THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

19th Annual International Conference on Information Technology & Computer Science
15-18 May 2023 Athens, Greece

Edited by
Adrian Ionescu & Olga Gkounta

2023

Abstracts
19th Annual International Conference on Information Technology & Computer Science

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(In Alphabetical Order by Author's Family Name)

Preface

This book includes the abstracts of all the papers presented at the *19th Annual International Conference on Information Technology & Computer Science* (15-18 May 2023), organized by the Athens Institute for Education and Research (ATINER).

A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications only after a blind peer review process.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which they can discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world can meet to exchange ideas on their research and consider the future developments of their fields of study.

To facilitate the communication, a new references section includes all the abstract books published as part of this conference (Table 1). I invite the readers to access these abstract books –these are available for free– and compare how the themes of the conference have evolved over the years. According to ATINER's mission, the presenters in these conferences are coming from many different countries, presenting various topics.

Table 1. *Publication of Books of Abtracts of Proceedings, 2011-2023*

Year	Papers	Countries	References
2023	58	19	Ionescu and Gkounta (2023)
2022	68	23	Petratos and Gkounta (2022)
2021	36	19	Papanikos (2021)
2020	33	17	Papanikos (2020)
2019	34	13	Papanikos (2019)
2018	24	10	Papanikos (2018)
2017	47	21	Papanikos (2017)
2016	34	12	Papanikos (2016)
2015	33	18	Papanikos (2015)
2014	30	21	Papanikos (2014)
2013	22	16	Papanikos (2013)
2012	26	15	Papanikos (2012)
2011	25	14	Papanikos (2011)

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world can regularly meet to discuss the developments of their disciplines and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published over 200 books. Academically, the institute is organized into 6 divisions and 37 units. Each unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together.

Gregory T. Papanikos
President

Editors' Note

These abstracts provide a vital means to the dissemination of scholarly inquiry in the field of Information Technology & Computer Science. The breadth and depth of research approaches and topics represented in this book underscores the diversity of the conference.

ATINER's mission is to bring together academics from all corners of the world in order to engage with each other, brainstorm, exchange ideas, be inspired by one another, and once they are back in their institutions and countries to implement what they have acquired. The *19th Annual International Conference on Information Technology & Computer Science*, accomplished this goal by bringing together academics and scholars from 19 different countries (Albania, Bulgaria, Canada, Germany, Hong Kong, Iraq, Israel, Italy, Mexico, Philippines, Russia, South Africa, Sweden, Switzerland, The Netherlands, Türkiye, UAE, UK, USA), which brought in the conference the perspectives of many different country approaches and realities in the field.

Publishing this book can help that spirit of engaged scholarship continue into the future. With our joint efforts, the next editions of this conference will be even better. We hope that this abstract book as a whole will be both of interest and of value to the reading audience.

Adrian Ionescu & Olga Gkounta
Editors

19th Annual International Conference on Information Technology & Computer Science, 15-18 May 2023, Athens, Greece

Organizing & Scientific Committee

All ATINER's conferences are organized by the <u>Academic Council</u>. This conference has been organized with the assistance of the following academic members of ATINER, who contributed by reviewing the submitted abstracts and papers.

1. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, U.K.
2. Adrian Ionescu, Head, Computer Unit, ATINER & Professor, Wagner College, USA.

FINAL CONFERENCE PROGRAM

19th Annual International Conference on Information Technology & Computer Science, 15-18 May 2023, Athens, Greece

PROGRAM

Monday 15 May 2023

08.30-09.15
Registration

09:15-10:00
Opening and Welcoming Remarks:
o **Gregory T. Papanikos**, President, ATINER.

10:00-11:30 Session 1
Moderator: Mervyn Wighting, Professor & Program Director, Regent University, USA.

