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ABSTRACTBOOKLET

IAUP Triennial Conference 2017 „Innovation in Education“

5th – 8th July 2017

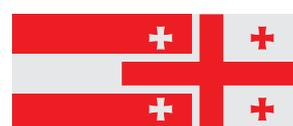
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„Innovation in Education“

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Preface

IAUP Triennial Conference 2017

Exciting new advances in computing and multimedia technology have ushered in an era of ubiquitous, always available educational content that can be tailored and adapted down to the level of individual users. Faced with this alternative method of knowledge dissemination, universities all over the world are currently working on ideas and methods for combining their traditional role in higher education with these alternative approaches.

We are excited to welcome university presidents, professors and researchers to Vienna to discuss, promote and share ideas on the future of higher education. The theme of our conference is "Innovation in education"; a number of keynotes from world-renowned researchers will set the stage for scientific sessions, panel discussions, and ample opportunities for fruitful discussions. The two major scientific focal points of the conference lie in the use of simulation tools in education and training, and in how to deal with the challenges faced by university presidents in a rapidly changing environment for higher education. With its rich history, the Vienna Hofburg will provide the ideal background for like minds to meet, discuss and shape the role of universities in the 21st century.

Sincerely,

Witold Jacak

Academic Head, FH Upper Austria

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Modern Technologies in E-Learning

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UN Academic Impact

Martina Gaisch

Global Trends in Higher Education

Michael Giretzlehner

Simulation-based Learning and Training

Francesco Longo

Modern Technologies in E-Learning

Andreas Schrempf

Hybrid Surgical Simulators in Medical Education



Can We Use New Ways of Modelling Complex Systems to Optimise Student Learning?

Robin Braun

University of Technology, Sydney, AUSTRALIA

ABSTRACT

Students and the way they learn, combined with the learning programs and environments we provide for them are complex and intractable systems. They create the wonderful emergent properties of learning, capability and creativity. The fundamental question is this. Can we model the process using new agent based modelling paradigms to both predict and optimise these emergent properties? This talk will explore both the learning system, and the modelling paradigm, using NetLogo to see if the two can ever meet, and if this may be useful to us.

BIOGRAPHY OF SPEAKER

Robin Braun received the B.Sc.(Hons) from Brighton University in the UK, and the M.Sc.(Eng) and PhD from the University of Cape Town, South Africa in 1980, 1982 and 1986 respectively. Professor Braun started his academic career in 1986 at the University of Cape Town, where he was director of the Digital Communications Research Group. He moved to the University of Technology, Sydney, Australia, in 1998, where he occupies the Chair of Telecommunications Engineering. Prior to moving to academia, he spent 10 years in industry, mostly with Philips and Plessey, where he worked on the design of precision electronic distance measuring equipment. His recent work has been in network protocols and Software Defined Networks. He has a strong interest in radar and remote sensing. Dr. Braun has been active in the IEEE and URSI for many years, serving as URSI Commission C representative, as well as chairing and being on the technical committees of a number of international Conference or TPC chair, including ITHET since 2006. Professor Braun's primary interests are in communications networks and sensor networks. He is interested in their theoretical constructs, middleware for their resources, routing algorithms and embedding such networks in feedback control systems. He has a deep interest in Complex Systems and their modelling. Professor Braun is a committed academic with a deep interest in new teaching paradigms and his current major work at UTS is the introduction of an engineering degree majoring in Data Engineering.



Who makes an Academic Impact?

Ramu Damodaran

United Nations Academic Impact
United Nations Secretariat, New York, USA

ABSTRACT

„Academic“ is a word that conjures images of senior scholars and teachers who have invested their lifetimes in studying, teaching and pursuing research in a chosen discipline. But as the demographic reach of innovation, technology and experience expands, so does the opportunity to make an „academic impact. „This is particularly good news for an organization like the United Nations which, founded as it was by „the peoples“ must derive intellectual strength from all of them, and for the International Association of University Presidents, whose members lead institutions driven as much by student as faculty energy.

BIOGRAPHY OF SPEAKER

Ramu Damodaran is Deputy Director for Partnerships and Public Engagement in the United Nations Department of Public Information's Outreach Division and is chief of the United Nations Academic Impact initiative, which aligns institutions of higher learning and research with the objectives of the United Nations and the States and peoples who constitute it. He is also the current secretary of the United Nations Committee on Information. His earlier posts with the Organization have included the Departments of Peacekeeping and Special Political Questions, as well as the Executive Office of the Secretary-General.

Ramu Damodaran has been a member of the Indian Foreign Service, where he was promoted to the rank of Ambassador, and where he served as Executive Assistant to the Prime Minister of India as well as in the diplomatic missions in Moscow and to the United Nations, and in a range of national governmental ministries. He has been actively involved in mass media in India, including print, radio and television, and was a recipient of the Asia-Pacific Broadcasting Union award for the best radio documentary.



A Snapshot of Transformative Trends and Knowledge Development in Tertiary Education

Martina Gaisch

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ABSTRACT

Higher education institutions continue to undergo massive change. They are increasingly impacted by competition, demographic shifts, technological disruption and social evolution. Global challenges such as health, sustainability, digitalization and an ever-growing complexity of newly emerging areas of investigation put new demands on universities as does the knowledge economy's need for innovation to spur economic growth.

This talk will explore new developments in higher education and identify major forces that impact the higher education sector at unprecedented speed, creating both new opportunities and new sources of competition.

BIOGRAPHY OF SPEAKER

Martina Gaisch is a full professor for English, intercultural competence and diversity management at the University of Applied Sciences Upper Austria.

She holds a PhD in philosophy from the University of Vienna. As an applied linguist and diversity manager working at a school of informatics, her main research areas are at the interface of educational sociology, higher education research and sociolinguistics. She has been certified ESOL examiner of the University of Cambridge for more than ten years and has profound insights into seven different universities throughout Austria, Germany, France and the UK where she both lived and studied.



Simulation Systems in Medical Informatics

Michael Giretzlehner

RISC Linz, AUSTRIA

ABSTRACT

Medical Informatics focuses on the systematic processing of data, information and knowledge in medicine and health care. As an institution of multidisciplinary research and development, the Research Unit Medical Informatics at RISC Software Ltd. (RISC-MI) has been successfully addressing and solving issues in following fields: Biomechanical Modelling and Simulation: Interactive simulation and surgical planning; Simulating interaction between biological structures; Anatomically correct adaptation of 3D patient models; Simulation of blood flow, with deformation of vessel walls. Medical Image Processing: Processing medical images (MRI, CT, DSA, photos, etc.) into computer simulation models; Reconstruction and patient-specific virtual replicas for visualization, simulation and calculation; Objective assessment and documentation of body surface area based on photos. Medical Education and Training Systems: Neurosurgical operation simulator and for surgical planning; Training ophthalmologists and orthoptists to better understand the basic function of eye movement; Training opportunity to assess affected body surfaces. Expert-Driven Data Analysis: Structured generic ontology-based medical data collection; Easy data integration from various existing systems; Medical validation and plausibility check of data. RISC-MI is a non-university affiliated research department with years of experience in acquiring and managing research grants. RISC-MI is funded by the Upper Austrian strategic economic and research program „Innovatives OÖ 2020“.

BIOGRAPHY OF SPEAKER

Michael Giretzlehner holds a PhD in business informatics from the Johannes Kepler University Linz. He is Head of the Research Department Medical Informatics of RISC Software GmbH, a company owned by the Johannes Kepler University Linz and the Upper Austrian Research GmbH, working in the fields of Biomechanical Modeling and Simulation, Medical Image Processing, Medical Education and Training Systems and Expert-Driven Data Analysis. His special focus is objective medical data acquisition and documentation on adjusted three-dimensional patient models. During his PhD, he worked intensively in the area of Evidence Based Medicine and meta-model based approaches for medical documentation, data analysis and knowledge generation. He is project leader of many international research projects.



New Enabling Methodologies and Technologies in and for Education & Training

Francesco Longo

University of Calabria , Arcavacata, Rende CS, ITALY

ABSTRACT

The speech “New Enabling Methodologies and Technologies in and for Education & Training” provides an overview, based on real projects and case studies, about how Modeling & Simulation, Virtual Reality, Augmented Reality, Serious Games and other cutting-edge methodologies and technologies can be successfully integrated in and for Education & Training at different levels (and in different sectors) keeping in mind the Industry 4.0 concept. The main idea is to develop new generations of simulation solutions able to reproduce multiple Education & Training scenarios to address the needs of real world operators. Such new solutions should be able to overpass traditional Education & Training limitations thanks to the possibility to undertake intelligent evaluations, operate easily and in a coordinate way with other people involved in the education, define the actions to undertake in specific situations (considering also procedural aspects in a dynamic scenario evolution), experience real scenarios (thanks to the use of Virtual Environments and Immersive Technologies), react to stochastically generated contingencies and failures and consider constraints and boundary conditions. To this end, we move toward the definition and use of Serious Games where trainees are required to “play” a serious game where they use their skills (and improve their skills) in order to learn how to perform specific operations and procedures and manage correctly available resources, equipment and tools.

BIOGRAPHY OF SPEAKER

Francesco Longo took his degree in Mechanical Engineering, summa cum Laude, in October 2002 and received his Ph.D. in Mechanical Engineering in January 2006 from the University of Calabria (Italy). He is currently Assistant Professor at the Department of Mechanical, Energy and Management Engineering where he teaches „Industrial Plants and Facilities” and “Industrial Plant Management” for Master Degree Students in Mechanical and Management Engineering. He is Director of the Modeling & Simulation Center – Laboratory of Enterprise Solutions (MSC-LES), a research laboratory operating at the University of Calabria, which is member of the MS&Net (McLeod Modeling & Simulation Network). Starting from 2016, he is also serving as CEO of CAL-TEK Srl, a Spin-off company of University of Calabria. His research interests include Industry 4.0, Complex Advanced and Intelligent Systems, Modeling & Simulation and Serious Games based on 3D real time and distributed interoperability for supporting decision making and for education & training.



Hybrid Surgical Simulators in Medical Education

Andreas Schrempf

FH Upper Austria, Garnisonstr. 21, 4020 Linz, AUSTRIA

ABSTRACT

Medical education is characterized by a time and cost intensive interaction between medical experts and trainees. According to demography the number of cases as well as the costs will increase. These demographic changes and the compliance with the European Working Time Directive have created fewer opportunities for traditional, mentor-based education, since medical doctors will be increasingly engaged with patient care. Innovative educational modalities like medical simulators, which model a real surgical procedure enable surgical residents to practice unrestrictedly without any limitation due to costs of specimen, without exposure to radiation or the requirement of a mentor. Hybrid simulators, combine a patient phantom with a computer model, provide realistic haptic feedback and allow to use the real surgical instruments. Within this talk hybrid simulators for needle insertions close to the spinal cord are presented, which include simulators for cement augmentation techniques, pedicle screw insertion, joint puncture, spinal and epidural anesthesia.

BIOGRAPHY OF SPEAKER

Andreas Schrempf is a full professor for Biomechanics, Computer Modelling and Simulation at the Department of Medical Engineering at the Upper Austria University of Applied Sciences. He leads the Research Group for Surgical Simulators Linz (ReSSL) and his research interests concern modelling and simulation in medicine, biomechanics and biomedical engineering as well as system identification and control theory. He received his master degree and PhD at the Johannes Kepler University in Linz in 1998 and 2004 respectively. After working as a senior researcher at the Linz Competence Center in Mechatronics, he moved to the University of Applied Sciences, Upper Austria in 2005.

SESSION I

Simulation-based Learning and Training

Yazan Alghazo
Benjamin Esterer
Marianne Hollensteiner
Werner Korb

The impact of Simulation-based Instruction on College Students' Understanding of Projectile Motion and Attitudes towards Physics

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ABSTRACT

1 Introduction

Educational researchers have often emphasized the importance of investigating different instructional approaches that foster better student understanding and motivation to learn within different subject areas [1-2-3-4]. More specifically, researchers have investigated the utilization of dynamic simulation software as a supplementary tool to teach content that is usually considered difficult by the majority of students such as physics and mathematics [2-5]. Simulation-based instruction in physics is considered one of the approaches that provide students with deeper conceptual understanding of the different physical phenomena that are introduced in physics classrooms [6]. In most physics classrooms, the modelling process is usually applied in the physics laboratories through hands-on lab activities that allow students to experiment and visualize the course material in real life situations [3]. The purpose of this study is to examine the impact of simulation-based instruction on students' conceptual understanding of a physics unit on the topic of motion in two dimensions.

