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Approach towards Secure Programming in Undergraduate Computing Curricula

Full Paper

SACLA 2019

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Abstract. The security aspect of software applications is considered as the important aspect that can reflect the ability of a system to prevent data exposures and loss of information. For businesses that rely on software solutions to keep operations running, a failure of a software solution can stop production, interrupt processes, and may lead to data breaches and financial losses. Many software developers are not competent in secure programming, resulting in risks that are caused by vulnerabilities in the application code of software applications. Although there are various techniques for writing secure code in the current body of knowledge, these techniques are rarely fundamental components of a computing curriculum, resulting in incompetent graduate software developers. This paper argues that secure programming education needs to be included across computing curricula. It proposes the incorporation of secure coding practices into undergraduate computing curricula through a step-by-step approach. This approach includes the identification of application risks and secure coding practices as they relate to each other and to fundamental programming concepts. It specifically aims to improve the security of software applications developed in the .Net environment.

Keywords: Computing Curricula, Software Security, Application Risks, Secure Coding Practices, Fundamental Programming Concepts.

Design Guidelines to Develop E-textbook Readers: A Task-technology Fit Approach

Full Paper

SACLA 2019

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Abstract. Electronic textbooks are gaining traction as the medium of choice in educational institutions across South Africa. The way in which readers engage with e-textbooks differs from the way in which they would read recreational e-books. E-textbook functionalities should assist readers with the construction of new knowledge and skills. These functionalities are not embedded in the e-book itself, but rather in the e-book reader software used to read the e-book. The task-technology fit (TTF) theory was used as a theoretical framework for the paper and semi-structured interviews were performed to collect data from secondary school learners. The aim was to determine the tasks required by learners when using an e-textbook, and consequently the functions which e-readers should contain to support these tasks. A set of guidelines is proposed which e-textbook reader developers could use to ensure the reader applications which they develop deliver a good fit to the task requirements of its users.

Keywords: E-book, E-textbook Reader, TTF Theory.

Detecting Similarity in Student Multi-procedure Programs Using Program Structure

Full Paper

SACLA 2019

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Abstract. Plagiarism is prevalent in most undergraduate programming courses, including those where more advanced programming is taught. Typical strategies used to avoid detection include changing variable names and adding empty spaces or comments to the code. Although these changes affect the visual components of the source code, the underlying structure of the code remains the same. This similarity in structure can indicate that plagiarism has taken place.

A similarity detection system has been developed to detect the similarity in the structure of two given programs. The system works in two phases, the first phase parses the source code and creates a syntax tree, representing the syntactical structure for each of the programs. The second phase takes as inputs two program syntax trees and applies various comparison algorithms to detect their similarity. The result of the comparison allows the system to report a result from one of four similarity categories: identical structure, isomorphic structure, containing many structural similarities, and containing few structural similarities. Empirical tests on example programs show that the prototype implementation is effective in detecting plagiarism in source code, although in some cases manual checking is needed to confirm the plagiarism.

Keywords: Plagiarism Detection, Code Structure, Student Code.

Making Sense of Unstructured Data: An Experiential Learning Approach

Full Paper

SACLA 2019

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Abstract. The need for competent data scientists are recognised by industry practitioners worldwide. Competent data scientists are human resources that are highly skilled, ready and able to work on industry data related projects upon graduation and the ability to work with data (to name a few). Currently tertiary education institutions focus on the teaching of concepts related to structured data (fixed format) for example database management. However, the hidden value contained in unstructured data (data with no fixed format) introduced the need to introduce students to methods for working with these data sets. As a result, an experiential learning approach was adopted to expose students to real-life unstructured data. Third year students were given an assignment whereby they could use any publicly available unstructured data set or an unstructured dataset supplied to them following a set methodology (CRISP-DM) to discover and report on the hidden meaning of the data. As part of the assignments students had to reflect on the process. Twenty student assignments were analysed in an attempt to identify the effectiveness of the experiential learning approach in the acquisition of skills pertaining to unstructured data. The findings of the study indicate that the experiential learning approach is successful in die teaching of the basic skills necessary to work with unstructured data. The positive aspects as well as challenges the students experienced are reported on. The lecturer's reflection reports on the appropriateness of the pre-scribed methodology, the students' performance and lessons learnt. The lessons learnt from this experience are offered up as recommendations to educators to improve on the learning experience associated with ELA within the context of educating future data scientists.