1. **Till Hänisch**, Professor, DHBW Heidenheim, Germany.
   Title: *A Case Study on Using Microservice Patterns in an Embedded System.*
2. **Nicholas Dimmitt**, Professor, Khalifa University of Science and Technology, UAE.
   Title: *A University Course on Innovative Approaches to Problem-Solving & Idea Generation with Design Thinking.*
3. **Desmond Wesley Govender**, Professor, University of Kwa Zulu-Natal, South Africa.
   Irene Govender, Professor, University of Kwa Zulu-Natal, South Africa.
   Reginald Govender, Senior Lecturer, University of KwaZulu-Natal, South Africa.
   Title: *Students' Experiences of Learning to Code Using Robotics.*
4. **Thomas Fehlmann**, Senior Researcher, Euro Project Office, Switzerland.
   Eberhard Kranich, Senior Researcher, Euro Project Office, Germany.
   Title: *A General Model for Representing Knowledge..*

Discussion

11:30-13:00 Session 2

Session 2a **Moderator: George Kamberelis**, Professor, Kent State University, USA.	**Session 2b** **Moderator: Thomas Fehlmann**, Senior Researcher, Euro Project Office, Switzerland.
1. **Denise Patmon**, Professor, University of Massachusetts Boston, USA. **Oris Bryant**, Educator, Noble & Greenough School, USA. **Surbhi Puri**, PhD Candidate, University of Massachusetts Boston, USA. *Title*: *Preparing Teachers to Teach Writing to Diverse Students in the U.S. and India.* 2. **Deon Vos**, Associate Professor, North-West University, South Africa. *Title*: *Multiculturalism, Interculturalism, Secularisation and School Autonomy: Responses to Hyper-diversity in Education in*	1. **Ginny Zhan**, Professor, Kennesaw State University, USA. *Title*: *Comparing Student Performance in Face-to-Face, Hybrid, and Online Modalities in Psychology Courses.* 2. **Deirdre Wilson**, Professor, Vancouver Island University, Canada. *Title*: *Blending Google Docs with the Face-To-Face Modality to Facilitate the Collaborative Writing Process.* 3. **Danielle Herro**, Associate Professor, Clemson University, USA. **Cassie Quigley**, Associate Professor,

the BRICS Countries (China).

3. **Glenn Svedin**, Assistant Professor, Mid Sweden University, Sweden.
Title: High Achievers and Gifted Students in the Swedish Compulsory School System, 1842-2022.
4. **Icarbord Tshabangu**, Associate Professor, Leeds Trinity University, UK.
Title: Examining Citizenship Education through the Lens of Interculturalism: A Review.

Discussion

University of Pittsburgh, USA.
Title: Reimagining Computer Science Curriculum: Co-Designing Computational Thinking Lessons in Primary Classrooms.
4. **Franziska Schuetz**, Senior Researcher, DHBW Heidenheim, Germany.
Till Hänisch, Professor, DHBW Heidenheim.
Title: Transforming CS Curricula into EU-standardized Micro-Credentials.

Discussion

13:00-14:30 Session 3

Session 3a
Moderator: Leslie S. Woodcock, Retired Professor, University of Leeds, UK.

Session 3b
Moderator: Danielle Herro, Associate Professor, Clemson University, USA.

1. **Karen Fries**, Associate Professor, Francis Marion University, USA.
Title: Active Learning Strategies as a Tool for Inclusion.
2. **Dorit Barchana Lorand**, Lecturer, Kibbutzim College of Education, Israel.
Title: Plato's Symposium as an Explanation for Educational Literary Censorship.
3. **Keitha Burnett**, Teacher/DEI Coordinator, Gulliver Prep, USA.
Title: Increasing Effective Decision-Making: Steps to Measuring and Constructing a Resilience Model.
4. **Jean Berlie**, Researcher, Education University of Hong Kong, Hong Kong.
Title: Chinese Universities Students Abroad and Particularly in the USA.

1. **Pamela Walsh**, Associate Professor, Athabasca University, Canada.
Agnieszka (Aga) Palalas, Associate Professor & Program Director, Athabasca University, Canada.
Rebecca Heiser, PhD Student, Athabasca University, Canada.
Anastasia Mavraki, Graduate Student, Open Digital and Distance Education, Athabasca University, Canada and International Hellenic University, Greece.
Chrysoula Lazou, Graduate Student, Open Digital and Distance Education, Athabasca University, Canada and PhD Candidate, International Hellenic University, Greece.
Title: Quality and Transformation through the Lens of Transnational Online Graduate Students and Their Instructors.
2. **Tugba Ozicik**, Assistant Professor, İstanbul Kültür University, Turkiye.
Title: The Information and Communication Technology Use of X and Y Generation Academicians.
3. **Stephen Quigley**, Lecturer, University of Pittsburgh, USA.
Title: (Un)disciplining Environmental Education: Using the Finnish Nature School Model to Explore Knowledges through Multimedia Storytelling.