2 Methods

An experimental design was utilized in this study. Two University Physics for Engineers courses, with 34 registered male students in each, were chosen and randomly assigned as a Treatment group and a Control group. Both groups of students were given a three-week instructional unit on two-dimensional projectile motion taught by the same instructor; the treatment group received instruction using simulation software in the classroom to visualize the projectile motion concepts and calculations introduced in the instructional unit, while the traditional lecture approach was utilized for the control group.

Initially, all students (N=68) were given a pre-test that measures students' understanding of concepts related to projectile motion. Then, at the conclusion of the three-week instructional unit, all students were given a post-test that measures their understanding of the material taught in the unit. Next, students attended several lab sessions after the three-week period and their performance in the lab session was measured through their grades on the lab quizzes administered at the end of each lab session. Finally, all students completed the Physics Attitudes Scale (PAS) [7], which measures their attitudes towards learning physics.

3 Results

The results showed no significant difference between the treatment group and control group on the pre-test, $t(2, 66)=0.61$, $p= 0.541$. Which indicates that all students had similar knowledge and understanding levels of the material that was introduced in the instructional unit prior to the beginning of instruction.

A t-test was conducted to test for any significant differences between students' scores on the post-test for both the treatment group and the control group. The results showed that there was a statistically significant difference between the the control group and the treatment group on the post-test. This indicates that students in the treatment group demonstrated higher levels of understanding of projectile motion than students in the control group. Moreover, results showed that students in the treatment group also demonstrated higher levels of understanding and achievement on the lab quizzes than students in the control group.

Finally, the results showed a statistically significant difference between the treatment group and the control group with regard to their scores on the PAS, which indicates that students in the treatment group had more positive attitudes towards learning physics that students in the control group.

In conclusion, the findings of this study suggest that implementing a simulation-based instructional approach in teaching physics improves students' understanding of the content and the new concepts being introduced, and allows students to "develop functional understanding of physics" [8]. Moreover, simulation-based instruction provides students with positive attitudes towards learning physics and, consequently, leads to a more productive learning process in the physics classrooms. While the findings of this study apply specifically to physics classrooms, further research might yield similar findings across different subject areas, such as mathematics and chemistry, which would provide the basis for developing curricula that incorporates simulation-based instructional units as a major part of learning and teaching materials.

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BIOGRAPHY OF SPEAKER

Dr. **Yazan Alghazo** is an Assistant Professor of Education at Prince Mohammad Bin Fahd University in the Kingdom of Saudi Arabia. He completed his Ph.D in Education in 2014 from Southern Illinois University at Carbondale, USA with a specialization in Curriculum and Instruction. Since then, he has been teaching in the CORE program at PMU, mainly teaching Learning Outcome Assessment courses, as well as research and communication courses. In addition to teaching, he is also the coordinator of the Humanities and Social Sciences department at PMU. Dr. Alghazo is an active researcher with more than 15 publications in the past three years; his current research focus is on Assessment and Quality in higher education; his other research interests include Mathematics Education, Elementary Education, Early Childhood Education, International Education, Gifted Education, Human Resource Development, CORE (General Education), Humanities & Social Sciences, Experimental Research, Qualitative Research in Education Dr. Alghazo leads an interdisciplinary research that includes fourteen faculty members with the goal of conducting research that improves achievement of learning outcomes at the program and the institution levels.

Development of Validated Methods to Generate Haptic Feedback in Interventional and Therapeutical Needle Insertions

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ABSTRACT

1 Introduction

Nowadays, surgical education still follows the Halstedian approach of “see one, do one, teach one” which is already over 100 years old [1]. Anaesthetist novices gather first hands-on experience directly on the patient assisted by a medical expert. Training anaesthetic procedures on simulators constitutes a safer alternative. The one way to learn is by making mistakes. By practicing on a simulator, a medical novice is allowed to make mistakes, learn from them, gather new information and to acquire surgical skills [2]. On the other hand, by learning from mistakes while performing a procedure on a patient can lead to major complications [3, 4]. Simulators on the market are categorized in low fidelity/high fidelity or virtual reality, manikins or hybrid simulators. A hybrid simulator combines artificial structures that provide realistic haptic feedback with a computer model [5]. One of these simulators is currently under development in the Research Group for Surgical Simulators Linz (ReSSL), which is department of the Upper Austrian University of Applied Sciences in Linz.

2 Methods

A realistic artificial patient phantom will be contained in the afore mentioned simulator. The hybrid character will be implemented in an intelligent instrument which changes its haptic feedback according to the insertion depth of the needle. The position data will be transferred wireless from a modern electromagnetic tracking system. These data is transferred wireless to the instrument where it modifies a control circuit for the fine adjustment of the haptic parameters. Based on previous research the tissue parameters are determined.

Artificial structures are developed which meet selected tissue parameters [5, 6, 7]. These structures are combined to form a patient phantom which is further compared to the literature. Finally a group of clinical professionals (n=9) validates the phantom by rating questions on a questionnaire after performing simulated puncture procedures of the epidural space.

3 Results

The insertion force into the patient phantom is shown in Fig 4. The skin and the supraspinous ligament (I), the interspinous ligament (II) and the ligamentum flavum (III) are indicated.

The results of the validation questionnaire are shown in Tab I. An agreement of 100% would indicate a perfect match with human tissue properties.

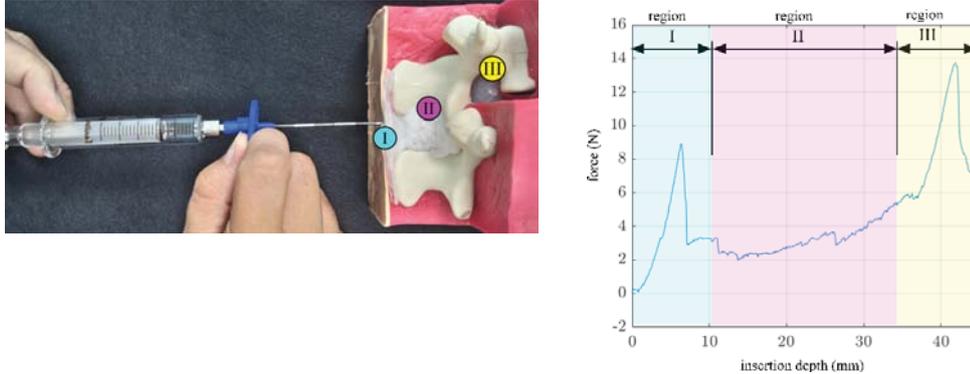


Figure 1: Design (right) and results (left) of the patient phantom with the different structures: the supraspinous ligament (I), the interspinous ligament (II) and the ligamentum flavum (III)

Acknowledgements

The Research Group for Surgical Simulators Linz (ReSSL) acknowledges the financial

<i>Question</i>	<i>Fulfillment</i>
1. <i>Is the applied force over the whole procedure realistic?</i>	72.2%
2. <i>Is the palpation of the spinal processus realistic?</i>	72.2%
3. <i>Does the ligamentum flavum penetration feel realistic?</i>	69.4%
4. <i>Is the phantom suitable for an epidural needle insertion simulator?</i>	80.6%

Table 1: Results of the questionnaire

support by the Austrian Research Promotion Agency (FFG) within the program line Cooperation & Innovation (COIN) and project number 845436. The authors would also like to thank Prof. Dr. Jens Meier, Kepler University Hospital Med Campus III, Linz, Austria for the cooperation and the validation of the phantom.

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BIOGRAPHY OF SPEAKER

The technical engine in the heart of **Benjamin Esterer** spurred to action during grammar school at the HTL-Paul-Hahn-Straße in Linz. The stubborn will to improve our healthcare system with modern technology directed him to the University of Applied Sciences School of Medical Engineering and Applied Social Sciences in Linz. Inspired by the Bachelor's Degree Program Medical Engineering he soaked himself into the topic Biomedical Engineering. Benjamin graduated the Master's Degree program in Medical Engineering magna cum laude. Subsequently he started the Medical Science Doctorate Study Program (Ph.D.) at the Paracelsus Medical University, Salzburg, always aiming higher.

Novel Simulator for Cranial Graft Lift Training

Marianne Hollensteiner^{a,b}, David Fürst^a, Benjamin Esterer^a, Stefan Gabauer^a, Peter Augat^b, Falk Schrödl^c, and Andreas Schrempf^a

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ABSTRACT

1 Introduction

Cranial grafts are used for the reconstruction of skeletal defects after trauma, tumor, infection or congenital pseudarthrosis [1] and due to their biocompatibility are more favored [2]. A common method to harvest parietal grafts is the split thickness graft method which is characterized by fast rotating surgical drives. To avoid accidents, appropriate thrust forces and drilling speeds have to be applied. Thus extensive training of novice surgeons is necessary. One training modality are model simulators, which provide a physical phantom with realistic anatomy and haptic feedback. Studies have shown that, in contrast to visual guided training only, simulators with haptic feedback have higher surgical skill-transfer to novel surgeons [3]. The aim of this study was to validate artificial parietal bones for graft lift training. Structural parameters of all bony layers were measured and characteristic forces during surgical machinery procedures were recorded [4]. Further, a simulator prototype was developed and tested by two experienced surgeons.

2 Methods

Customized artificial skull caps made of polyurethane resin were molded. Human parietal bones (n=2) were used as references. For validation, structural parameters of all bony layers (externa, interna and diploe) were measured and characteristic forces during surgical machinery procedures (drilling, sawing and milling) were recorded within a material testbench. During measurements, real surgical tools were used. The measurement procedure is described in detail elsewhere [4].

The validated artificial skull bones were used to develop a training simulator for harvesting split thickness grafts (see Figure 1). The artificial skull cap was placed on a brain-shaped silicone base to prevent slipping. Furthermore, the skull cap was covered with a layer of artificial soft tissues (muscles and skin).

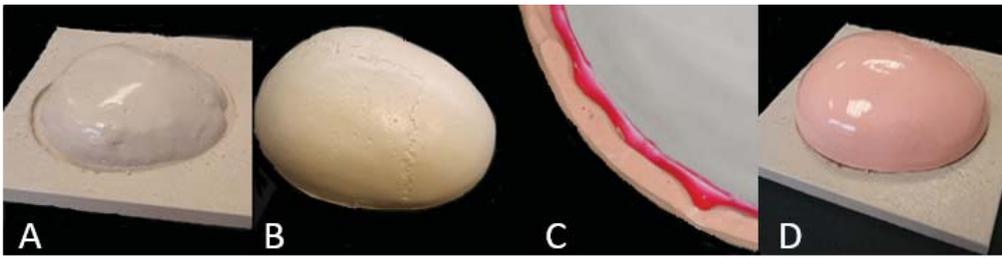


Figure 1: Simulator prototype (A: silicone base with brain bulge, B: artificial skull cap, C: artificial scalp, D: whole simulator assembly)

3 Results

All measurement results are summarized in Table 1. The created artificial skull caps were suitable to mimic human bone layers realistically. Apart from the milling, the artificial bone provided a realistic tactile feedback in comparison to the human reference.

		Human (mean±SD)	Artificial skull (mean±SD)
Machining parameters	Drilling [N]	2.10±1.24	2.50±0.73
	Milling [N]	1.73±0.72	0.89±0.20
	Sawing [N]	0.82±0.35	0.94±0.23
Thickness parameters	Externa [mm]	1.26±0.34	1.15±0.25
	Diploe [mm]	3.28±0.95	4.72±1.09
	Interna [mm]	0.76±0.22	1.07±0.34

Table 1: Characteristic parameters of human and artificial skulls

The simulator prototype was independently tested by two surgeons. The sequences in Figure 2 oppose the main steps of a parietal graft lift performed on a human skull (upper image sequence) and the simulator prototype (lower image sequence). All procedural steps could be realistically performed with the simulator, as reported by the surgeons. Further, the initial incision and retraction of the artificial scalp was congruently described as realistic by them. Both surgeons confirm the suitability of the prototype as a valid educational tool for surgical residents.