Keywords: Experiential Learning, Big Data, Unstructured Data, CRISP-DM Methodology, Data Scientist.

Innovation for Computing Students Matters, of Course!

Full Paper

SACLA 2019

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Abstract. Literature identifies enablers promoting Innovative Behavior (IB) among employees. Modelling motivation, metacognition and affective aspects of learning towards developing IB among Information Systems (IS) and Information Technology (IT) Higher Education Institution (HEI) students is, however, not well-understood. The study objectives included addressing this literature gap by examining how motivation, metacognition and affective aspects of Self-Directed Learning (SDL) act as antecedents of IB via Knowledge Sharing Behavior (KSB). A quantitative cross-sectional survey was employed with 268 students enrolled in IS and IT programs, from seven Kenyan public HEIs. Data collected using a questionnaire, with a 2,000-bootstrap sample generated direct and indirect effects. Findings are summated in a structural equation model for students in an educational context, largely supporting all hypotheses. Findings also revealed that SDL acted as a driver of KSB and IB among IS and IT students. Implications for HEI managers include leveraging attributes of IB antecedents in learning contexts.

Keywords: Self-Directed Learning, Innovation, Motivation, Metacognition, Affective Aspects.

Developing a Digital Forensics Curriculum: Exploring Trends from 2007 to 2017

Full Paper

SACLA 2019

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Abstract. The young science of digital forensics has made great strides in the last decade, but so too has cybercrime. The growing complexity of cybercrime has necessitated that traditional forensics methods be updated to accommodate new technologies and that further research is carried out to keep up with the rate of technological innovation. The main purpose of this research was to determine how academic teaching and research can support the needs of industry when investigating cybercrime. The research initially explores digital forensics and its challenges before describing past academic research conducted around digital forensics ontologies and taxonomies. Current digital forensics higher education curricula are discussed thereafter, along with limited information relating to forensics trends observed via social media sources. This is followed by a research analysis of academic research trends for this discipline for the period 2007 to 2017. It ends by highlighting research trends for which more research is required, and which could possibly contribute towards shaping future teaching and learning for digital forensics and also suggests future research to be conducted.

Keywords: Digital Forensics, Cybercrime, Curriculum, Research Trends.

Synthesis of Social Media Messages and Tweets as Feedback Medium in Introductory Programming

Full Paper

SACLA 2019

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Abstract. Social media has been recognised as a supportive tool in Education, creating benefits that supplement student collaboration, class interactions and communication between instructors and students. Active informal interactions and feedback between instructors and students outside class is one of the main reasons behind Social Media pedagogy. With many innovative usage methods of social media in Education this creates new opportunities, one being automatic feedback for students. Despite the prevalence of traditional email methods of providing feedback to students, many studies show that they do not check their emails as frequent as they check their social media accounts. In this paper, we present the automatic generation of feedback messages and tweets using a Context-Free Grammars (CFG). Our design takes a class list of students and their mark sheets and automatically composes tweets (using the CFG rules) about statistical "fun facts" about programming problems, exercises, class performances, and private messages about individual student performances. These tweets and messages are then pushed to Tweeter using the Twitter Application Programming Interface (API). A survey of 116 student participants at a South African university showed that the majority of the students will love to get such notifications on social media, rather than check their emails; and that lecturers also find this initiative to be a forward thinking one.

Keywords: Synthesis of Things, Social Media, Tweet Synthesis, Context-Free Grammar, Introductory Programming, Procedural Generation.

Exercise Task Generation for UML Class/Object Diagrams, via Alloy Model Instance Finding

Full Paper

SACLA 2019

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Abstract. The Unified Modelling Language (UML) is the standard for designing and documenting object-oriented software systems. Its most frequent use is for static modelling in the form of class diagrams. A correlated concept is that of object diagrams. An object diagram may or may not adhere to a given class diagram, and the understanding of this connections is key to correctly using class diagrams in practice. We present an approach for automatic generation of verified, non-trivial, conceptually relevant examples and counterexamples of class/object diagram combinations, aimed at providing exercise tasks in a university course setting. The underlying technique is a model instance finding us - ing Alloy specification language and analyser. We provide an implementation of our approach in an e-learning tool.