Discussion

Discussion

14:30-16:00 Discussion + Lunch

16:00-18:00 Session 4

Session 4a **Moderator: Karen Fries**, Associate Professor, Francis Marion University, USA.	Session 4b **Moderator: Pamela Walsh**, Associate Professor, Athabasca University, Canada.
1. **Elize Vos**, Associate Professor, North-West University, South Africa. *Title: Guidelines for Developing Self-Directed Readers and Learners in Natural Science.* 2. **Serwan Baban**, Chief Scientific Advisor, The Residency, Iraq. *Title: A Practical Approach for Developing Strategic Learning and Teaching Plans for Higher Education Institutions.* 3. **Ulrika Gidlund**, Senior Lecturer, Mid Sweden University, Sweden. *Title: How Does Relational Pedagogy Affect Students with Psychiatric/Psychological Disorder in Secondary School?* 4. **Cem Ozicik**, Assistant Professor, İstanbul Kültür University, Turkiye. *Title: Pedagogical Formation Students' Attitudes and Readiness Towards Teaching Profession.* 5. **Haleema Haleema Sadia Mian**, Senior Tutor, University of Manchester, UK. *Title: Understanding Postgraduate Students' Perceptions about their Inclusion in Transitioning to the UK Higher Education in the Post COVID19 Era.*	1. **Mervyn Wighting**, Professor & Program Director, Regent University, USA. *Title: Impact of Positive Behavioral Interventions and Supports on Student-teacher Relationships.* 2. **Vicki McGinley**, Professor, West Chester University, USA. *Title: Animated Case-Based Learning to Support the Teaching of Trauma Sensitive Practices.* 3. **Woon Lam Ng**, Associate Professor, Nanyang Technological University, Singapore. *Title: Adopting Engineering Problem Solving Framework for Applied Art Training.* 4. **Ivy Yeung**, Assistant Specialist, University of Hawaii, USA. **Natalie Nimmer**, Associate Director, University of Hawaii, USA. **Deborah Zuercher,** Professor & Director, University of Hawaii, USA. *Title: Show Don't Tell: A University of Hawaii Self-Study on Using ePortfolio versus Thesis as the Master's Degree Capstone Assessment.*
Discussion	**Discussion**

18:00-20:00 Session 5
A Round-Table Discussion on Teaching and Researching in the Post Pandemic World: Learning from Country Experiences
Moderator: Gregory T. Papanikos, President, ATINER.

1. **Thomas Fehlmann**, Senior Researcher, Euro Project Office, Switzerland.
   Title: In the Eye of Hysteria.
2. **Yuyi Chen**, Associate Professor, Binzhou University, China.
   Title: Influencing Factors of Rural Teachers' Professional Honor in China.
3. **Woon Lam Ng**, Associate Professor, Nanyang Technological University, Singapore.
   Title: The Use of Multiple Resources in Teaching & Learning.
4. **Eti De Vries**, Program Manager, Hanze University of Applied Sciences, the Netherlands.
   Title: Students' Post-pandemic Wellbeing in Higher Education.
5. **Till Haenisch**, Professor, DHBW Heidenheim, Germany.
   Title: Are Microcredentials the Future of Higher Education?
6. **Nayif Adil Awad**, Head, Center for Digital Instruction & Director, Simulation Center, Sakhnin Academic College for Teacher Education, Israel.
   Title: Teaching in the Post-Pandemic Era: Investigating Lecturers' Responses to Online Instruction.

Discussion

20:00-22:00
Athenian Early Evening Symposium (includes in order of appearance: continuous academic discussions, dinner, wine/water, music and dance)

Tuesday 16 May 2023

10:00-11:30 Session 6: "Is Artificial Intelligence Generated Text (AIGPT) a Threat to Academic Integrity or an Opportunity to Enhance Teaching and Learning Practice?	**08:00-11:00** **Old and New-An Educational Urban Walk**
Speakers: o **Ali Abusalem**, Director, Center for Higher Education Futures (CHEF), ATINER & Course Coordinator, Kent Institute Australia & External Member of Academic Board, Elite Education Institute, Australia. o **Lorraine Bennett**, Deputy Director, Center for Higher Education Futures (CHEF), ATINER &Managing Director, Lorraine Bennett Learning and Teaching Consultancy, Australia.	The urban walk ticket is not included as part of your registration fee. It includes transportation costs and the cost to enter the Parthenon and the other monuments on the Acropolis Hill. The urban walk tour includes the broader area of Athens. Among other sites, it includes: Zappion, Syntagma Square, Temple of Olympian Zeus, Ancient Roman Agora and on Acropolis Hill: the Propylaea, the Temple of Athena Nike, the Erechtheion, and the Parthenon. The program of the tour may be adjusted, if there is a need beyond our control. This is a private event organized by ATINER exclusively for the conference participants.

