart phones are becoming standard learning tools in many classrooms, lecturer theatres and labs and adopting mobile devices in these environments is becoming a must. However, unfamiliarity with the technology is the main reason given by academic staff for not incorporating mobile technologies into their teaching, learning and assessment practices, so, the 12 Apps of Christmas @ DIT online initiative was designed and developed to address this need. This initiative was inspired by a similar programme devised by Chris Rowell of Regent's University in London. Over 12 consecutive weekdays starting Dec 1st 2014, the 12 Apps of Christmas site introduced the participants to 12 mobile apps that they could use with students for a variety of different reasons. The overall approach was grounded in social constructivist theory and also drew on the SAMR model of technology integration as well as the TPACK framework, which describes the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology enhanced learning environment. It will also designed to give academic staff an opportunity to expand their personal learning networks and, via twitter at #12appsDIT and the initiative's WordPress site, they were encouraged to connect with others who were also interested in this emerging field. The initiative was free and open and 700 academics registered worldwide. Each day, some basic information was given on that day's app before it was evaluated against the SAMR model, giving examples of how it could be used to 'substitute', 'augment', 'modify' and/or 'transform' learning activities. A short task was also provided to get the participants started with the app. In some cases this short task was gamified and there was a prize to be won. The participants were challenged to reflect on how they might integrate the apps in ways that would modify and redefine how they teaching and how their students learn, and encouraged to share those ideas via twitter and the wordpress site. The feedback from the participants was brilliant. The initiative was really well received and many indicated that it was just enough to get them started on their journey to integrating

mobile technologies in a pedagogical manner into their teaching, learning and assessment practices. The site has been left open for all to use as resource and it has been licenced under the creative Commons Licence CC BY-NC-SA 2.0. Testing 'flipped learning' by marrying online and face-to-face interactions

Testing 'Flipped Learning' by Marrying Online and face-to-face Interactions

Dr Jeffrey Browitt
University of Technology Sydney, Australia

The Contemporary Latin(o) Americas subject is a compulsory component of the BA and MA International Studies degrees taught at the University of Technology Sydney (Faculty of Arts & Social Sciences) for those students who have chosen to do their year of In-Country Study in one of our destinations in the Spanish-speaking Americas: Latino USA, Mexico, Colombia, Chile, Argentina, or Costa Rica. A flipped approach was pursued in 2013 to produce better learning outcomes for the kind of globalised work place students are increasingly entering; and my own desire as an educator to create a better learning environment in which students can develop as independent, self-confident and creative lifelong learners. The instructional design was gleaned from flipped learning sites I haunted, mostly in the United States, which gave examples of student-centered learning, especially in K-12 schools. This led me to start doing some serious background reading in student-centered learning philosophy, such as Teaching for Quality Learning at University (Biggs) and Understanding by Design (Wiggins and McTighe).

Key features of my flipped experiment include:

- The use of a private Wordpress blog to which all enrolled students are invited. The blog contains all lectures and links to set readings, sample student work from the previous year, useful links to sites which provide information for their self-chosen assignments, links to major Latin American newspapers, links to blogs of students currently on in-Country Study in the Americas (thus creating a cross-cohort organic link between students of different years), links to popular music, a dedicated Pinterest link, etc.
- Abolition of most lectures, which are loaded up online 2 weeks in advance in both video and PDF format.
- Students choose their own case study topics and the format in which they will deliver it to me: Wordpress blog, Prezzie, Tumblr, Wix, etc.
- Students choose deadlines for assignments

- Students design their own questions for their final test in consultation with the tutor.
- Outstanding students contribute towards subject content design
- In-class activities include students discussing what they don't understand in the set readings and lectures (student queries emailed ahead of the class); group work on their cultural case studies; class discussion and critique of previous students' cultural case studies and critical literature reviews; free time to work on whatever; and students designing their own test questions.
- Out-of-class work includes engaging with content, some homework on their assignments, responding to some short prompt questions about the content, etc.

The success of the experiment has been judged through: the standard UTS student surveys at the end of the semester (which have shown dramatic increase in student satisfaction from a base that was already above the UTS averages); my own Survey Monkey surveys (2 during the semester) to solicit student opinion on the new learning style, my performance, subject materials, changes they wish to see made, etc. In 2014 I won a university-wide teaching & learning award as well as a faculty teaching award.