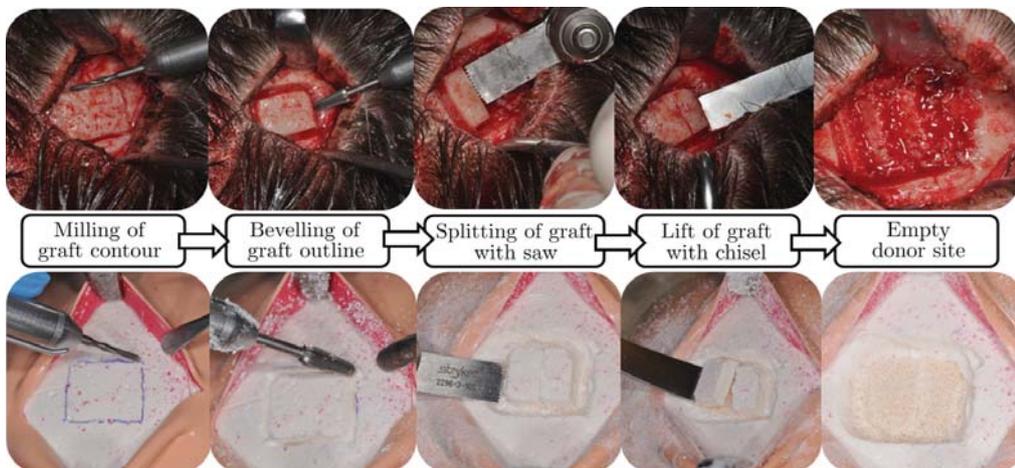


Figure 2: Procedural steps of a parietal skull graft lift. Upper image sequence: real surgery. Lower image sequence: simulator training

Acknowledgements

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BIOGRAPHY OF SPEAKER

Marianne Hollensteiner received her BSc. and MSc. degrees in medical engineering from Upper Austria University of Applied Sciences in 2011 and 2013. In 2013, she started to work at the Department of Medical Engineering as a research associate dealing with the development of surgical simulators. Her research interests are biomechanical modeling of instrument-tissue interaction, haptics and artificial tissue development. In 2014 she started to participate in the doctoral program medical sciences at the Paracelsus Medical University Salzburg.

Development and Assessment of the RealSpine Simulation System for Surgical Training

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ABSTRACT

1 Introduction

In the last few years, the technical development in the field of medicine has evolved to the extent to which the training both of residents as well as consultants could not keep up with [1-2]. Therefore, the development of new technologies and concepts focusing on the current needs of medical education has become a necessity. According to experts [2], one of the technological advances that may revolutionize medical education is the simulation. In aviation, the simulation has made considerable progress in the field of training of pilots. Nevertheless, there are few comparable solutions in the area of medical training and especially in the area of surgical training.

For this reason, the an interdisciplinary research group at the University of Applied Sciences Leipzig has set itself the goal to develop a new generation of surgical simulators.

2 Methods

RealSpine provides surgeons a realistic surgical training on the lumbar spine (see figure 1). The simulator has the following characteristics.

- realistic anatomy (a simulation based on synthetics with natural optical and haptical appearance – a rapid prototyping and material modelling approach was chosen)
- use of real surgical instruments and intraoperative technique
- a bleeding simulation system based on theatre blood was chosen
- sensors to evaluate the quality of the surgical intervention were integrated
- exchangeable modules to simulate a series of different surgical spine procedures (all the procedures are modelled bases on real patient cases and radiological images)

The face/expert validity of the RealSpine system was shown by the group in 2014, see [3].



Figure 1: The RealSpine simulation system, which was developed by the research group in Leipzig, to provide a realistic surgical training environment

3 Results

Due to the mentioned characteristics the RealSpine system distinguishes itself considerably from other training technologies such as cadavers, bone models or virtual simulators. In addition, the simulator provides the following additional benefits:

- Cost reduction: the organisational cost for the training of surgeons can be reduced by using simulation systems directly in the hospital or operating theatre.
- Avoiding the ethical issue of surgical training: RealSpine offers a realistic alternative to the previously used human and animal specimens.
- Motivation effects through realistic surgical environment: The surgery on the simulator can be performed with real instruments, intraoperative technique and a real surgical team (scrub nurse, resident, surgeon). The doctor finds himself in his usual learning environment, but with additional benefits.
- Quantitative performance measurement: Integrated sensors are monitoring the forces and loads on risk structures, which act on the patient during surgery. The visualization of measurement data allow the surgeon to evaluate his own performance and learning progress.

We found finally a proper pedagogic methodology to prove a learning outcome of the participants. For this kind of assessment of the training procedures with the RealSpine-System we use two concepts:

- (1) procedure-based Assessment (pbA) is a method, that allows experienced trainers to analyse the advancement of young surgeons (such as residents) according well defined spine procedures. There for in the best circumstances a standard operating procedure (SOP) is available. With the RealSpine system it is possible to follow the pbA-methodology, since the RealSpine system is a simulator following a case-based approach (see above).

(2) self assessment of the participants: During every training session, each of the participants fills in a pre-training and a post-training questionnaire. They should answer their own estimation for fulfilling a certain surgical step during the RealSpine surgery simulation on a Likert-Skale [1 = insufficient up to 5 = very good). So it is possible to measure the reaching of learning goals, and improvements of the participants during several learning sessions.

The current analysis of the questionnaires shows that the participants always improve their own skills, at least for their own self-estimation.

Summary: Simulation in surgical training is crucial to improve the worldwide health care system. Training on cadavers, animals or real life training on patients is not up to date anymore. Therefore realistic training environments will allow improved education of residents in the near future. Computer-based training lacks usually the realistic modeling of haptic characteristics of surgical procedures. Therefore the RealSpine system follows the rapid-prototyping and material modeling approach, including bleeding simulation and sensorics. Together with the pedagogic concept, in future this approach will allow to perform better education and include also assessment of surgical residency programs in spine surgery. Other surgical domains may follow.

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BIOGRAPHY OF SPEAKER

Werner Korb is associate professor for „Simulation and Human Factors in Operative Medicine“ at the University of Applied Sciences Leipzig, Germany.

For 15 years now, as part of his research activities, Werner Korb manages an outstanding number of projects in the field of medical technology, ergonomics and training, in particular simulation training. He has already accompanied the establishment of two institutes, the „Innovation Center Computer Assisted Surgery (ICCAS)“ at the Medical Faculty of the University of Leipzig and the Research Institute „Institute for Surgical Training Technologies (ISTT)“ at the University of Applied Sciences (HTWK) Leipzig. For 10 years now, Werner Korb has been doing much for the application of synthetic-based material and electronic simulation systems in surgery. Especially the combination of service (didactic) and technology (training technology) is particularly important to him.

He has a degree in Technical Mathematics /Computer Sciences at the Vienna University of Technology. He earned his doctorate in Medical Informatics/Medical Physics from the University of Heidelberg. Werner Korb is Co-Founder and CEO of RSTT Real Surgical Training Technologies GmbH, Leipzig.

SESSION II

Innovation in Education

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Waiting for the President to Leave

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ABSTRACT

1 Introduction

Calls for change in the role of the higher education, how it could and should be delivered, and how it should be more relevant to the wider community have been a constant theme in recent decades. More recently, the discussion has intensified, largely driven by the wider use and availability of information and communication technologies, the influence of the pioneering open universities, and increasing pressure to close the gaps between the privileged and those left behind. There is little excuse left not to engage in on-going innovation and change in any institution or system.

The points of view are diverse. Bass [1], Gibbs et al [2], LeBlanc [3] and Carnavale [4] are four one could start with, but the literature plus the broad range of relevant blogs such as those of Watters [5] and Downes [6] suggest that the call to action is getting louder.

Where does that leave the leadership of institutions of higher education, particularly those in the public sector (which often have serious and contradictory constraints imposed upon them) and in a strongly unionized environment where matters of technological change, evaluation of faculty performance, and the allocation of resources for innovation are subject to negotiation?

Selingo [6] has considered the future of learning in the next 10 years and identified a greater focus on competencies rather than grades; lifelong learning being embedded in undergraduate degree structures; and the impact of technology and data analytics to recruit students, to intervene in order to ensure student success, and to track graduate achievements. One could also add the impact of brain research into how people learn, and the increasing importance of informal and experiential learning [1], all creating, as Milliron has called it, “a golden age of learning” [8].

2 Methods

This work is based on a review of recent literature on change and innovation in teaching and learning in higher education and its alignment with the evolution of a new, teaching university in urban British Columbia.

Kwantlen Polytechnic University (KPU), is a regional teaching university in metropolitan Vancouver, which serves 20,000 students across 5 campuses drawn largely from a very diverse population of about 1 million citizens. A comprehensive strategic plan is in place [9], along with a set of nearly 80 measures of progress towards strategic goals [10].

On the surface, KPU is successful: graduate success and student satisfaction metrics are high, although no better than at most universities in Canada. For example, 91% of degree graduates reported satisfaction with the usefulness of the knowledge

and skills acquired at KPU in performing their jobs [9].

Offsetting this is the absence of a plan for teaching and learning, making any significant investment in innovation risky. Likewise there is no co-ordinated dialogue or reflection, no shared governance of teaching and learning, no observatory for looking ahead, and no coherent approach to our underserved learner populations. All of this is the result in large part to cuts in public funding coupled with heavy government-imposed regulations and constraints on revenue generation.

As a multi-campus organization with a wide range of programming at many levels, this fragmentation is understandable, plus the KPU organizational culture includes little reward for change, and some anecdotal evidence indicates that faculty members are simply “waiting for the president to leave”, since senior administrators tend to come and go relatively frequently.

There are many examples of individual innovation and success among the faculty and staff, often involving the students themselves. Some advances in, for instance, the use of open educational resources are starting to spread. New leadership in the Office for Teaching and Learning is key to shifting the culture and to increasing the levels of engagement in the scholarship of teaching and learning, thus improving student and graduate success.

3 Results

The results of this review of literature, data and opinion suggests a short term strategy that continues to seed, celebrate and incentivize champions of innovation, to collate, make sense of, and leverage current individual innovations, and to invest in immediate training and infrastructure needs. In the mid-term, the university is set to approve a strategy for the advancement of teaching and learning in 2017. This will feed into longer-term, flexible strategic thinking for KPU rather than formal five-year strategic planning.

For the senior leadership team especially, there is a need for persistent optimism about the “golden age of learning” [8]. KPU must clarify and re-affirm its mission and have clearly expressed values. Deans and faculty then need to be empowered with clear expectations as they encourage, seed and reward innovation, and the university must engage in “entrepreneurial leadership” [2], encouraging overlap and integration both inside and out [2].

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BIOGRAPHY OF SPEAKER

Dr. **Alan Davis**, President and Vice Chancellor, Kwantlen Polytechnic University

Alan Davis was born in Reading, England. He attended Ranelagh School and University College London to study Chemistry, and was awarded his BSc with honours in 1972.

In 1972 he undertook graduate studies at Simon Fraser University, and received MSc and PhD degrees, also in Chemistry.

In the late 1970's he began 12 years as a chemistry faculty member at the (then) Fraser Valley College. He also became active in community theatre, writing and directing plays with the college and the Chilliwack Players Guild. He was elected to the Chilliwack School Board, serving as Chair for seven of his 13 years as a Trustee.

He has held senior administrative position at the Open Learning Agency, Athabasca University, Niagara College, Vancouver Community College, and in 2008 he was appointed President of Empire State College at the State University of New York.

Since 2012, he has served as President and Vice Chancellor at Kwantlen Polytechnic University.

Dr. Davis is a member of the Board of the Council for Adult and Experiential Learning, and has served on various committees and commissions with the American Association of State Colleges and Universities and the American Council for Education. He is a Distinguished Member of the Canadian Society for the Study of Higher Education, and serves on the board of the Collaboration for Online Higher Education Research.

In addition to his papers in inorganic chemistry, Dr. Davis has published in key areas of higher education.

Dr. Davis is also a published playwright. His plays for young people have been performed across Canada.

He is married, and is a father to three daughters and a son.

New Trends in Education: “How Can Japanese Universities Contribute to the New System of Moral Education?”