11:30-13:30 Session 7	
Session 7a **Moderator: Keitha Burnett**, Teacher/DEI Coordinator, Gulliver Prep, USA.	**Session 7b** **Moderator: Douglas Moodie**, Assistant Director, Kennesaw State University, USA.
1. **Effie Papoutsis-Kritikos**, Professor & Department Chair, Northeastern Illinois University, USA. **Noreen Powers**, Assistant Professor, Northeastern Illinois University, USA. **Russell Wartalski**, Associate Professor & Department Chair, Northeastern Illinois University, USA. *Title: The Great Resignation's Effect on Higher Education: Moving Forward in a Post-COVID World.* 2. **Jacob Jenkins**, Professor & Chair, California State University Channel Islands, USA. **Thomas Clobes**, Assistant Professor,	1. **Nayif Awad**, Director, Sakhnin Academic College, Israel. *Title: Augmented Reality and Computational Thinking for Enriching Computer-Supported Collaborative Learning.* 2. **Abigail Gonzales**, Research Associate, University of the Philippines, Philippines. **Ma Nympha Joaquin**, Professor, University of the Philippines, Philippines. **Sheryl Lyn Monterola**, Professor, University of the Philippines,

California State University Channel Islands, USA.
Title: OER for Social Justice: Removing Educational Barriers for Historically Underserved College Students.

3. **Martha Elena Vazquez Arias**, Professor, University of Guadalajara, Mexico.
   Edith Rivas Sepulveda, Professor, University of Guadalajara, Mexico.
   Elva Dolores Arias Merino, Researcher, University of Guadalajara, Mexico .
   Neyda Ma Mendoza Ruvalcaba, Researcher, University of Guadalajara, Mexico.
   Title: Motivations and Needs of the Students of the Master's Degree in Gerontology of the University of Guadalajara.

4. **Rajni Shankar-Brown**, Professor and Distinguished Chair of Social Justice Education, and the President of the National Coalition for the Homeless, Stetson University and the National Coalition for Homeless, USA.
   Title: Education and Justice: Navigating Complexities and Creating Social Change.

5. **Eti De Vries**, Program Manager, Hanze University of Applied Sciences, the Netherlands.
   Title: Major Transitions in Higher Education: A Case Study.

Discussion

Philippines.
Title: Popularizing Math: Application of Mathematical Thinking Processes in Citizen Science.

3. **Sohni Siddiqui**, Researcher, Researcher, Technical University of Berlin, Germany.
   Title: Successful and Emerging Cyberbullying Control Programs: A Narrative Review of Seventeen Interventions Applied Worldwide.

4. **Brantina Chirinda**, Lecturer, Cape Peninsula University of Technology, South Africa.
   Title: Mathematics Teaching in a Context of Historical Disadvantage.

Discussion

13:30-15:00 Session 8	
Session 8a **Moderator:Martha Elena Vazquez Arias**, Professor, University of Guadalajara, Mexico.	**Session 8b** **Moderator: Brantina Chirinda**, Lecturer, Cape Peninsula University of Technology, South Africa.

Session 8a:

1. **David Elicerio Conchas**, Professor, University of Guadalajara, Mexico.
   Title: Psychological Wellbeing and Hope-Despair Scores of Undergraduate Students at the Centro Universitario de Ciencias de la Salud after one Year of COVID-19 Confinement.

2. **Grace Fantaroni**, Professor, Point Loma Nazarene University, USA.
   Title: Including Students with Disabilities in Higher Education: Preliminary Social and Academic Outcomes Provided through Peer Suppor

3. **Myriam Mercedes Espinosa de los Monteros Godinez**, Professor, University of Guadalajara, México.

Session 8b:

1. **Lena Ivarsson**, Assistant Professor, Mid Sweden University, Sweden.
   Title: Swedish Principals' Perceptions of Teaching and Learning for Gifted Students – Acceleration, Enrichment, and Coaching.