International Master of education program in Adult learning and Global Change (ALGC)

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Now in its 15th year, the Intercontinental Master of Education Program in Adult Learning & Global Change (ALGC) program is an e-learning collaboration among four adult-education research groups located in four universities on four continents. The collaborators envisioned a novel program that allowed students from different countries to leverage their disparate locations by cooperatively exploring issues of globalization directly, in a way not possible in conventional campus-based or online courses. Students remain with the same international cohort as they move through a sequence of courses. Thus, students from at least four different continents constitute the class:- a world-class, quite literally. The two-year program, offers global perspectives on learning in cross-cultural environments. Courses are taught collaboratively by adult-education faculty from the four partner universities. The program's pedagogical practice emphasizes group work. Examples from students' everyday lives provide educational content for analysis and permit comparisons between different con-

texts. Each course includes collaborative tasks across countries, and draws extensively on resources from the program's different local settings. We use a web-based learning platform and a variety of online and e-learning techniques that provide opportunities for students to use various types of media to support their learning. The updating and revision of courses, and ongoing development of the program, is the mandate of the ALGC Management Committee, made up of Coordinators from each of the partner universities, which conduct regular face-to-face meetings at each of the participating universities in turn. The program was honored by the Commission of Professors of Adult Education of the American Association for Adult and Continuing Education with the presentation of The Curriculum Innovation Award.

Using e-Learning to Build Accounting Competency Amongst First year Students

Alice Luby

Dublin Institute of Technology, Ireland

Action Accounting is an innovative cross-faculty collaboration to develop e-learning activities to enhance the learning experience of students. The cross-faculty Action Accounting project includes accountancy lecturers from the College of Business and the College of Arts and Tourism as well as members of the Learning Teaching & Technology Centre. The Accounting lecturers on the team had observed that many first year students had been struggling with the accounting modules and this often resulted in high levels of examination failure and low retention rates. They also recognised the need to cater more adequately with students who have learning disorders such as dyslexia, as well as those for whom the traditional lecture environment is a barrier to learning. Pedagogical assumptions underpinning this project are that learners learn more effectively and efficiently when they are in control of the learning pace and that feedback is a critical part of effective learning. In addition it was agreed that active involvement is more likely to lead to more effective outcomes than passive involvement. Therefore the ultimate aim of Action Accounting is to deliver e-learning activities built around key module content where the student would engage with basic concepts through purpose written software. A key component would be to ensure they have to interact with the activities and receive immediate feedback make learning accounting more effective for students and subsequently more enjoyable. To date the project has developed a web based approach to learning double entry bookkeeping (can be viewed at www.actionaccounting.org) which is currently utilized on a number of DIT programmes. Students are encouraged to use the activities in their own time to explore and build confidence in the concepts pre-

sented in lectures. Students appreciate being able to work at their own pace and receive immediate feedback on their progress.

Case Study: Podcasting Studio and SmartClassroom

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Stevens Institute of Technology's mission is to provide not just great courses online, but the best online learning experience. Our strategy for achieving superiority in online engineering, computer science, and management degrees cannot be based solely on our inventory of classes, an experienced faculty, or even the latest online learning technologies with which to deliver them. These things are critical, though they fall short of distinguishing factors. To make WebCampus a dominant force in online learning, it will take all of these things, combined with innovative techniques that are coordinated holistically, executed with purpose, and not easily imitated. In the past, we had incorporated videos into our courses using BlackBoard Collaborate, YouTube and Camtasia. Even with these technologies, our students clambered for more. We needed to implement a technology that was easy for the professors to use, easy for our department to edit and store and most importantly, easy for our students to download and use on a mobile device. We chose NJVid as the community to host the storage of our videos since they could not only integrate with our single signon strategy but were easy to work with. When a professor or guest speaker wants to record their session, they simply select a flash drive that has been pre-formatted in one of 3 display options, plug this stick into the podium and begin. Once they are finished, they unplug the flash drive and the recording stops. While the session is being recorded, the camera mounted in the back of the Smart classroom can be moved and zoomed to correspond to an audience member speaking or zoom in on the speaker. The speaker informs us when the recording is completed and where it needs to be posted. Snippets of videos are used in marketing campaigns with the permission of all participants. All videos that are posted within our LMS are private to that course and only those students that have access to the course. The audio and video quality of these recordings are superior to what can be generated using BlackBoard Collaborate, Camtasia or YouTube and students have responded very favorably in their end of course surveys. Student views of our Podcasting and Smart classroom videos have grown every year. We currently have 884 videos uploaded to NJVid since its inception in 2011. Approximately 89% of the media components within our online courses are posted within NJVid with the balance of 11% that are recordings from