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ABSTRACT

When we consider moral education in the Japanese tertiary sector today, we cannot ignore the fact that large numbers of university professors are in accord with the tenor of the remarks about the place of morality and ethics in higher education made by the political scientist, John Mearsheimer. In *Debating Moral Education* (Duke University Press, 2010) Elizabeth Kiss and J. Peter Euben drew attention to Mearsheimer’s controversial 1997 address to the University of Chicago freshman class on the “Aims of Education”, in which he argued that the chief purpose of a university education was “to help students think critically, to broaden their intellectual horizons, and to promote greater awareness.”[1] From this premise, Mearsheimer deduced that a university had to be “a remarkably amoral institution”, one that did not, and should not, provide its students with “moral guidance”, nor offer courses in which they could “discuss ethics or morality”.

The situation in Japanese tertiary education at the time of his speech would probably have pleased Mearsheimer, since in 1997 moral education was provided solely in the country’s elementary and junior high schools. Instruction ended abruptly at age fifteen, and things have only just begun to change. Not until the start of the 2014 academic year was moral education extended to some, but by no means all, high schools, and that remains the high water mark. Sadly, the idea that universities have a civic responsibility to teach their students morality and ethics still encounters scepticism, suspicion and, on occasion, outright rejection. So it is no surprise that moral and ethical education is not especially common at university level in our country today. This is consonant with a widespread belief in Japan that such concerns are the province of the home, and of instruction in elementary and junior high schools where moral education is a requirement under the Ministry’s official guidelines for teaching. The fact of the matter is, though, that even elementary and junior high schools do not always seem to achieve satisfactory results in moral education when tackling a variety of problems.

We are at last, though, on the threshold of significant changes in the matter of moral education. In 2016 the Ministry of Education, Culture, Sports, Science and Technology decided that moral education will become a “special subject” in the next national curriculum, and so a new moral education system will start in elementary schools in the 2018-2019 school year, and in junior high schools in the 2019-2020 school year.

Despite strong official backing, though, the new system has not gone unchallenged by those responsible for teaching the subject. This is partly because moral education has not been a school subject since World War II, so Japanese universities have neither academic departments nor faculty solely devoted to scholarship or instruction in the area of moral studies. As a result, they have not to date produced researchers and

educators specializing in the subject in sufficient numbers; courses on the “methods of teaching morals”, a required subject in teacher-training programs, are therefore sometimes offered by faculty who are not specialists in moral education. Such courses, which are supposed to provide students with a comprehensive grasp of the objects, content and methods of moral education, attract just two credits for one 90 minute class per week for fifteen weeks. This paucity of provision for moral education in teacher training programs in Japanese universities has inevitably done considerable harm to the prospects of advancing the cause of moral education in elementary and junior high schools.

This narrow, if important, problem of teacher training should stimulate us to rethink the place of moral education in Japan’s entire tertiary sector [2]. In the U.S., for example, a new trend, completely at odds with Mearsheimer’s ideas, has already emerged. After being marginalized for decades in the secularized 20th century academy, more than 100 ethics centres and programmes are now flourishing on campuses across the country, evidence of a renaissance in moral education in the American tertiary sector. In this globalized age, moral education in Japan can no longer be allowed to lag behind, but must seize the future by participating in collaborative academic and educational initiatives worldwide.

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Graduate Teaching Assistants Learn like PreService Teachers - a Novel Idea

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ABSTRACT

1 Introduction

Many undergraduate students will encounter being taught by Graduate Teaching Assistants (GTAs), especially early in their college career (DeChenne, Eniochs & Needham, 2012). While the GTA is a critical component in many university systems, the amount and types of training available for GTAs are somewhat limited (Luft, Kurdziel, Roehrig, & Turner, 2004; Gray and Buerkel-Rothfuss, 1991). Many STEM GTAs have very little pedagogical training beyond “on the job” training, this is critical as early teaching experiences highly influence long-lived teaching pedagogy (Boice 1996). The meager amount of research on GTA pedagogy may be a result of the moderate number of opportunities that GTAs have to skillfully craft their teaching pedagogy. While research on teacher assistant efficacy is sparse (Komarraju, 2008), research surrounding the needs of GTAs for content and logistical support are pervasive (Luft et al., 2004). Additionally, GTA pedagogy training can have a positive effect on the teaching skills of GTAs, Postareff, Lindblom-Ylanne & Nevji (2006) showed that training instructors in pedagogy helped to increase self-awareness in their teaching. Additionally these instructors are also more open to trying various pedagogical methods in efforts to improve their teaching. As a result of high-teaching self efficacy, instructors tend to be better teachers and are more earnest in their efforts with students, especially during more difficult teaching tasks (DeChenne, Koziol, Needham & Enochs, 2015).

2 Methods

The Summer Institute for Graduate Teaching Assistants (SIGTA) was created in hopes of increasing STEM GTA pedagogy knowledge as they enter their PhD programs. SIGTA was conceived as a joint creation between several departments at the University that include: biology, chemistry, physics, math, computer science, engineering and education. The structure of SIGTA was modeled after the Master in Arts (MAT) program, an established secondary program of 25 years housed in the department of education. The study is guided by the following research questions: 1) How can an intensive summer teaching program impact self-efficacy in graduate STEM GTAs? 2) How does participation in an intensive summer teaching program impact STEM GTAs facilitation of undergraduate student learning? Seven GTAs (2 females and 5 males) are participating in this phase of the study. All participants are 1st year PhD students in chemistry, biology and math and were required as part of their teaching assistantship to attend SIGTA (as the first cohort of students). Several data sets were collected: 1) GTAs without SIGTA training completed a questionnaire about their teaching self-efficacy and pedagogy 2) An interview with a focus group of GTAs without 3) Video recordings of SIGTA GTAs' current recitation sections 4) Interviews with faculty who work with GTAs. Interviews

were semi-structured and used an open-ended protocol to guide the researcher's questions (Seidman, 1998). Additionally SIGTA GTAs completed a questionnaire related to pedagogy, kept reflection journals of their experiences as they progressed through the program and also practiced teaching through micro-lessons that were all video-recorded. The data provided from the questionnaires, observations made and the videotaped lessons from the GTAs were read by and observed by two researchers and coded for ideas related to self-efficacy. Specific codes have started being developed by using the constant comparison method (Glaser and Strauss, 1967).

3 Results

This abstract will focus on the findings from the journals due to space.

Steve*, a GTA from Sri Lanka early journal entry states:

"...I tried to explain concept through examples. They do not like that. Finally I was also plug into what they need. I would like to know some methods to handle them. (Motivate them to think and give the excitement of successful challenges)"

Steve's later journal entries state:

Previously, as a TA I had a hard time to engage student in the discussions. I tried to ask questions from them, they always avoided to answer. In Sri Lanka this never happened. They respect the lecturer and at least tried to give an answer. But in the US, I cannot tell them you must give an answer. I tried to do that and they complained to the professor. In the future, I can introduce "think/pair/share" technique in the beginning of the semester and slowly asked questions from individuals. Also the US students refused to write their answer on the board. Again, I might want to use the group presentation to avoid this conflict. I might use minute papers, 3-2- 1 or some online forms to collect feedback from the student. Feedback is important for both parties." and "Instead of direct teaching on the board, I will be using discussion technique to engage students ... May be one group can teach to the class and ... That will allow me to manage the time and facilitate a good discussion among student."

Reflective journaling provided evidence that the GTAs felt more confident in their abilities to teach group of undergraduate students. Journal entries transformed from worries and frustrations to specific pedagogical techniques the GTAs were using or planning to use. Other major themes that emerged from the data set include emotion, culture (particularly US culture) and career goals (academia versus industry). The study continues to collect data as the first cohort of STEM GTAs are currently teaching. A Classroom Observation Protocol for Undergraduate STEM (COPUS) will be used to analyze GTA teaching undergrad recitations. This study offers an innovative way for college instructors to think about the training they offer for their own GTAs.

Acknowledgements

We would like to thank the graduate students who participated in this work.

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SESSION III

New University Models

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Student Transformative Learning Record (STLR)

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ABSTRACT

1 Introduction

Higher Education around the globe is at its own “disorienting dilemma,” that point where Jack Mezirow, founder of Transformative Learning theory, says adults moving into a transformative realization about themselves, are struck with the need to adapt to circumstances in which their prior assumptions about how they should act, what they should do, must change [1].

Employers now say many college graduates do not possess the employability skills to enter the workforce [2, 3]. Universities themselves are recognizing that the old methods of lecture and mere transmission of information do not serve a population of students who already have such information at their fingertips via the World Wide Web, nor does that pedagogy develop beyond-disciplinary skills.

What is needed are ways to teach college students that are effective for both helping students learn the course content and for helping students develop the skills for the workforce, the community, and for life-long, life-wide learning.

The University of Central Oklahoma decided to meet these challenges by developing the Student Transformative Learning Record (STLR) process.

2 Methods

Initial planning and design for STLR began in February of 2012. We decided to organize STLR around our Central Six Tenets, which are the university’s designations for broad areas of development necessary for students to become creative, responsible contributors to society. STLR’s small pilot launch occurred Fall Semester 2014. Now moving into our third year of broad implementation, we have STLR-associated assignments in hundreds of classes, we are averaging over 40 STLR-associated Student Affairs events each term, and we have already had over 100 students involved in STLR-related research projects outside of class with faculty and staff. We will have STLR fully in place across the entire university for all students by Fall 2019.

To accomplish this:

- We developed a vision for how we wanted to operationalize Transformative Learning (TL), the pedagogy defined in our mission that helps develop students’ beyond-disciplinary skills so needed in the workforce and community.
- We designed a measurement process to track how well students were achieving this learning. This required developing rubrics to use to assess this student learning, whether the learning happened in the classroom or in the

co-curriculum.

- We created the training for faculty and staff in how to use the rubrics. To date we have trained close to 350 faculty and staff and by Fall 2019 will have trained over 1000.
- We worked with our Learning Management System (LMS) provider to make the LMS serve as the place where student TL artifacts, the rubrics used to assess performance as demonstrated in the artifacts, and the achievement rating assigned by the faculty or staff are collected in course shells, whether for curricular or co-curricular STLR engagement. We developed a system to collect these data and display student achievement in a mobile dashboard so each student can see personal achievement in each of our Tenets as shown across three badge levels.
- We utilize the LMS eportfolio as the place where students gather their STLR artifacts and ratings, and we train students in how to select and display information about their beyond-disciplinary learning in ways that are useful and convenient for employers, graduate schools, and others.
- We are now developing the mechanism to link students' STLR badging achievement levels to the electronic version of their academic transcripts, thereby creating a Comprehensive Student Record.

3 Results

Our early results, collected in October 2015, are very positive. We have been gratified, too, that multiple external higher education organizations, foundations, and institutions have recognized STLR. As of Fall 2016, two institutions have begun adopting/adapting STLR at their own campuses, with a third about to begin that process. To assist such institutions, we are developing a "STLR Guidebook" to provide advice, answers, and recommendations — we are completely transparent with STLR, which has been developed as a platform-agnostic, replicable, and scalable process.

	Spring 2011 Old LMS	Spring 2013 D2L	Spring 2015 D2L
Active Courses:	1,361	2,548	3,360
Total Courses :	3,663	4,047	4,303
Percentage of courses using LMS:	37%	63%	78%*

*89% Percent of Faculty Used D2L Spring 2015



Table 1: Fall 2015 to Fall 2015 results, STLR students vs. non-STLR students

Recognition of STLR's efficacy and impact include:

- Selection to the Gates Foundation 2015 Breakthrough Models Incubator Cohort, a project designed to help institutions advance worthy initiatives to wider adoption.
- Selection as one of 12 institutions funded by a Lumina Grant to develop a Comprehensive Student Record, with UCO invited specifically in order to develop the means to link STLR achievement information to the academic transcript.

- Receipt of the 2016 WCET Outstanding Work Award: <http://wcet.wiche.edu/initiatives/wcet-awards/wow/media-release-2016>
- A national ranking for student engagement of 6th among U.S. colleges and universities in the Wall Street Journal-Times Higher Education rankings announced September 2016: <http://www.wsj.com/articles/the-colleges-where-students-feel-most-engaged-1475030165>

We believe STLR is serving our students, serving our local and global communities, and is helping higher education transform in foundational and necessary ways for the 21st century.

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BIOGRAPHY OF SPEAKER

Over the span of more than 47 years, **Don Betz** Ph.D has enjoyed a reputation for teaching, encouraging students and developing leaders. He started teaching in 1971 at Northeastern State University (NSU) in Tahlequah, Oklahoma, USA, (the capitol of the Cherokee Indian Nation). From 1982 to 2003, he worked for and with the United Nations on Middle East issues including the question of Palestine. He initiated the development of a UN affiliated global network of non-government organizations focused in the Middle East peace process.