2. **Douglas Moodie**, Assistant Director, Kennesaw State University, USA.
   Title: The Effect of Covid on Student Outcomes by Demographic Groups.

3. **Ron Phillips**, Associate Professor, Nipissing University, Canada.
   Title: First Nation Education in Canada: A History of Underfunding.

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Monica Ramirez Mata, Professor, University of Guadalajara, Mexico. *Title: The School after Covid19: An Approach to the Perceptions of the University Community about the Effects of the Pandemic.* 4. **Ruth Dawley-Carr**, Associate Professor, Northeastern Illinois University, USA. **Kiel Harell**, Consultant, Northeast Wisconsin Technical College, USA. **Sara Lam**, Vice President, Northeast Wisconsin Technical College, USA. *Title: Who Should Teach about Elections?: Pre-Service Teacher Views, Self-Efficacy and Preparation.*	
Discussion	

15:00-16:00 Discussion + Lunch

16:00-17:30 Session 9

Session 9a Moderator: Mr Kostas Spyropoulos (ATINER Administrator).	Session 9b Moderator: Mr Konstantinos Manolidis (ATINER Administrator).
1. **Goran Bostedt**, Associate Professor, Mid-Sweden University, Sweden. *Title: Study Motivation in Primary Schools in Sweden – What are Teachers' Perceptions and Responsibilities.* 2. **Osmanaga Fatbardha**, Lecturer, University "Luigj Gurakuqi", Albania. **Kilda Gusha,** Lecturer University "Luigj Gurakuqi", Albania. *Title: Nursing Students' Perceptions about Perinatal Mental Health Issues.* 3. **Annalisa Ianniello**, Researcher, University of Salerno, Italy, Felice Corona, Professor, University of Salerno, Italy. **Tonia De Giuseppe**, Associate Professor, Giustino Fortunato University, Italy. *Title: A Quantitative Study on Special Education Teachers' Life Satisfaction for Inclusive Education.* 4. **Alexander Belenky**, Professor, HSE University, Russia. **Tamara Voznesenskaya**, Associate Professor, HSE University, Russia. *Title: Choosing Optimal Sets of Elective Courses by College/University Administrations and by Students: The Problem Statements and Modeling.*	1. **Mihail Mateev**, Assistant Professor, University of Architecture, Civil Engineering and Geodesy, Bulgaria. *Title: Using Digital Twins, IoT, and Anomaly Detection for Predictive Analysis in Construction Industry.* 2. **Angeline Duma**, Lecturer, University of the Witwatersrand, South Africa. *Title: Cumulative knowledge building in distance and contact sessions: A comparison of two lessons in Technical Sciences on the topic of semiconductors for Grade 12.* 3. **Carsten Lecon**, Professor, Aalen University of Applied Sciences, Germany. *Title: Supporting Distributed Learning through Immersive Learning Environments.*
Discussion	**Discussion**

17:30-19:00 Session 10	
Session 10a **Moderator: Mr Kostas Spyropoulos** (ATINER Administrator).	**Session 10b** **Moderator: Mr Konstantinos Manolidis** (ATINER Administrator).
1. **Ibrahim Asadi**, Lecturer, The Arab Academic College for Education, Israel. *Title: The Impact of Diglossia on Reading Comprehension in the Arabic Language: A Longitudinal Study.* 2. **Alison Nimmo**, Head of Academic Development, Glasgow Caledonian University, UK. *Title: Searching For Resilient Academic Leadership – Where it Resides and the Forms it Takes.* 3. **Dawn Martelli**, Associate Professor, Florida Gulf Coast University, USA. **Vickie Johnston**, Instructor, Florida Gulf Coast University, USA. *Title: University Literacy Festival: Students from Title I Schools Share their Social and Cultural Experiences through Writing.* 4. **James Bryant**, Associate Professor, Appalachian State University, USA. *Title: The New Removal: The Struggle to teach American Indian history in the CRT Panic.*	1. **Manfred Rossle**, Professor, Aalen University of Applied Science, Germany. **Stefan Pohl**, Master Student, Carl-Zeiss AG, Germany. *Title: Quality Testing in Aluminium Die Casting – A Novel Approach using Acoustic Data in Neuronal Network.* 2. **Octaviano Garcia-Robelo**, Professor, Autonomous University of the State of Hidalgo, Mexico. **Jesús Cisneros Herrera**, Professor, Autonomous University of the State of Hidalgo, Mexico . **Gelacio Guzmán-Diaz**, Professor, Autonomous University of the State of Hidalgo, Mexico. *Title: Anxiety and Depression Factors Associated with Academic Performance in Students of a Public University in Mexico during the COVID-19 Pandemic.* 3. **Davis Tingle**, Researcher, Roanoke College, USA. *Title: Drone Delivery Optimization in Mixed Fields.*
Discussion	**Discussion**