BlackBoard Collaborate and other sources. The current statistics of user views are 2012 - 2019 total video views, 2013 - 7,335 views, 2014 - 8,128 views.

The Role of Programming Language Concepts and APOS Theory, promoting Computational Thinking

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Abstract: The e-Learning initiative is twofold: addressing the mathematics dilemma in education at school level and improving education in programming. Within the schooling system of the Western Cape Education Department (WCED) in South Africa mathematics is taught from an early age, but still problem solving skills are lacking yielding poor results in mathematics and science. At the Cape Peninsula University of Technology (CPUT) students are placed as programmers, most of them with no formal IT education at school and not satisfactory mathematics background. The concept of abstraction is important to any learner when performing problem solving activities in mathematics and programming. Computational thinking (CT) is suggested for such problem solving activity, but acquisition of abstract thinking skills is difficult and for some impossible to acquire when using mathematics as a vehicle to teach abstraction when it is an abstract vehicle in itself. It is not clear how school curricula contribute towards the learners' CT skills at a cognitive level of formal operations. Using a learning management system (LMS) such as Moodle is well documented, but this research emphasises the unique combination and implementation of Moodle together with the Greenfoot programming language and APOS model in such a manner which contribute to abstraction skills among learners bridging the digital divide. What makes the combination unique is that Greenfoot integrates with computational thinking and programming language concepts in a seamless manner, not being a hurdle to the learners' understanding of these concepts. Programs are developed according to the APOS model and learners are able to discover concepts such as interiorization, inheritance and generalization creating an object by performing mental actions on discovered processes. Although it is a work in progress, Moodle acts as resource and mentor with which a learner can interact in a ubiquitous manner exploring potential development in a constructivist way, with the focus on improving mathematics learning.

Keywords: Abstraction, APOS, cognitive ability, cognitive level of formal operations, computational thinking (CT), object oriented programming (OOP) and science, technology, engineering and mathematics (STEM).

Lessons from a B-Learning Course in Information Literacy for Engineering Freshmen

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Abstract: This article presents a case study from the “Projeto FEUP” course, taken yearly by about 1000 freshmen at the Faculty of Engineering of the University of Porto, in Portugal. The goals of the course include introduction to academic excellence, soft skills and Information Literacy. The article will detail the Information Literacy module. Upon reflection and given the pressure for efficiency, the course was redesigned and improvements were implemented: reducing lectures (“theoretical” classes); eliminating all classical-style “practical” classes; ramping up E-Learning and creating fun but educational hands-on activities run by older students in an integrated B-Learning approach. Moodle is the LMS and repository but it was linked to additional tools such as the Libguides platform in order to provide multi format engaging materials, where the main learning object is built as a WebQuest containing formative evaluation on Moodle activities (with feedback). This student centred strategy considered the technologically minded target audience and their natural curiosity in a world dominated by a WWW without frontiers, whilst maintaining regularity and health of discourse in a “mastery learning” manner. At the end of the course, all students take a Moodle quiz (“midterm”) that remained essentially constant throughout most recent years, thus allowing for comparability. The full article will debate teaching/learning/evaluation issues, including processes and quantitative results. Logistics and operational costs will also be analysed at several points of the implementation, alongside with associated learnings, as measured by the midterm. Results reveal that proper setup of teaching/learning/evaluation is fundamental, even with lower costs of operation and, in this case, even lead to a slight improvement in the results of the midterm. Final notes will show some lessons learned, debate the extrapolation to other realities and discuss further improvements to increase student’s engagement and to enhance learning.