Keywords: E-Learning, UML, Alloy

Decoding Source Code Comprehension: Bottlenecks Experienced by Senior Computer Science Students

Full Paper

SACLA 2019

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Abstract. Source code comprehension (SCC) continues to be a challenge to undergraduate CS students. Understanding the mental processes that students follow while comprehending source code can be crucial in helping students to overcome related challenges. Set within the Decoding the Disciplines paradigm, this paper reports on a study aimed at uncovering common SCC bottlenecks that senior CS students experienced. Thematic analysis of the collected data revealed eight common SCC difficulties specifically related to arrays, programming logic and control structures. The identified difficulties, together with findings from existing literature as well as the authors' personal experiences, were then used to formulate six usable SCC bottlenecks. The identified bottlenecks point to student learning difficulties that should be addressed in introductory CS courses. This paper intends to create awareness among CS instructors regarding the role that a systematic decoding approach can play in exposing the mental processes and bottlenecks unique to the CS discipline. Further investigations are needed to uncover the mental tasks that expert programmers follow to overcome the identified bottlenecks so that students can be taught more explicit SCC strategies.

Keywords: Undergraduate Programming, Source Code Comprehension, Student Learning Bottlenecks, Decoding the Disciplines.

e-Tutors' Perspectives on the Collaborative Learning Approach as a Means to Support Students of Computing Matters of Course!

Full Paper

SACLA 2019

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Abstract. Open Distance e-Learning (ODeL) institutions support e-tutors, providing them with digital tools, to select what they feel comfortable using to facilitate e-learning. Management systems further enable e-tutors to collaborate with students of Computing modules. This paper explores the collaborative learning approach employed in 'Computer Integration in the Classroom' offered at an ODeL institution. The Collaborative Learning Environment (CLE) was studied based on Vygotsky's social constructivist theory. The research approach was qualitative, with a case study design. The population was seven purposively sampled e-tutors. Data was gathered using unstructured interviews, non-participant observation and document analysis. Findings revealed limited interaction between e-tutors and students in the CLE. Participants indicated a need for training in how to motivate and engage students in a CLE. We recommended that e-tutors receive training, ensuring that they do not focus solely on how to interact with students using a particular platform, but also develop scholarly approaches towards involving students.

Keywords: e-Tutors, Collaborative Learning Environment, Students, Open and Distance e-Learning, Learning Management System.

A Decision Making Approach to Evaluation of Learning Components in Adaptive Educational Systems

Full Paper

SACLA 2019

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Abstract. Personalized learning models are developed to cater for the differentiation in learner styles and needs. Tutors determine the most appropriate learning components for each student. The learning units (LUs) are adapted to learners based on their contexts. However, there are no methods that adapt learning objects to learners based on their personalized learning styles. There also does not exist appropriate techniques that employ decision making approaches to evaluate the LUs. This study presents a model that uses learning styles to determine the appropriate learning information by employing learning analytics. Its proposed evaluation model facilitates evaluation of how suitable, acceptable and usefulness of personalized learning in the LUs. To test the model, varying evaluation criteria weights are employed. It is proposed that the model can be used by tutors to assist learners in creating and applying LUs that are most suitable for their needs thereby improving the quality of learning.

Keywords: Educational Data Mining, Adaptive Educational System, Suitability Evaluation, Personalized Learning.

Enhancing Computer Students' Academic Performance through Explanatory Modeling

Full Paper

SACLA 2019

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Abstract. A key challenge facing universities today is the growing attrition rate of computer studies students, attributed to poor academic performance. While extensive research has been conducted on how to enhance students' performance in computer programming, very little research investigates other computer courses, more so in sub-Saharan Africa. This study set out to address this gap by conducting experiments that revealed some of the factors that influence a student's overall academic performance at university through explanatory modeling. Results obtained showed that a student's background in mathematics and their performance in the Introduction to Information Systems course were key in determining performance. Unexpectedly, prior computer skills or secondary school grades had less impact. The strategies identified for enhancing students' performance include an emphasis on building a student's mathematics background, providing a string teaching approach to foundational computing courses, re-structuring of courses in the computer program, and linking courses across the curriculum. Therefore, explanatory modeling creates an opportunity to adopt a proactive approach to enhancing the performance of computer studies students.

Keywords: Computer Science Education, Academic Performance, Explanatory Modeling.