19:00-20:30
Ancient Athenian Dinner (includes in order of appearance: continuous academic discussions, dinner with recipes from ancient Athens, wine/water)

Wednesday 17 May 2023
An Educational Visit to Selected Islands
or
Mycenae Visit

Thursday 18 May 2023
Visiting the Oracle of Delphi

Friday 19 May 2023
Visiting the Ancient Corinth and Cape Sounio

Ibrahim Asadi
Lecturer, The Arab Academic College for Education, Israel
Abeer Asli-Badarneh
Lecturer, The Arab Academic College for Education, Israel
&
Remah Khalifeh
Head, Special Education Department, The Arab Academic College for Education, Israel

The Impact of Diglossia on Reading Comprehension in the Arabic Language: A Longitudinal Study

Background

The Arabic language is characterized by diglossia, a phenomenon that refers to the existence of two forms of the same language: the spoken and the literary/written language, which are distant at different linguistic aspects. The spoken version is used until the pre-school period and the literary one is acquired mainly after entrance to school. Thus, the different linguistic components in the literary oral language are not available for literacy acquisition in the first grade. For instance, the "Simple View of Reading" (SVR) model posits that reading comprehension (RC) is a product of decoding and oral language comprehension. In light of the diglossic situation, this study aimed at examining the validity of the SVR model in the spoken and literary versions of the Arabic language.

Methods

Using a longitudinal design, we tested whether decoding and listening comprehension (LC) in kindergarten can later predict RC in the first grade and whether the contribution of LC to RC differs between the spoken and the literary languages. The participants were 261 kindergartners that were followed to the first grade.

Results

Our results from separate SEM analysis for spoken and literary versions revealed some similarity between the explained variance of the spoken (52%) and the literary (48%) models. However, while the contribution of LC to RC was higher than the contribution of decoding in the spoken model, the reverse pattern was observed in the literary one.

Conclusions

This study provided support to the SVR in Arabic, showing that decoding and LC are critical for RC and might be identified even in preschools. The differences between the spoken and literary versions

suggest that the differences between the oral languages should also be taken into consideration when testing the SVR. In effect, our findings illustrate the importance of imparting the literary language at early preschool stages.

Nayif Awad
Director, Sakhnin Academic College, Israel
&
Cheng-Yu Chung
PhD Student, Arizona State University, USA

Augmented Reality and Computational Thinking for Enriching Computer-Supported Collaborative Learning

Augmented Reality (AR) is considered a promising technology for enhancing learning and teaching. Much research has shown that AR can support students learn challenging concepts and promote positive attitudes toward learning. However, few studies have focused on the opportunities and potential benefits of AR in computational thinking (CT) and collaborative problem solving (CPS). To fill in this research gap, an AR-based learning environment was designed to engage students in collaborative programming tasks for "debugging an autonomous helicopter". The task involves two users who need to debug a script for flying a helicopter and collecting all flags in the scene. To complete this task successfully, the users are required to use CT concepts that include extracting relevant information (abstraction), breaking down the problem into smaller sub-problems (decomposition), observing and recognizing regularities (pattern recognition), and designing a self-contained script with a series of command instructions (algorithm design). The research questions that guide this study are:

• How can AR-supported collaborative learning affect students' performance and communication?
• What are students' attitudes towards the use of AR for debugging tasks? How are the user experiences and usability of the application?

A user study was conducted among undergraduate students from a first-year programming course at a university. Twelve dyads (13 males and 11 females) were engaged in an AR task (experiment) and a non-AR task (control). Data were collected from the study and analyzed by multi-modal learning analytics. In addition, the participants filled out a questionnaire and were interviewed at the end of the study for their subjective opinions about the tasks.