Keywords: Engineering Freshmen, E-Learning, B-Learning, Information Literacy, Moodle, Libguides, WebQuest

Learning to Teach Online- Evolving Approaches to Professional Development for Global and Impact

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Education for children in the developing world is in crisis, and children growing up in war are already at the sharp end of global development challenges: of the 57 million primary-age children who are out of school, almost half live in conflict zones. This project is grounded in the issues of educating children in these zones, with a particular focus on innovative approaches to access via online and distance learning. E-Learning Sudan (ELS) is a custom-built tablet game that provides alternative learning opportunities to Sudanese children who are excluded from education (in Arabic). ELS is unique in that children can learn mathematics in their own remote community, without a teacher because the e-learning program itself includes instruction, practice, a learning management system, is designed to be culturally appropriate, and can also be used offline. ELS is conceived through a collaboration between the Ministry of Education of Sudan, Ahfad University for Women in Khartoum and War Child Holland. It is funded through the Ministry of Foreign Affairs of The Netherlands, with additional funding from UNICEF Sudan. Curriculum and development is provided by TNO. The e-learning program was produced by Flavour with support from creative partners in Sudan. ELS is now in its second phase as an ICT4E pilot. Research from the first phase (and to date in the second) showed that children with no previous access to education were able to learn faster and smarter with a gamified version of the existing curriculum in primary maths. Motivation to learn remained high (around 3 on a 4-point scale), and qualitative data show that children as well as parents value the opportunity to learn, in their own village. As a result we are now looking for ways to scale the program and extend to other areas of learning, like reading and writing.

Learning to Teach Online - Evolving approaches to professional development for global reach and impact

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Abstract: The Learning to Teach Online concept focuses on developing capacity amongst teachers in all sectors to design and deliver education using online technologies. The case history follows the iterative development of a series of pedagogically-focused professional development initiatives at UNSW Australia. All are based upon the concept of interdisciplinary support communities, providing practical strategies to alleviate the problems and anxieties teachers can suffer when moving into unfamiliar online teaching practices:

- (2004-2008) The Art & Design Fellowship Programs helped to improve the online teaching practice of 75 UNSW academics, leading to the creation of 50 fully online UNSW undergraduate and postgraduate units.
- (2009-2011) The Learning to Teach Online project (LTTO) [tinyurl.com/ltoproject] evolved the concept of the local programs into a series of open educational resources (OERs) that continue to be accessed since the completion of the project. To date, these have been viewed over 367,000 times from 146 countries; linked to by 153 institutional websites in 19 countries; and embedded in 133 postgraduate or professional development programs in 23 countries.
- (2014-2015) The LTTO MOOC [coursera.org/course/ltto] was the next evolutionary stage designed to help educators develop their own teaching strategies by applying the knowledge gained from the LTTO OER. In 2014, the MOOC attracted over 28,000 enrolments from teachers in 192 countries. Its 2nd offering will be in July 2015, and has been incorporated into the US Government's ConnectEd Initiative [bit.ly/1Aj98Dw].

This evolutionary approach exemplifies the strategies used to extend a successful face-to-face professional development program (with limited capacity, flexibility and academic access), into online, flexible and openly accessible resource and curriculum. The case history will demonstrate how to adapt to, and maximise the potential of, the rapidly changing dynamics of online education and technology, to continue to improve the teaching practice of an ever-increasing number of teachers around the world.

Transforming the International Student Experience: a Unique Online Learning Resource Providing Transition for International Students Entering UK Higher Education

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Prepare for Success is an elearning initiative that has helped international students from 227 countries prepare for UK higher education. Launched in July 2008, Prepare for Success is an open website of multimedia interactive learning resources, which is still expanding in its reach – it received its one millionth visit in November 2014 and its highest monthly total of almost 36,000 in October 2014. Students use the resources for self-paced learning to discover what academic culture is like in UK colleges and universities and what kind of academic skills they will need for effective study. As a learning tool, 'Prepare for Success' is innovative, particularly in the flexibility it offers for different modes of use by students (self-selected pathways by skill or topic or linear course progression) and teachers (blended with classroom teaching or mixed with an institution's own resources through their preferred platform). The learning resources are created using an in-house authoring tool underpinned by its own activity-based learning design. The website has grown to include a range of additional resource types besides its core menu of 23 interactive units of elearning about UK academic life and study. These are an interactive FAQs page about study in the UK; an information page for teachers and institutions with downloadable resources; an active presence in both western- and Chinese-based social media; interactive FAQs page for international students preparing for FE study, and the most recent addition, a blog responding to students' questions. Supported by UKCISA (UK Council for International Education) and created by a small elearning team at the University of Southampton, the website's considerable impact and elearning excellence is demonstrated by the quality of feedback received from international student, teacher and institutional users and its proven and sustained track record.