Integrating Secure Coding Principles into Undergraduate Programming Modules

Full Paper

SACLA 2019

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Abstract. The rise of the use of the internet has led to significant growth in software applications for conducting business, entertainment and socialising, which in turn has led to a higher rate of attacks on software applications. This problem has led to the Information Technology industry requiring that software developers be skilled in developing software in a secure manner. The challenge that industry faces is that many software development graduates requiring employment do not have the requisite knowledge regarding secure programming. The need is therefore for academia to address the needs of industry by integrating secure coding principles into undergraduate programming modules. This paper highlights some secure coding principles that could be integrated into such modules. In addition, it discusses the challenges of, and various approaches to, integrating these principles into programming modules. Finally, it presents a framework for integrating secure coding principles into undergraduate programming modules to assist university departments in integrating these principles into their undergraduate programming modules.

Keywords: Secure Software Applications, Secure Coding Principles, Undergraduate Programming Modules, Secure Programming.

A Connectivist View of a Research Methodology Semantic Wiki

Full Paper

SACLA 2019

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Abstract. The use of virtual learning spaces for learning and teaching needs to be underpinned by a pedagogy that provides a basis for the approach used. Connectivism takes a networked view of knowledge, and its characteristics and understanding of learning were investigated. The development and structure of a research methodology semantic wiki were described, including how the semantics present in the wiki allowed for the exploration of the structure of a research methodology. Positive student evaluation of the wiki led to examining it from a connectivist point of view -- how connectivism's nodal and networked structure could be identified in the wiki and how learning could be understood in terms of the activities and levels of interactions in connectivist learning.

Keywords: Connectivism, Semantic Wiki, Research Methodology.

Investigation into Best Practice Approaches for Computing Research Programmes in South Africa

Full Paper

SACLA 2019

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Abstract. The purpose of this paper is to identify best practice approach to teaching research in the field of Computing in South Africa. The methods used included a systematic literature review and a preliminary investigation of seven South African higher education institutions. The findings revealed a set of outcomes and best practice approaches to address these outcomes. The most popular research methods used in Computing in the seven largest higher education institutions in South Africa were identified as literature reviews, data analysis and case studies. The primary challenges reported relate to over dependence on supervisors, writing skills, critical reflection and confusion regarding the wide array of research methodologies. The findings provide a high-level understanding of postgraduate research in Computing disciplines in South Africa and indicate a need for more research on curriculum design for teaching Computing research in South Africa using best practice approaches such as integration, reflection and a common research culture.

Keywords: Computing Research Methods, Research Methodology Education, Research Outcomes, Best Practice Teaching Approaches.

Modernizing the Introduction to Software Engineering Course

Full Paper

SACLA 2019

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Abstract. We report on the modernization of an undergraduate, introductory course in software engineering that started in 2017-2018 semester 2 offered at the University of Puerto Rico, Mayagüez. We present the institutional setting, our underlying philosophy, and resources considered. We aimed at complementing informal descriptions in any phase with formal ones. We describe the revised course, discuss evaluations of the modernized course as held in two subsequent semesters, and outline options for future improvement.

Keywords: Software Engineering, Formal Methods, Education.

The Application of Teaching Interventions in a First-year Fundamental IT Course in Improving Throughput Using the PAC Framework: 2013 to 2018

Full Paper

SACLA 2019

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Abstract. South African students come to university with vastly different background and skills and are grouped together in general first year courses. All first-year students at university are introduced to an information technology and information literacy subject, called Academic Information Management (AIM), where they have to be able to pass the course as a prerequisite for their future courses and assessments. From 2013 to 2018, new teaching interventions were introduced annually and the success rates of the students were measured in terms of comparing the intervention with the pass rate. The Providers, Activities and Contexts (PAC) Framework is used as a structure to place the teaching interventions in context. It is concluded that technology as a teaching tool can assist universities to manage large groups of students, but also ensure an upward trend in throughput. A short comparison is drawn between other large university groups, mostly locally, but also internationally. Future research will expand the comparison of other courses with large numbers to AIM, both nationally and internationally.

Keywords: Teaching Interventions, Technology, PAC Framework, Blackboard, Learning Management System, Student Throughput.