He served over the years as Provost at Palmer College in Iowa, and then become Provost at the University of Central Oklahoma from 1999-2005. After three years as Chancellor of the University of Wisconsin at River Falls, he returned to Northeastern State as President between 2008 and 2011, and then became President of the University of Central Oklahoma in 2011.

He was a founding member of the American Association of State Colleges and Universities' American Democracy Project in 2002.

In 1991 Betz received the Medal of Excellence in University Teaching from the Oklahoma Foundation for Excellence and in 2012 he was given the Governor's Award from the Oklahoma Arts Council. He was selected as a fellow for the 2011 Fulbright-Hays Seminar for Presidents Scholars. In 2013, the Oklahoma Higher Education Heritage Society named Betz to the Oklahoma Higher Education Hall of Fame. He currently is serving a three-year term with the International Association of University Presidents as chair of its United States Council.

Betz holds a Bachelor of Arts in Political Science and Philosophy from the University of San Francisco as well as a M.A. and a Ph.D., from the Korbel School of International Studies at the University of Denver. He is a graduate of the Harvard University Institute for Educational Management.

Interdisciplinary Doctoral Programs to Address Major Technical and Societal Challenges

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ABSTRACT

1 Introduction

Many of the major challenges to our societies and countries are interdisciplinary in nature and require innovations in graduate education to find solutions that also must be interdisciplinary. Two such major problems in most countries of the world relate to (1) energy supply and use and (2) use of and extraction of knowledge from huge data sets that are now common to so many fields of inquiry, e.g., health care, cyber security, materials, transportation, etc. To address the need for solutions to major challenges in these two fields, we have initiated two interdisciplinary PhD programs between the University of Tennessee (UT) and the nearby Oak Ridge National Laboratory (ORNL).

2 Background

The University of Tennessee Knoxville is in some ways a conventional American university in structure and style. We have 11 colleges and related undergraduate and graduate degree programs serving students in many fields. These degrees are disciplinary in nature and prepare students well for jobs and careers in many fields. But, it is becoming clear that modes of interdisciplinary education are needed to address major societal challenges that are interdisciplinary in nature. Energy and big data are two fields of research, development, innovation, and business that demand interdisciplinary solutions. We have therefore been engaged in creating two doctoral programs that are interdisciplinary in nature and directly address the research, entrepreneurial, and policy aspects of these two areas.

The University of Tennessee can address these large interdisciplinary challenges in part due to the long-term and broad partnership with nearby ORNL. This partnership dates from the founding of the laboratory via the Manhattan Project during World War II. The partnership has evolved and expanded greatly in recent decades and is now a model for a large state-supported university working closely with a federally supported national laboratory. In fact, in 2000 the University of Tennessee and Battelle Memorial Institute won the contract to manage ORNL via UT-Battelle LLC. This management contract has extended over the past 16 years and has led to a large expansion of an already extended partnership between these two rather different institutions, UT Knoxville (UTK) and ORNL. This partnership now includes more than 250 joint faculty, six joint institutes in various fields of joint expertise, and now two interdisciplinary doctoral programs organized jointly by UTK and ORNL.

3 Structure

One challenge to initiating an interdisciplinary graduate program addressing major broad areas of research is to form a college or center to locate the degree program so that the doctorate encompasses faculty, research areas, and course offerings of a number of disciplinary colleges. In our case, the Bredesen Center for Interdisciplinary Research and Graduate Education was formed to locate and administer interdisciplinary graduate degree programs. The Bredesen Center reports to the UTK chancellor and to the ORNL director to ensure high-level oversight of and support for the program. The partnership between UTK and ORNL has important strategic importance for both institutions and thus this high level of reporting is imperative.

The two institutions engage in joint recruiting of talent from top universities to join the Bredesen Center doctoral programs. On-site interviewing is necessary for selecting students who have the right backgrounds and are truly interested in an interdisciplinary rather than disciplinary doctoral program. Competitive fellowships of \$30K per year are offered to approximately 25 new doctoral students in each program. Cost sharing of the stipend and tuition is required from the mentor at either institution. To ensure an interdisciplinary focus to the doctoral program, six graduate credit hours are required relating to either entrepreneurship or policy relative to either energy or big data. The Bredesen Center has no faculty lines and relies on research mentorship by UTK faculty in various departments and staff scientists at ORNL.

4 Results

The Energy Science and Engineering (ESE) PhD program was initiated in 2010 with the first class of doctoral students entering in August of 2011. This program has grown to 138 doctoral students in the fall of 2016 with 14 doctorates already awarded and another dozen ready for graduation. On average these graduate students have higher entering credentials than others at the university, and their performance has been outstanding. Approximately 100 of these students work on dissertation research at ORNL, taking advantage of the wide set of energy-related R&D capabilities of the laboratory. These areas include biofuels, nuclear, batteries, fuel cells, photovoltaics, hydro, grid, and climate change. Some of the students are deeply involved in the entrepreneurship track and six small companies have been started by the graduate students using intellectual property from ORNL [1]. Those involved in policy have engaged in activities relative to energy planning in Tennessee and national energy issues, sometimes with published results, e.g. Wellington and Mason [2]. The Bredesen Center faculty numbers 126 and their primary responsibility is to mentor graduate students in dissertation research. It is clear that the activity of these bright doctoral students is attacking some of the major issues in energy supply and use, even starting companies to contribute to the solutions [3].

The success of the ESE doctoral program has led to the initiation of a second interdisciplinary PhD program in Data Science and Engineering (DSE). The structure of the DSE degree program is very similar to that of ESE. The joint research capabilities of UTK and ORNL in data science make this new degree possible, e.g., the strength of ORNL in supercomputing. The potential for “big data” analysis is limitless and much additional research is needed to learn how to extract information through the analysis of large disparate data sources. Examples of big data challenges that require data science include the study of electronic health records on a massive scale to identify more efficient and cost effective ways to treat patients, and the combination of data from

cellphones, GPS, and traffic sensors, which could be used to improve traffic flow and emergency responsiveness. The careers of many current students will be shaped in the future by the complex issues related to the generation of, use of, and extraction of new knowledge from large data sets. The issues leading to the generation of most large data sets and the questions that they are used to address are extremely interdisciplinary in nature, thus the need to educate students accordingly in an interdisciplinary manner by coupling computer science, statistics, and analytical techniques to various domain sciences. From this coupled training come advances in data-driven discovery.

The DSE doctoral program initiates with the first doctoral students in August of 2017.

Acknowledgements

The support from Oak Ridge National Laboratory is greatly acknowledged.

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BIOGRAPHY OF SPEAKER

Jimmy G. Cheek is Chancellor Emeritus and Distinguished Professor of Educational Leadership and Policy Studies at The University of Tennessee, Knoxville. He became the seventh chancellor of the University of Tennessee, Knoxville, on February 1, 2009 and stepped down from that position in February 15, 2017 upon the arrival of Chancellor Beverly Davenport.

Within a year of taking office, he accepted the Governor's challenge for UT to become a Top 25 public-research university in the United States. This aggressive initiative sparked exciting momentum around improving undergraduate education, graduate education, research, campus infrastructure, and securing additional financial resources.

Several new academic, research and student service buildings have been built or significantly renovated and an unprecedented \$1 billion in campus construction is now underway or in the design stages. A new student union, classroom, laboratory and research facilities are under construction, and 4 new residence halls are open and more are on the way.

Numerous changes in the university's delivery of core services including advising, tutoring, mentoring, admissions, and other support to help students graduate on time and achieve their academic goals. These changes have dramatically improved enrollment, retention and graduation rates and brought our metrics closer to our aspirant peers.

The increased commitment to faculty and staff salaries has aided recruitment and retention of world-class faculty and staff. Cheek also has led an effort to enhance relationships with existing partners, such as Oak Ridge National Laboratory and Eastman Chemical, and to create new relationships. These partnerships broaden our research and provide opportunities for collaborations with faculty and students.

A first-generation college student, Cheek has set in motion several initiatives to increased diversity and student access to the university. The university's work on improving

access led to Cheek's participation in two White House Summits on increasing college opportunity for low-income students.

Cheek currently serves on the United Way Resource and Development Committee, the Tocqueville Cabinet, the Board of Directors, and is Campaign Chair Elect. He is a member of the Delaware Valley University Board of Trustees and he is the Chair of the Board of Directors for the International Fertilizer Development Center (IFDC), whose mission is to enable smallholder farmers in developing countries to increase agricultural productivity, generate economic growth and practice environmental stewardship. While Chancellor he served on the UT-Battelle Board of Governors for Oak Ridge National Laboratory, the Board of Directors for United Health System, the Pat Summit Foundation, and the Southeastern Conference Board of Directors and the Executive Committee. In addition, Cheek chaired the Leadership Knoxville Board of Directors.

The Board of Trustees of the University of Tennessee System honored him for his work as Chancellor with a resolution commending him for this outstanding service to the Board, University, and State. He received the Leadership and Service Award from the Alumni Board of Directors, a Faculty Senate Resolution honoring his significant and lasting contributions, a Thomas Jefferson Cup for his support and dedication from the Chancellor's Associates, and the Student Government Association created the Jimmy G. Cheek Visionary Award to annually recognize a visionary student leader.

He received the Outstanding Alumni Award for the College of Agriculture and Life Sciences from Texas A&M University. And, Tarleton State University awarded him the President's Legacy Award for Excellence Through Leadership.

Prior to his service with UT, Cheek was a member of the faculty and an administrator at the University of Florida for thirty-four years, last serving as senior vice president of agricultural and natural resources. While at Florida, he received the President's Medallion and Student Body Resolution 2009-104 for dedicated and loyal service to the university and outstanding service to students, respectively, and the Morton Wolfson Faculty Award for outstanding contributions to the quality of student life. He was named to the Academy of Teaching Excellence in 2008, a Fellow of the American Association for Agricultural Education in 2005, and a Fellow of the North American Colleges and Teachers of Agriculture in 1998. Cheek's research focused on the influence of experiential learning on student achievement and educational accountability.

Cheek earned his bachelor's degree with high honors and his doctorate from Texas A&M University. He received his master's degree from Lamar University. A native of Texas, he is married to Ileen Cheek, and they have two children and four grandchildren.

RLS-Sciences: A Multilateral and Multilevel Approach

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Please note that this abstract is submitted in the name of all RLS-Sciences members.

ABSTRACT

1 Introduction

RLS-Sciences is a unique, multilateral and multilevel science and education experiment under the umbrella of the Regional Leaders Summit. The Regional Leaders Summit (RLS) is a high level forum comprising seven regional governments (state, federal state, or provincial), which together represent approximately 177 million people across five continents, and a collective GDP of 3 trillion USD. The regions are: Bavaria (Germany), Georgia (USA), Québec (Canada), São Paulo (Brazil), Shandong (China), Upper Austria (Austria), and Western Cape (South Africa). Since 2002, the heads of government for these regions have met every two years for a political summit. These summits offer the RLS regions an opportunity for political dialogue [1].

Within the framework of RLS, RLS-Sciences seeks to leverage the unique composition and strengths of the RLS network to support scientific research within and between the RLS regions. It aims at generating and supporting academic, scientific, and technological exchanges, as well as the initiation of multilateral research projects. The existing resources of RLS-Sciences include its scientific network, the existing bilateral relationships between the RLS members, and its pilot project, the Energy Network (2013-ongoing). Further ongoing multilateral research projects are in the fields of digitalization, aerospace, and small satellites. In all four ongoing research projects as well as at the overall coordination level of RLS-Sciences, promotion of education is a target.

2 Methods

RLS-Sciences is in the process of defining a multilevel governance structure that enables greater cooperation between the political, scientific and administrative levels within RLS (see Figure 1). Our priority is to generate cross-sectoral and cross-regional interactions that enhance science. In our multilateral research projects, graduate students and young researchers have the opportunity to deepen their academic knowledge in a global environment that is immediately interdisciplinary, international, and practice-oriented [2].

Example One: Campus Aerospace

In order to strengthen the specialized training of aerospace engineers, researchers and

experts from industry are coming together to build a new training platform with virtual and in-person components. We want to create a leading teaching platform in aerospace, and to improve the visibility of aerospace research activities within the RLS Network and internationally, helping release research results faster and reducing the distance between teaching and research. A first comprehensive MOOC will be delivered in two years. Additionally, the first summer school of Campus Aerospace took place within the Munich Aerospace Summer School 2016 in Herrsching, Bavaria on „Autonomous Flight“. For the first time, PhD candidates from across the RLS regions participated, for a total of nine RLS-Sciences graduate participants.