Effects of Virtual Conversations on International Students' Intercultural Communicative Competence

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The Virtual Conversation Partner Program (VCP) is a peer e-learning program that promotes intercultural communication through virtual conversations using Skype. The VCP pairs American domestic students from the College of William & Mary (W&M) in eastern Virginia with incoming international students. Each pair schedules conversations on Skype, for at least one hour per week, for three months during the summer. Three-hundred forty-two students, including 163 American domestic students and 179 international students from 18 countries, participated in the program during the past three years. The 2012 pilot was funded by a W&M Innovative Diversity Efforts Award (IDEA) grant.

One of the challenges was how to match virtual conversation partners purposefully rather than randomly. This is done considering factors such as motivation, previous intercultural experiences, academic major, and personal preferences. Each year, both domestic and international participants rated their virtual experiences as highly satisfying. International participants said that they became more involved in campus life after arrival than they imagined that they would have been had they not participated in the program. Their intercultural communicative competence (ICC) was measured both before and after participation. The results indicated that ICC pretest scores and virtual conversation hours predicted international participants' ICC posttest scores ($p < .001$). This research earned the 2014 Marjorie Peace Lenn Research Award by the American International Recruitment Council.

Virtual conversations between American and international students facilitate intercultural communication and understanding. Intercultural programs such as the VCP have the potential to enhance higher education internationalization efforts in a cost-effective way. The VCP has been featured in *Supporting International Students on Campus: 17 High Impact Practices to Ensure Student Success*, a publication of the Education Advisory Board (EAB) that provides best-practice research and advice to higher education professionals. The future plan is to expand the program to other schools worldwide.

Late Submission Papers

A Generic eLearning Tool for Radiologists and Hospital Practitioners with CBR

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Abstract: In this paper, we propose the design and development of a generic eLearning tool dedicated to radiologists and hospital practitioners. This tool is generic and transposable to other fields. We use the Case-Based Reasoning (CBR) approach to develop this tool. CBR (Case-Based Reasoning) is an approach based on cases to problem solving and learning. CBR utilizes the specific knowledge of previously experienced, concrete problem situations (cases). A new problem is solved by finding a similar past case, and reusing it in the new problem situation. In medicine diagnosis is based on clinical cases. CBR is suited to medical field. We apply CBR to organize and structure clinical cases of patients. The paper is organized as follows: first, we describe the analysis and design of the tool, secondly we describe the components of the eLearning tool and its operational mode and finally, we illustrate it by real clinical cases, different scenarios and sessions of learning between students.

Keywords: eLearning, tool, radiologists, hospital practitioners, CBR

Business Simulation Software: Bridging the Gap Between Educators and Industry

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Abstract: Over the past decade, business has changed dramatically. As a result, workforce skills and requirements have also changed. However, while this has happened, one sector has lagged behind: higher education. Business education in particular, is criticised for being theory-driven with a lack of critical thinking, creativity and innovation (Ford et al., 2010; Hughes et al., 2008; Snyder and Snyder, 2008) and this has become a major challenge in third level institutions. Furthermore, the process of globalization and liberalization of the business world has changed the types and qualities of human capital required by the corporate sector. Therefore, business

graduates are not only expected to have theoretical understanding of business, but also communication skills, critical thinking skills (Adams, 2015) and the ability to apply multidisciplinary knowledge. Evidence suggests that the use of simulation software in business education has the capacity to fill the gap between what is required in the market and what is supplied by the education system (Mitchell, 2004). This paper explores the use of technology in the delivery of business education at third level. The paper focuses on the use of business simulation software in teaching strategic management concepts. The research provides empirical insights into the application of simulation software to enhance students' critical thinking skills, and that it has the potential to increase students' resilience and ability to handle complex and ambiguous situations that exist in the real world.

Keywords: Business education; education and industry; simulation software

Citation Pages

The importance of paper citations and Google Scholar

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