A Knowledge-based Service-learning Framework for Large-scale Community Projects in Higher Education

Full paper

SACLA 2019

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Abstract. Service-learning that combines academic study with community service by giving students volunteer projects in community organisations provides a richer, more practical experience for students, while delivering benefits to the community. To achieve faculty, student and community goals, service-learning engagement must be closely aligned with the students' faculty experience and must be built on a sustainable, trusting relationship between the faculty and the community partner. However, current research that focuses on factors that create a supportive environment for service-learning is scarce, and this study aims to contribute a holistic approach for service-learning by considering the role players, their interaction goals and the knowledge conversion processes in service-learning. In this study, we designed a knowledge-based service-learning framework for large-scale community projects in higher education. We applied the framework by mapping it to a service-learning module from a higher education institution (HEI) using the elements of the framework as a guide, as well as proposing a conceptual architecture for the service-based knowledge management system (KMS). By using the knowledge-based service-learning framework and KMS architecture for large-scale community projects in higher education, service-learning designers can ensure that the service-learning solution enables strong support to the community, while students' knowledge and skills are enhanced.

Keywords: Knowledge Management System, Service Learning, Knowledge Exchange.

Connecting Generation Z to Technology through the Task-technology Fit Theory

Full Paper

SACLA 2019

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Abstract. This study investigated how an interactive e-resource could be used to increase students' performance for a specific assignment given. As academics we are struggling to find sources that really talk to generation Z and how they prefer to learn and understand knowledge. The authors wanted to determine if one can create such a resource to increase student performance. This study investigates the usefulness of a self-created e-textbook through the task-technology fit theory lens. A quantitative data analysis was conducted on a group of undergraduate students at an urban university. A significant association between the characteristics of the tasks, and the technology used to perform the specific task was found. A significant association between the students' (generation Z) understanding of the work and improving his/her knowledge as well as the contribution in a team was also determined. Another significant finding is that generation Z relies heavily on their peers for assistance even though literature says their social skills are underdeveloped. This means that as academics, we need to understand the generation Z and how they prefer to study, and then create content and tools for them so that they can indeed broaden their own knowledge and become life-long learners. Higher education institutions should become more learner-centered and not so much teacher-centered.

Keywords: e-Textbook, e-Resource, Interactive Textbook, Generation Z, Millennials, Task-technology Fit Theory.

The Use of Industry Advisory Boards at Higher Education Institutions in Southern Africa

Full Paper

SACLA 2019

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Abstract. An Industry Advisory Board (IAB) can provide useful feedback to academic schools or departments relating to topics such as industry graduate requirements, IT trends, programme quality and curriculum development. Academic literature provides general guidelines on the role and responsibilities, membership, composition and functioning of IABs. Accreditation bodies further provide guidelines for the implementation and functioning of IABs at Higher Education Institutions (HEIs). Presently, recent literature on the use of IABs by HEIs in Southern Africa is limited. No literature studies on best practices and perspectives for the use of IABs for Computer Science (CS), Information Systems (IS) and other related IT departments (IT) in Southern Africa exists.

The research question addressed in this study is: How are IABs used by CS/IS/IT departments at HEIs in Southern Africa? The aim of the study is to investigate the use and practices of IABs by CS/IS/IT schools and departments at HEIs in Southern Africa. An IAB questionnaire was compiled and distributed to the Head of Departments (HODs) of 32 universities in Southern Africa. A total of 23 HODs or representatives at 17 HEIs completed the survey over a two-week period. The data were statistically analysed and the results of the study indicate that 17 of the 23 respondents actively use IABs and that the IABs play an important role in academic programme development and maintaining high academic standards. This research study could assist CS/IS/IT academic departments to implement and maintain an IAB and follow best-practice standards.

Keywords: Industry Advisory Boards, Quality Management, IAB Usage.

The Influence of Learning Style Theory within a Blended Learning Environment: A Systematic Review

Full Paper

SACLA 2019

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Abstract. Blended Learning (BL), is about blending traditional classroom instruction with online learning activities using both asynchronous communication as well as real-time synchronous communication modes (Lin and Overbaugh, 2009). The complexity of designing a blended learning intervention comes into play when considering the variety of blended learning tools, both asynchronous and synchronous, and learning styles of students. This paper presents a systematic review of literature on how to create an effective blended learning intervention when considering learning styles. The literature reveals that there is a relationship between learning styles and blended learning. The research suggests that certain learning styles are better suited to a synchronous learning environment while others are more suited to an asynchronous learning environment. This study proposes two frameworks, which together provide educators with insight into the link between learning styles and the use of asynchronous and synchronous technologies in terms of learning effectiveness of students.

Keywords: Blended Learning, Learning Styles, Asynchronous and Synchronous Learning Environment.