Example Two: Small Satellites

The main objective is to promote global technology leadership through multilateral cooperation. The seven RLS regions have the necessary expertise: they can either contribute a full satellite or key components. Their cooperation will maintain research and training excellence in their RLS network, and provide a regional advantage in the increasing international science and innovation competition around small satellites. For students (both undergraduate and graduate) as well as for young researchers out of our regions, being part of this scientific project is a unique opportunity to join a network of space experts and learn more about technology, international cooperation in space, and also legal and ethical requirements in this field.

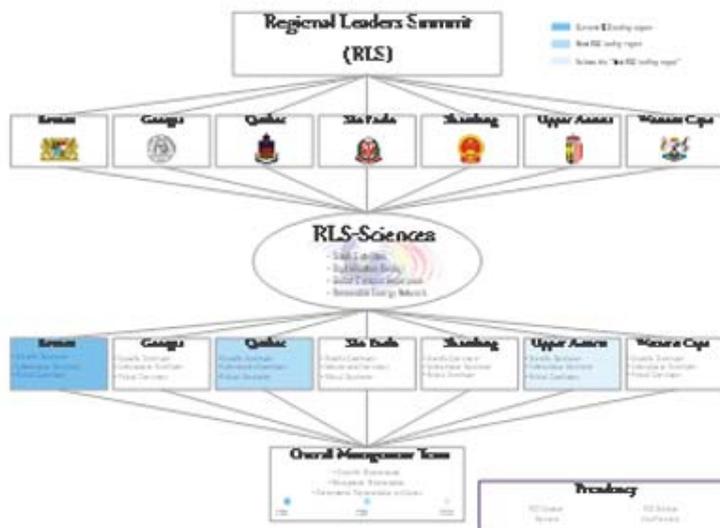


Figure 1: RLS-Sciences Governance.

Example Three: Renewable Energy Network

Due to their geographical composition spanning five continents, and in accordance with their research profiles, the RLS regions represent strong potential in this field. Together, the RLS regions can cover all aspects of energy, from production to usage, monitoring to efficiency. The Energy Network focuses on four thematic research areas: biofuels, energy efficiency, energy storage and conversion, and waste-to-energy. These areas are focused on through four mechanisms: regular exchange of scientific information between network members, privileged access to research undertaken by partners, identification of bi-and multilateral funding opportunities in and outside of the network, and joint research activities and participation in international research programs. A dedicated

student exchange module is in preparation to support international, multilateral mobility. The Renewable Energy Network has a virtual working platform (<http://rls-energynetwork.org>)

3 Results

Campus Aerospace	Small Satellites	Energy Network
Yearly Multilateral Summer School in Aerospace with industry involvement	Research training for participating students and young researchers	Research training for participating students and young researchers
Comprehensive joint MOOC in preparation	Student and young researcher mobility within the 7 participating regions	Student and young researcher mobility within the 7 participating regions
Internships in the private sector	Professional training in the field of space	Research internships

Table 1: First results of RLS- Sciences in education.

Acknowledgements

The authors deeply acknowledge the work of Fiona Rumohr, WKS, Bayerische Forschungsallianz, Munich.

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[2] <http://www.rls-sciences.org/>

BIOGRAPHY OF SPEAKER

Sebastian Goers works as a Researcher since April 2008 and as a Senior Researcher since December 2013 at the department of energy economics of the Energieinstitut at the Johannes Kepler University Linz. After his studies in Bonn, Germany, and Córdoba (Universidad Católica de Córdoba), Argentina, he graduated in economics with a focus on international macroeconomics and environmental economics at the Rheinische Friedrich-Wilhelm University Bonn. His dissertation at the Johannes Kepler University Linz, entitled with „Assessing the European Emissions Trading Scheme’s effectiveness and efficiency via an analysis of endowment and CO2 allowance price behavior“, dealt with selected aspects on the effectiveness and efficiency of the European Emissions Trading Scheme. His research focuses mainly on the macro econometric analysis of energy issues at regional and national level and in the evaluation of European energy and climate policies. In addition, Sebastian Goers acts since mid-2013 as the scientific coordinator of Upper Austria within the RLS Energy Network of the partner regions of Bavaria, Georgia, Western Cape, Upper Austria, Québec, São Paulo and Shandong.

Entrepreneurship 2020

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ABSTRACT

1 Introduction

Innovative ways to teach entrepreneurship and to create entrepreneurs around the world is more important than ever. College students interested in entrepreneurship need to understand the theory, test their idea, establish a strategy, and implement their planned business. Educating entrepreneurs today must include these four steps. They must understand why actions are taken and how those actions work. This approach to educating entrepreneurs enables colleges and universities to become more of an economic engine. It also enables each individual to live their dream.

2 Methods

Entrepreneurs and employees of entrepreneurs were interviewed for this study. The question that was answered by these individuals was, "What should future entrepreneurs be taught in the universities of today?"

The following steps were taken:

- a. The open-ended question above was drafted.
- b. The question was analyzed, then put into a survey instrument.
- c. The question was pretested, then, confirmed.
- d. Participants were interviewed by the researcher.

3 Results

Entrepreneurs must be taught that entrepreneurship is a lifestyle. Work time and play time are often interrelated. Although, there has to be balance in life; which includes recreation, exercise, and family. The lines between these activities can become blurred occasionally. For example, the exercise routine may sometimes include a potential customer or an employee that needs support. Recreation may be combined with a networking reception with a private dinner with your significant other. The life of an entrepreneur does not always have a specific separation of activities. Entrepreneurs today have to be socially and interpersonally versatile.

Entrepreneurship is not about the entrepreneur personally. The question is: "Can the person's organization provide a service or product that is valuable to the community and beyond." The question has to do with serving our fellow human beings. The better entrepreneurs begin with humility and remain humble through the life of their organization. They tend to make mistakes, but they are not defined by their mistakes. The better entrepreneurs learn to move through their mistakes, one success at a time.

Entrepreneurs, today, must understand that entrepreneurship is a marathon rather than a sprint. In many cases success takes longer than what was originally planned. Entre-

preneurship can be difficult, stressful, exhausting, liberating, exhilarating and rewarding all in the same week.

There are many new pathways to entrepreneurship. Innovation, new ideas and understanding the failure of others are just a few approaches. An important first step is for the entrepreneur to be clear about his or her vision. Why are you doing what you are doing? Build change into your operating procedures. Analyze the competition. Know how the money works in today's environment. Finally, discuss the common mistakes that many entrepreneurs make and how to avoid these mistakes. These basic components, among others, are interwoven throughout the new pathways to entrepreneurship.

Acknowledgements

Agile Precis LLC. Sean Hamilton, President & CEO.

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BIOGRAPHY OF SPEAKER

Keith T. Miller, Ph.D: Past President, Virginia State University - President Emeritus, Lock Haven University; Consultant, AASCU-Penson Associates - Professor, Educational Leadership

Specialties: Branding the institution, succession planning, community and government relations, enterprise resource planning (ERP), emergency response management, internationalization, change management and entrepreneurship/intrapreneurship.

Dr. Keith T. Miller brings more than 25 years of experience working with public and private universities, as well as a land-grant university. In addition to having two university presidencies he has worked in industry with a Fortune 500 company. He was also Provost at the University of Wisconsin, Oshkosh and Dean at the Niagara University College of Business Administration. He was Master of Business Administration Director at Fairleigh Dickinson University and Association Dean at Quinnipiac University.

Known for innovation in higher education, Dr. Miller has been a leader in developing public-private partnerships, including the Commonwealth Center for Advanced Manufacturing (CCAM), the Niagara Institute for International Accounting and the Commonwealth Center for Advanced Logistics. Lock Haven University was among the first to require laptop computers, while Virginia State was among the first to use digital text books on a large scale. A Small Business Development Unit helped entrepreneurs secure five to ten million dollars a year in start-up money. An international experience was offered to all new faculty. A large concurrent enrollment program was implemented and sustained as well.

Dr. Miller's teams have received nine Emmy Awards from the American Academy of the Arts and under their leadership research has grown, professional development activity has been a priority, and fundraising has thrived. Virginia State received a 105 million dollar in kind software contribution. He has been involved in more than 300 million dollars in capital projects. Grants and contracts have grown as much as 75 percent in four

years and they were a partner in receiving a 400 million dollar grant from the U. S. Army. Additionally, universities for which he has been involved have had academic partnerships on almost every continent.

Sampling of Service Highlights:

Chair, Virginia Council of University Presidents	Entrepreneur of the Year
United Nations Committee on Peace and Conflict	Governor’s Innovation Award
International Association of University Presidents.....	Community Impact Award
Faculty, New Presidents Academy	Crisis Communication Award
Education: Ph.D., M.P.A., B.S. University of Arizona	

PANEL SESSION IV

Industry & Education

David Atkinson
Md. Sabur Khan

Crisis, Innovation, and New University Models

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ABSTRACT

The future of the modern university is a consuming concern for university administrators and faculty alike, confronted as they are by an increasing skepticism about the role the university plays in shaping the future. Implicit in much of this discussion is the view that undergraduate education is in crisis and that the modern university is failing in one of its most important responsibilities.

Thirty years ago, Alan Bloom, in *The Closing of the American Mind* (1987), gloomily wrote that the modern university possesses “no vision . . . of what an educated human being is.” This was followed fifteen years later by Bill Reading’s aptly titled book, *The University in Ruins* (1996), in which he talks of the “twilight of the University’s critical and social function.” Finding fault with universities has been a popular topic for a long time.

Today, however, there is a new shrillness about this criticism which is both sustained and widespread. The books keep on coming with titles suggesting we have reached a tipping point in how we see universities: Arum and Roksa’s *Academically Adrift* (2011) Cote and Allahar’s *Lowering Higher Education* (2011), Carey’s *The End of College*, and Reynolds’ *The Education Apocalypse* (2014). We hear repeated claims that universities have failed, and that they are not doing a good job—that students graduate little better than when they arrived in university, and that we are educating them in disciplines in which there are no jobs and little future. We have reached a point, according to Ken Coates and Bill Morrison, that “the global university system needs a reset.”

Underpinning this is a long list of concerns. We continue to struggle with the distinction between liberal education and more applied professional and vocationally-driven education. We view distance delivery as a challenge to conventional face-to-face teaching. We set traditional classroom study off against practical real world experience. We agonize over declining standards, that the degree stands for very little and that the degree itself is not necessarily the credential for the future. Teaching is viewed in opposition to research, and we are criticized for not caring about students. We ring our hands about grade inflation and student disengagement. We worry that in a world of social media university education has become disconnected from the experience of our students.

Partially in response to these issues, a “new” kind of university has developed in the western Canadian provinces of Alberta and British Columbia. These new institutions aspire to take the best of traditional community colleges and incorporate them into the context of a different kind of undergraduate university that allows for new forms of credentialing, new and creative academic pathways, and an academic flexibility responsive to student interest and need. In this regard, they represent a striking departure from established norms and open the doors for new academic possibilities. At the same time, these institutions, while enjoying singular successful in attracting students, have con-

fronted a series of challenges in not conforming to established models of a university. These challenges include status and acceptance in the context of entrenched attitudes that traditionally defines a university.

This presentation aims to do two things. Using the Canadian experience, it dwells on new models for universities focusing on undergraduate education, and whether they do, in fact, provide an improved learning experience for students. It also dwells on the challenges experienced by these institutions in the face of attitudes that reinforce what is and is not legitimate for a university. To this end, it discusses whether new norms for universities are, in fact, even possible given the overwhelming self-interest and intransigence of established universities.

BIOGRAPHY OF SPEAKER

David Atkinson is the President of Grant MacEwan University. With a career marked by a commitment to student engagement, Dr. Atkinson has served as the president of four Canadian universities, including his current position.