Hackathons as a Formal Teaching Approach in Information Systems Capstone Courses

Full Paper

SACLA 2019

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Abstract. Hackathons are hack[ing mar]athons where participants collaboratively and rapidly prototype new applications (apps) over a 24-48 hour period. The potential of hackathons as an informal strategy for stimulating interest in the CS fields is well established. Their application as a formal teaching strategy in the CS/IS curriculum is less prevalent. This paper reports on the introduction of such a closed hackathon in a third year IS capstone course at a South African University. An exploratory case study method was used to evaluate the feedback from the participants and organisers. In the process, the students completed seven novel apps which they had started during the course. They also learned about new technologies and programming interfaces (API's) as well as exhibited growth in personal and inter-personal competencies. Seven fundamental differences between curricular and traditional hackathons are highlighted in this paper. Some suggestions for integrating hackathons in the undergraduate CS/IS capstone course are provided together with possible areas for further research.

Keywords: Capstone Projects, Computer Science, Hackathons, Information Systems, Software Application Development, Teaching Approach, Undergraduates.

Cohort Supervision: Towards a Sustainable Model for Distance Learning?

Full Paper

SACLA 2019

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Abstract. In response to the challenge of increasing supervision capacity while improving the supervision experience, we used a design science research approach to guide the design, implementation and evaluation of a cohort supervision model for master's students in computing at an open-distance learning university. First, a systematic literature review was done to identify and report on the factors influencing cohort supervision. Second, this paper reports on the implementation of a cohort programme in 2018 and the findings from data collected during a focus group with students and supervisors, student reflective evaluations at the end of the proposal module, feedback from the supervisors and our reflective notes. The main theoretical contribution is the cohort model proposed for developing supervision capacity on master's level. The practical contribution is the methodology that describes a practical supervision model for master's students based on the concepts of co-operative learning and conversational theory.

Keywords: Postgraduate Supervision, Group Supervision, Cohort Supervision, Co-supervision.

Guidelines for Conducting Design Science Research in Information Systems

Full Paper

SACLA 2019

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Abstract. Information Systems (IS) as a discipline is still young and is continuously involved in building its own research knowledge base. Design Science Research (DSR) in IS is a research strategy for design that has emerged in the last 16 years. IS researchers are often lost when they start with a project in DSR, especially young researchers. We identified a need for a set of guidelines with supporting reference literature that can assist such novice users of DSR. We identified major themes relevant to DSR and proposed a set of six guidelines for the novice researcher supported with references and summaries of seminal works from the IS DSR literature. We believe that someone new to the field can use these guidelines to prepare him/herself to embark on a DSR study.

Keywords: Design Science Research, Design Science Guidelines, Design Science Process, Design, Artefact, Information Systems, Methodology for Design Science.

Students' Perceptions of Gamification Mechanics and Dynamics in a Gamified Learning Environment

Full Paper

SACLA 2019

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Abstract. The infusion of learning material with game elements have been used to capture the attention of students, improving engagement and motivation. Some gamified learning environments have not been successful and educators should pilot test these platforms before full scale implementation. The goal of this study was to explore a gamified learning environment to determine if the use thereof could successfully be incorporated in a first year programming module. A group of 92 students used the Khan Academy platform for one academic term. Semi-structured interviews were used to collect qualitative data from students. The results indicate that students enjoyed using this platform and a large percentage of students reported that the lessons on the Khan Academy platform assisted them to better understand programming principles. The gamification elements in the platform namely points, badges and a leaderboard also motivated students to keep using the platform.

Keywords: Gamification, Points, Badges, Leaderboard, Khan Academy.

SHORT PAPERS

Back to BASIC in Compiler Construction

Short Paper

SACLA 2019

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Abstract. This short paper offers an experience report about a successful way of giving an introductory compiler construction course to 3rd-year undergraduate students. Because the in-depth-presentation of compiler construction has nowadays become rather seldom at South African universities, this short-paper is intended to serve as motivation and recipe for the topic's (re)introduction at other institutions of tertiary education.

Keywords: Compiler Construction, 3rd-year Undergraduate, Experience Report, Tertiary Education, Computer Science.