Dr. Atkinson obtained his MA and PhD in English from the University of Calgary. He was a faculty member for 15 years at the University of Lethbridge, where he also held a series of administrative appointments, until his appointment as Dean of Arts and Science at the University of Saskatchewan. Subsequently, he served as President of Brock University (St. Catharines, Ont.), Carleton University (Ottawa, Ont.) and Kwantlen Polytechnic University (Surrey, B.C.) before going to MacEwan University

An accomplished academic and researcher, Dr. Atkinson has published four books and over 90 essays and reviews. He was Visiting Professor at Hokkaigakuen University in Sapporo, Japan, and has served as reviewer and referee for various journal and granting councils. He currently holds an academic appointment as Professor of English at MacEwan University. A specialist in sixteenth and seventeenth century English literature with interests in religious hermeneutics and religion and literature, Dr. Atkinson has in recent times turned his attention to an examination of the challenges confronted by the contemporary university.

Dr. Atkinson is a Paul Harris Fellow of Rotary International and a recipient of the Queen's Golden Jubilee Medal and the Queen's Diamond Jubilee Medal. He has served on the boards of numerous national and international organizations, most recently the Association of Commonwealth Universities, the Consortium for North American Higher Education, and the Coalition of Urban and Metropolitan Universities. Dr. Atkinson very recently received an honorary doctorate from Ternopil State Medical University in Ukraine.

Industry-University Collaboration: A Way for Innovation and Employment

Md. Sabur Khan

Daffodil International University, Education, 102/1, Shukrabad, Mirpur Road, Dhanmondi, 1207 Dhaka, PEOPLE'S REPUBLIC OF BANGLADESH

ABSTRACT

Industry and Universities around the world have been collaborating for innovation for long time. Linking strategic partnerships among them is essential instead of traditional funding of research projects as it is the age of knowledge based economy. This paper strives to address and analyze the growing gaps between the skills expectations of the employment market and what educational institutes are providing. The demand of employment market for skilled and quality graduates has been enhancing the significance of more collaboration between educational institutes and industries throughout the world. This also puts pressure on curriculum development considering the expectations of the industry and real world. The paper also attempts to evaluate the role of tertiary educational institutes in ensuring the development of skills and quality of outgoing graduates. Development of skills of students largely depends on the ability and quality of teachers. The research study also focuses to find out the readiness of teachers and students to reduce the gap of skills expectations of the industries and examine the practices of other countries to better understand the different types of university industry collaborations and their impacts on national economy and innovations. The educational institutions and industry as well faces a number of barriers to establish such collaboration which is also attended and discussed ways out, focusing public policy.

Keywords: Skills expectation of industry, knowledge economy, employment market, curriculum development, university-industry collaboration, national economy and innovation, public policy

JEL Classification: I23, I25, O3

BIOGRAPHY OF SPEAKER

Mr. Md. **Sabur Khan**, Chairman of Daffodil International University (DIU) and, Daffodil Education Network (DEN) has involved himself with lot of challenges while his attachment as the president of Dhaka Chamber of Commerce and Industry (DCCI), President of the Bangladesh Computer Samity (BCS), Member of Prime Minister ICT Task Force, etc. He has great contributions to Establish ICT Ministry, IT Incubator, BCS Computer City (IDB), etc. Bangladesh government has awarded Mr. Md Sabur Khan, with the status of, Commercially Important Person' (CIP) for his role.

Mr. Md. Sabur Khan is the Chairman, Global Trade Committee and also Director of World IT & Services Alliances (WITSA) -World's highest IT organization.

He has been a Visiting Professor of some foreign universities for his expertise in Entrepreneurship, Business & IT. During the year 2013 Mr. Khan initiated a challenging project to create 2000 new entrepreneurs. A serial entrepreneur, Mr. Khan has written &

published several books: "Handbook of Entrepreneurship Development"; "Uddokta Unnoyon Nirdeshika" (Entrepreneurship Development Guideline); "Art of Effective Living" and "A Journey towards Entrepreneurship". With a view to making a self-employed and self-dependable generation, he aims to creating more job opportunities; his innovative initiatives like: business incubator, start up, venture capital, department of Entrepreneurship in the university level, are notable to promote entrepreneurship.

For his contribution, Mr. Khan has achieved many awards nationally, and internationally.

He established social welfare Institution naming 'Daffodil Foundation' for the well being of under privileged people.

For more information please visit: <http://saburkhan.info/>

PANEL SESSION V

New Trends in Education

Chair

Nicolette DeVille Christensen

Panelists

Tim Brailsford

Shawn Chen

Fernando Leon Garcia

Bonita Jacobs

Les Wong

President Panel Session: Four Nations, Five Innovative Institutional Perspectives

SESSION CHAIR

Nicolette DeVille Christensen

President, Arcadia University, Glenside, Pennsylvania, USA

Four University Presidents representing three different nations, will discuss how Innovation in Education has kept their respective institutions invigorated and moving forward in an increasingly complex climate of increased federal legislation, student and faculty recruitment competition, student persistence and retention concerns, budget reductions, and sweeping changes with the internal and external constituents which every University President must maneuver on a daily and long-term basis.

PANELISTS

Bonita Jacobs

President, University of North Georgia, Dahlonega, GEORGIA

The University of North Georgia, a member of the University System of Georgia, is a leading public university formed through the consolidation of North Georgia College & State University, which was chartered in 1873, and Gainesville State College, which was chartered in 1964.

The consolidation plan was announced in January 2012 and was ratified by the system's Board of Regents in January 2013. This fast-paced change, ranging from governance and accreditation issues to mission and branding development, required a transparent and participative process involving students, faculty, staff, alumni, and community stakeholders.

Each separate institution, including one of only six senior military colleges in the nation, had a strong history of academic excellence and student success; however, each operated under different missions and serving different student populations. Now, through a united effort, UNG is focused on developing students into leaders for a diverse and global society and offers a range of degree opportunities and pathways to get them there, including associate, bachelor's and graduate degrees, as well as certificate programs. Since consolidation, UNG has expanded bachelor's degree programs on one of its campuses from eight to more than 20, opened a fifth campus to serve a rural community in its region, and expanded graduate degree programs.

Fernando Leon Garcia

President, CETYS University, Mexicali, MEXICO

CETYS University is one of only a handful but increasing number of institutions in Latin America that has sought to improve academic quality by engaging in and being granted US regional accreditation. In the process, CETYS also become one of the universities in Mexico with the highest rates of study abroad among its graduating classes. This engagement has also led to innovative cross border collaboration, the most recent of which involves exploring participation and membership in US collegiate athletics.

Shawn Chen

Chairman, SIAS International University, Henan Province, P.R. CHINA

Sias International University is the first solely American-owned University in Central China. Affiliated with Zhengzhou University, as well as Fort Hays State University of Kansas, USA, it was developed and designed in response to the most current educational demands. It is the first full-time undergraduate university approved by the Degree Committee of the State Council in China to grant both Chinese and American Bachelor's Degrees. Combining Chinese and Western educational philosophies, Sias aims to nurture talent and develop sophisticated and specialized individuals that can contribute to the modernization and economic development of China. Internationalization and Entrepreneur Education at Sias campus are designed as the key development strategies of the university.

Tim Brailsford

Vice Chancellor, Bond University, Gold Coast, AUSTRALIA

Bond University is Australia's first private university, established in 1989, and still the only fully independent non-profit operating in the Australian sector which is built around a traditional public university system. Despite not receiving any educational grants, Bond has rapidly grown over its first three decades and is consistently rated the nation's best for the student experience, teacher quality and learner engagement. A consistent strategy of the university has been its international focus. Recently Bond has been at the forefront of introducing a range of co-curricula programs designed to better prepare students for life beyond graduation. Brailsford will speak on the lessons learned and how his institution must continually differentiate and innovate.

Les Wong

President, San Francisco State University, USA

Dr. Wong is committed to providing SF State students with an exceptional educational experience forged in the intellectual energy of one of the world's most innovative cities and fostered by the diversity, creativity and dedication of SF State's faculty, staff, students and alumni. SF State graduates approximately 8,000 students per year and boasts a Gator alumni family that is more than 200,000 strong. SF State's distinguished alums can be found in virtually every walk of life. Their accomplishments include 10 Pulitzer prizes, 15 Oscars, the invention of the microprocessor, and (jointly with SF State faculty) the discovery of the first exo-planets beyond the solar system.

Dr. Wong is devoted to moving San Francisco State forward to achieve its full potential. He co-chaired the recently completed strategic planning process that produced a value driven roadmap to advance the university's goals. He also launched SF State's first comprehensive fundraising campaign to provide the resources necessary to support the needs of SF State students in the 21st century as well as the innovative research and creative projects of SF State students and faculty. Early campaign success contributed to new scholarship funds, the renovation of the SF State gym and the revitalization of the athletics program.

SESSION VI

Education as a Tool for Development

Eurico Ngunga
Elizabeth J. Stroble

Scientific and Industrial Strategy for the Socio-economic Development of Angola

Eurico Ngunga

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Agostinho Neto University, Luanda, ANGOLA, e-mail: ejngunga@gmail.com

ABSTRACT

1 Introduction

Starting from the idea that a society's whole system is the product of its norms, values, practices, and history (KUADA, 2003), I believe that the process of innovation will depend on these elements for the success of economic development. Such development does not only concern the interdependent links between environment and development, but also includes a concern for issues such as human rights, population, housing, food security and gender that are important parts of sustainable human development (www.unesco.org, accessed in 11/11/2014). These elements underscore a range of knowledge and skills that will serve as a lever for the development of a society, through its scientific and technological actions.

The objective of this study was to analyze and discuss the specific challenges of strengthening the R&D strategy to boost the national economy of Angola. Also, determinants such as culture, history, the struggle for independence, civil war, educational processes and the gaps among peripheral countries and the OECD countries were crucial to answer the questions proposed for this work.

Broadly, it focused first, on problems of Angola such as the use of technologies and industrial strategies for the development of a national economy. Secondly, it relies on belief that higher education plays a key role in promoting innovation capabilities. It is a way to foster economic growth, and diminish the plethora of problems, and can help to eradicate extreme poverty in Angola.

2 Methods

This article relied on several readings related to technological and economic development, higher education and National Innovation Systems (NIS). The main objective was to analyze the challenges of R&D and building up a strong industry in order to have sustainable development in Angola, by taking into account the changes in the patterns of economic development.

The discussion comes from in-depth interviews undertaken with seven senior stakeholders from the Ministry of Science and Technology and Rectors. In this vein, an attempt was made to perceive and analyze the strategies around STI policies for socio-economic development. I also took into account the new socio-political scenario and Angola's aspirations for economic development in the period following the civil war that lasted 27 years.

Moreover, I found that it is of paramount importance to make sure that the nature of this work dictates an interdisciplinary approach because a rich body of literature was used

to explain Science and Technology, R&D and National Innovation System, including approaches found in economic, social sciences and humanities.

3 Results

Angola is a country whose the core economy relies on oil production. Taking into account the current global economic recession due to the oil crisis, this country has been forced to change and foster new and intense strategies. Nevertheless, adapting to this global context requires concentrated and systematic actions that rely on knowledge.

Thereby, the Angolan government is striving to rebuild infrastructure in order to strengthen R&D and its industry. Overall, there are some points that need much attention from the policy-makers such as:

- a) There are difficulties in enhancing a symbiosis between STI and industry;
- b) It has been hard to boost IR&D¹ institutions because of the lack of well trained technicians;
- c) There is a huge lack in funding STI activities to boost the national industry;
- d) There is a large number of imported cutting-edge technologies, but there are problems in the maintenance.

Thus, one of the challenges is to bring politicians and governments together in order to advise them on the need for patience, as well as ongoing, long term and systematic investment in knowledge. That is one of the challenges of Angola, considering that it is a blessed country with a lot of natural resources and a great environment that could boost the economy.

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¹ IR&D is R&D undertaken by industry. As such, expenditures on IR&D should be regarded as synonymous with business enterprise expenditure on R&D (BERD) as collected and reported by the OECD.

BIOGRAPHY OF SPEAKER

Doctor **Eurico Josué Ngunga**, is an Angolan researcher living in Luanda, the Capital of Angola. He holds an Assistant Professor position at Social Sciences Faculty of Agostinho Neto University, the main University in Angola. For 20 years he lived in Brazil, where he turned PHD and worked at the Federal University of Minas Gerais. As Visiting Fellow with the Institute of African Studies at Carleton University-Canada from 2014-16, Prof. Ngunga pursued his doctoral thesis research on “Science, Technology and Innovation. His main work is to address the specific challenges of strengthening the National Innovation System in Angola, in order to put all actors at the same path of development.

The idea is to work in conjunction with the Angolan government, private and public R&D institutions to enhance alliances between all social actors of the productive system, families and traditional knowledge to undertake researches related to building a strong society.

As National Director at the Ministry of Science, Technology and Innovation of Angola, Doctor Ngunga was part of a high level group who drafted the National Policy of STI of Angola. He has also been working across Sub-Saharan Africa, aiming at understanding the problems of socio-economic development from the challenges of knowledge production, taking into account the program of systematization of Science, Technology and Innovation of each country, in order to reduce existing asymmetries between the peripheral countries and the other OECD countries.

Impact of an Innovative Leadership Development Program on Global Capacity

Elizabeth (Beth) J. Stroble

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ABSTRACT

1 Introduction

Webster University advances its mission to ensure learning experiences that transform students for individual excellence and global citizenship through its action-oriented programs of study, innovative policies and initiatives, and the global presence of our own dedicated residential campuses and distinguished partners on four continents. The effectiveness of a comprehensive and systemic approach to internationalization depends upon investments in our most important resource: the commitment, talent, and capacity of faculty and staff at each of Webster's campuses as well as the quality of their interactions to educate students as global citizens.

The Global Leadership Academy was created by President Stroble and Provost Schuster as an innovative leadership development program designed to enhance Webster's institutional capacity for global work by virtue of the program's impact on faculty and staff leadership. Developing and enhancing leadership skills of faculty and staff, providing a comprehensive and grounded understanding of Webster's complexity, and creating ambassadors to the communities Webster serves are the three goals of the year-long Global Leadership Academy. The academy's successful impact should advance Webster's strategic plan, "Global Impact for the Next Century." This study examines the effectiveness of the Global Leadership Academy in its first three years of implementation for 2013, 2014, and 2015 cohort groups.

2 Methods

The effectiveness of the Global Leadership Academy was assessed through analysis of:

- Description of program components
- Demographics of participants
- Changes in demographics of participants: position and geography
- Participants' pre and post survey responses linked to academy goals and objectives
- Participants' reflections on their leadership accomplishments one year after their participation in the Global Leadership Academy
- Identification of Global Leadership Academy participants' roles in key initiatives of the institutional strategic plan, Global Impact for the Next Century

3 Results

Analysis of the demographic data, survey results, participant reflections, and strategic plan metrics indicate these results in terms of the impact of the Global Leadership Academy on institutional global capacity by virtue of impact on the faculty and staff participants:

- Participation in the Global Leadership Academy has created meaningful interactions among faculty and staff from 15 Webster University campuses, including 4 international campuses and 9 metropolitan campuses outside the home campus in St. Louis, Missouri.
- Participation in the Global Leadership Academy has increased faculty and staff global mobility by providing the first international travel experience for approximately 18% of participants.
- Participation in the Global Leadership Academy has increased participants' grounded understanding of Webster University's complexity, developed and enhanced participants' leadership skills, and created ambassadors to the communities Webster serves. Notable gains appear in participants' 1) establishing of relationships across the Webster network and leveraging them to resolve institutional challenge and 2) recommending innovative and creative solutions to institutional challenges.
- Leadership accomplishments occur within the project-based framework of the Academy as well as in participants' current roles and new roles as a result of promotions within Webster or at other institutions.
- Key initiatives in the institution's strategic plan have been advanced by participants in areas such as leading major curriculum revisions, developing talent and improved culture within units, building student community, and advancing major facilities and information technology projects. Webster's global impact has been extended by academy participants through new partnerships, faculty scholarship, and campus locations or study abroad initiatives that facilitate greater mobility.

Conclusion

The Global Leadership Academy has immediate and extended impact on Webster University's global capacity. Individual participants identify areas of leadership growth as a result of interaction with colleagues from across the university's network. During the course of the year-long academy, their work in teams focuses on innovative solutions to the university's challenges. Through these activities as well as in their individual and communal roles following academy participation, participants themselves report the effectiveness of the Global Leadership Academy. An inventory of strategic plan initiatives reveals the key roles played by academy participants in the four themes of the plan, Global Impact for the Next Century.

Acknowledgements

I thank Global Leadership Academy Director Laura Rein and Co-Directors Holly Hubenschmidt and Erik Palmore for use of data they have collected from academy participants.

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SESSION VII

Challenges for Education in the 21st Century

Yazan Alghazo
José Agustín Ruiz-Escalante

Inclusion of Global competence in Higher Education: Perspectives of Faculty in Saudi Arabia

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ABSTRACT

1 Introduction

In recent years, there has been ongoing debate about the definition of terms like Globalization, Internationalization, and Global Competence [1]. This debate and lack of a consensus upon a definition of what it means to become a globally competent professional creates difficulties for higher education institutions in deciding what skills, knowledge, attitudes and experiences are necessary for undergraduate students in order for them to become globally competent [2]. Since the term global competence was first introduced in the year 1988 by the Council on International Exchange, many researchers have provided different definitions of the term as well as different interpretations of the skills it incorporates [1]. Global competence was first defined as a person's ability to demonstrate empathy towards others, understand current events, maintain a positive attitude, has a certain "unspecified" level of foreign language proficiency and "ability to understand something foreign" [2-3]. Other researchers provided a broad definition of Global, international, and Intercultural Competence (GII) that included knowledge about and appreciation of other international cultures, appreciation of diversity, understanding complexities within the current global society, and ability to work comfortably with people from other cultures [4].

According to [1], incorporating global competence in higher education can increase institutional and "individual effectiveness in learning and career success". They further emphasized the importance of international communication skills and knowledge in providing graduates with more guaranteed chances of career success.

Interestingly, a research study that examined the perceived benefit of students' participation in Global, International, and Intercultural (GII) curricular and co-curricular activities on their home campus concluded that students' participation in such activities may "gain greater perceived benefits than study abroad for students' development of GII competence [4].

The purpose of this study is investigate faculty members' dispositions towards the inclusion of global competence as part of competency-based program and within university curricula. Moreover, the study aims to investigate faculty members' understanding of globalization and their opinions on what skills, knowledge, attitudes, and experiences are necessary for students to become globally competent.

2 Methods

This study utilizes a mixed-methods survey research design that incorporates both quantitative and qualitative data collection methods. A researcher-developed survey

was distributed to all faculty members of a private university in the eastern province of Saudi Arabia. The survey included questions that aimed to measure faculties' opinions of what skills, knowledge, and attitudes constitute a globally competent individual. Moreover, the survey measures faculties' own dispositions towards the inclusion of global competency as one of the core competencies within the university's competency-based core program.

Simultaneously, faculty were also asked if they are willing to participate in semi-structured interviews with purpose of gaining an in-depth understanding of faculties' definitions of global competence, as well as the reasons behind their dispositions towards the inclusion of this competency as a core competency in the university's curricula.

3 Results

Thematic analysis was used to analyze faculty members' responses to the interview questions and, as of yet, several dimensions were identified as part of the faculties' definition of global competence and what it means to be a globally competent university graduate or professional. Other researchers have also identified very similar dimensions as part of the set of skills that define global competency, which include:

1. Appreciation of other cultures [5].
2. Ability to communicate across cultures.
3. High-level communication skills in a second language [6].
4. Professionalism skills within diverse work environments [5].

Designing curricula that incorporates these dimensions was also discussed with faculty and different methods of incorporation were presented. Moreover, the majority of faculty members interviewed expressed their belief of the importance of including global competence as part of the university's core competencies because of the nature of the globalized society we live in and the need for all citizens to develop a sense of "global citizenship".

Finally, quantitative analysis results of the survey will provide a more clear understanding of the overall faculty perception and disposition towards the inclusion of globalization into the competency-based core curriculum of the university as well as all other degree program curricula across different colleges within the university.

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BIOGRAPHY OF SPEAKER

Dr. **Yazan Alghazo** is an Assistant Professor of Education at Prince Mohammad Bin Fahd University in the Kingdom of Saudi Arabia. He completed his Ph.D in Education in 2014 from Southern Illinois University at Carbondale, USA with a specialization in Curriculum and Instruction. Since then, he has been teaching in the CORE program at PMU, mainly teaching Learning Outcome Assessment courses, as well as research and communication courses. In addition to teaching, he is also the coordinator of the Humanities and Social Sciences department at PMU. Dr. Alghazo is an active researcher with more than 15 publications in the past three years; his current research focus is on Assessment and Quality in higher education; his other research interests include Mathematics Education, Elementary Education, Early Childhood Education, International Education, Gifted Education, Human Resource Development, CORE (General Education), Humanities & Social Sciences, Experimental Research, Qualitative Research in Education Dr. Alghazo leads an interdisciplinary research that includes fourteen faculty members with the goal of conducting research that improves achievement of learning outcomes at the program and the institution levels.

Preparing Educators to Meet the Challenge of Educating Immigrants and Refugees

José Agustín Ruiz-Escalante, Muhammad Siraj ul huda Khan

Prince Mohammad Bin Fahd University, Alkhobar, KINGDOM OF SAUDI ARABIA

ABSTRACT

1 Introduction

In the last few years, Europe is facing large number of refugees that are escaping war zones and poverty. School age children are among these refugees. European countries may be facing a challenge on how to educate these new comers, as well as how to incorporate them into the society and the work force.

The number of students from different languages keep increasing in different countries is Europe. Germany is recruiting 8,000 teachers to educate the over 196,000 immigrant and refugee children [1], while Finland is facing the same challenge due to the number of refugee application. Also, it was reported that Finland has received 2,000 unaccompanied children in 2016 [2].

Some of the issues that European countries need addressing is the type of education offer to newly arrivals who do not speak the language of the country and how to prepare the teachers who will be educating them. This paper will discuss models that best serve the educational needs of speakers of other languages, including refugees and immigrant children. The British Council [3] addresses the issue of educating the Syrian refugees in a safe environment, and this type of education will facilitate the integration into the host communities.

2 Methods

This abstract proposal is not a research study. It is a descriptive presentation of models to educate speakers of other languages. The Unites States has struggle for decades on how to educate students who come from homes that do not speak English. Many models and methods have been used as an attempt to meet the needs of these students. Most of these methods had the goals to teach English as soon as possible and to assimilate the students to the mainstream culture.

The assimilation approach to education in the United States resulted in an academic gap between English speakers and non-English speakers, since these models and methods focused on the teaching of English neglecting the academic content. The students learned the language but did not receive a solid academic preparation.

For the last two decades or so, the United States has been offering a dual language model to educate both native speakers as well as second language learners. Thomas and Collier [4] conducted a longitudinal study on the effects of bilingual education in second language learner. Their study included the six different models of bilingual educa-

tion. Their finding showed that the only program that closes the academic gap for non-native English speakers is dual language, either two- or one-way.

Dual language programs are designed to educate students using two languages as medium of instruction. These programs can be two-way or one way. In a two way-program, students form two different linguistic groups learn in two languages, while in a one-way program, students from one linguistic group learn in two languages (Gómez & Ruiz-Escalante, [5]; Estrada, VL, Gómez, L, & Ruiz-Escalante, J.A. [6]).

We will discuss the importance of dual language to best meet the educational needs of second language learners. The paper will also discuss three different dual language models: 90-10, 50-50, and Gómez & Gómez. The last issue that will be discussed is the role that universities have in preparing educators to meet the needs of immigrants and refugee students (Ruiz-Escalante, J. A., Canales, J., Escamilla, K., Zelasko, N., Colley, D., & García, Herman [7]).

The 90-10 model uses the second language for instructional purposes ninety percent of the time, while teaches in the second language ten percent. The percentage of teaching in the second increases ten percent every year until it reaches a fifty-fifty ratio by fourth grade. The 50-50 model teaches all subjects in both languages. The model may teach one day in one language, while the second language is used the following day, or they might alternate weekly. The last model is the Gómez & Gómez. This model is divided fifty fifty based on academics. Fifty percent of the courses are taught in one language, while the other fifty percent are taught in the other language.

Education is the key for integration into a new society; however, this education does not have to be assimilationist, but it rather should be with the aid to acculturate the new comer into the dominant society. Their future and the future of many nations depend on how well we meet their educational needs.

3 Results

The presenters will address how is the best way to educate students who come from homes where the native language of the country is not spoken. Three models will be discussed, as well as how universities can assist public schools to prepare teachers to meet the challenge of educating and integrating these students into society to be productive and well educated citizens.

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