Evaluation of Tablets for Teaching and Learning for Information Technology Extended Programme at Walter Sisulu University

Short Paper

SACLA 2019

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Abstract. Information and Communication Technologies have become an integral part within the Teaching and Learning environment especially in Higher Education. Despite the growth of these technologies, less research has been done to evaluate the effectiveness of tablets for teaching and learning. In this paper, we have considered tablets as the common device used at Walter Sisulu University for Extended Programme students in the Information Technology (IT) Department. The authors wanted to evaluate the usage of tablets towards teaching and learning among students and lecturers. A mixed methods approach was consid- ered where both qualitative and quantitative methods were utilized. Data was col- lected through online questionnaires, focus groups and interviews. Findings show that students use tablets for sending and receiving e-mail messages, access course material posted by their lecturers and also search for information. The paper pro- vides details on what and how the engaged participants are utilizing tablets for teaching and learning.

Keywords: Higher Education, Information Technology, Tablet, Technology Evaluation.

EXTENDED ABSTRACTS

Post-Graduate CS and IS Students' Career Awareness

Extended Abstract

SACLA 2019

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Abstract. The Information Technology (IT) industry is constantly creating new job positions and job titles. IT students should be familiar with new IT positions and IT job titles available in industry in order to select the appropriate IT career after completing their studies. In this study, the IT career awareness of students completing their post-graduate Computer Science (CS) or Information Systems (IS) qualification were evaluated. The CS and IS students had to self-evaluate their understanding of 10 IT job titles and then define the IT job titles and relevant job descriptions. The results of the study indicate that the students were generally not familiar with IT job titles, job descriptions and career opportunities available in industry.

Keywords: IT Career Choice, IT Job Titles, IT Career Awareness.

Lecturer-Chatbot: An AI for Advising Struggling Students in Introductory Programming

Extended Abstract

SACLA 2019

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Abstract. Students often struggle to communicate with their peers or lecturers about some of the issues they face during their time at university, be it either academic or personal. One of these issues is introductory programming, in some instances they choose to memorise code in order to pass rather than understanding how the logic behind the code actually works. Programming requires an understanding of how a certain logical flows and algorithm work. In this article, we discuss the difficulties that students face in introductory programming. We have also developed an interactive AI chatbot (called Lecturer-Chatbot) that students can interact with on some of the academic issues they face. Lecturer-Chatbot can provide many practice algorithms and their solutions to students. Additionally, Lecturer-Chatbot provides personal advice to students. An evaluation of Lecturer-Chatbot showed that there is a need for such a tool in aiding students through their university life.

Keywords: Novice Programmers, Introductory Programming, Chatbot, Automated Advisory, Artificial Intelligence in Education.

Recommendations for Improvements to the South African IT Curriculum: A Case Study of New Graduates' First Year of Employment

Extended Abstract

SACLA 2019

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Abstract. Employment issues in South Africa represent a significant problem, and the employability of local graduates – particularly within the Information Technology (IT) sector – poses a challenge. IT graduates' preparedness has been questioned regarding their skill sets, their employability status and the ability of the current curriculum to meet industry needs. The case study focuses on graduates from an accredited private higher education institution in this country, and only the undergraduate qualification covering the Information Systems (IS) stream is investigated. The authors set out to understand the experiences of various industry participants upon employing IS graduates, by investigating, determining and confirming their recommendations for enriching the higher education curriculum within the IT sector. Highlighted are the key skills which employed graduates lack, and the impact thereof on industry. The research further addresses how the South African higher education IT curriculum can be adapted to improve the efficiency of graduates upon employment.

Keywords: Employability, Higher Education, Graduate Impacts, Graduate Preparedness, IT Curriculum Design, IT Graduates, Skills Gap, Skill Sets.

Evaluating Alumni Satisfaction in the School of ICT

Extended Abstract

SACLA 2019

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Abstract. Alumni are important stakeholders in academic institutions and can provide valuable feedback on service offerings. In the academic environment, customer/student satisfaction and perceived value positively influence graduate/alumni satisfaction. The purpose of this research study was to measure the perception and satisfaction of the Alumni of the School of ICT at the Nelson Mandela University and to identify areas for improvement by performing a systematic analysis of the determinants of satisfaction. Eight key factors affecting alumni satisfaction with the School of ICT were investigated. The results indicate that the alumni agreed that the academic staff and administrative staff maintained high academic standards and that possible new courses and modern technologies could be introduced. Closer links between the School of ICT and alumni must also be established.

Keywords: Alumni Satisfaction, Alumni Perceptions.

Notes

Notes

With thanks to NEMISA for the use of the digital countdown clocks