Findings showed that more students in the AR task managed to complete the task than the non-AR one. They demonstrated clearer code-editing trajectories and were engaged more in programming,

problem-solving, and collaborative work. In addition, the students showed more actionable feedback and self-reflection in verbal communication. In the interview, most of the students stated that the AR task was more interesting and enabled greater enjoyment, for example, *"AR is more interactive… you can see and feel things… you flow with it.", "With AR, you easily become part of the game.", "AR is 3D... you can move in depth and clearly see what things actually look like."*

Overall, this study sheds light on the potential benefits of AR experience for CT and CPS and demonstrates how AR can be used to promote CPS and its effects on group collaboration in terms of verbal communication and task performances.

Serwan Baban
Chief Scientific Advisor, The Residency, Iraq

A Practical Approach for Developing Strategic Learning and Teaching Plans for Higher Education Institutions

Universities attempt to stay relevant and viable through engaging effectively with society, government and the private sector at all levels. These objectives are achieved via renovating their vision, approaches to learning and teaching and developing relevant graduate profiles for employment in both public and private sectors.

It has been recognised that these interrelated challenges can successfully be accomplished through effective management practices and resourceful planning to handle ongoing market influences, competition and fluctuations in student enrolments. Therefore, enabling the institution to align its decisions with its mission and goals, while addressing risk assessment and risk management and considering the needs and expectations of its internal and external constituents.

This paper presents a collaborative process for developing learning and teaching strategic plans to fulfill an institution's forethought for the future. The paper also proposes an implementation procedure to manage the successful delivery of declared learning and teaching priorities and objectives. In other words, enabling the organisation to remain relevant and competitive and on the path to realize this aspiration.

Dorit Barchana Lorand
Lecturer, Kibbutzim College of Education, Israel

Plato's Symposium as an Explanation for Educational Literary Censorship

In books 2 and 3 of *Republic*, Plato offers a series of limitations to the literary education of the guards and, subsequently, all citizens of the state. The reasons for that literary and artistic censorship stem from the needs of the state: its future citizens must be shaped accordingly (see, for example, Pappas 2008; Wilburn 2021). However, I will show that in *Symposium* Plato inadvertently provides a different perspective on the motivation to limit the artistic (and specifically literary) freedom within the educational context. *Symposium* considers the motivation to educate not from the perspective of the state, but from the perspective of the teacher. Education derives from the teacher's desire to create a continuum of oneself via their pupils. The dark side of this desire is the will to limit the education of one's pupils to the scope of knowledge, taste, and values that create an accurate replica. I will also suggest a way of overcoming this inherent motivation.

Alexander Belenky
Professor, HSE University, Russia
&
Tamara Voznesenskaya
Associate Professor, HSE University, Russia

Choosing Optimal Sets of Elective Courses by College/University Administrations and by Students: The Problem Statements and Modeling

A problem of choosing a set of electives by a college/university student from a set of courses that can be viewed as those to be chosen as electives are considered. Two approaches to analyzing this problem, to its mathematical formulations as mathematical programming problems and game problems under linear constraints, and methods of finding optimal solutions in the problems and optimal (equilibrium) strategies in the games are proposed. One of the proposed approaches is based on the assumption that each student (at a particular faculty) is allowed to choose any elective from a list of the courses—offered by the college/university as a set of electives to choose from by all the faculty students—independently of a particular specialization chosen by that student and to be indicated in the student's bachelor or master degree, expected to be awarded by the college/university upon graduation. In the framework of the second approach, a list of particular specializations is offered to faculty students for every faculty; however, for each specialization from the list, a set of electives is determined, and only courses from this set are those allowed to be chosen from as electives for every faculty student. It seems natural to assume that in the framework of the first above approach, a student and the college/university administration may consider different electives as optimal to the student, and corresponding problems are formulated by the authors as mathematical programming problems with linear constraints and Boolean variables. In the framework of the second approach, first of all, a list of possible electives for each specialization is to be determined for each faculty by the college/university administration (and once this list has been determined, particularly, the first above approach can be used to find out the optimal set of electives for a particular student from the viewpoint of this student herself/himself and that for the same student from the viewpoint of the college/university administration). It's proposed to consider finding this list by the college/university administration as a game problem, which can be formulated as that in which available player strategies are

described by systems of linear constraints, and the payoff functions of the players are described by sums of linear and bilinear functions of corresponding vector variables. As it's shown, the above list can be found proceeding from the structure and the values of the game (Nash) equilibrium points, whereas the equilibriums can be found by solving mathematical programming problems with linear constraints and linear and bilinear functions of vector variables. The demonstrated possibility to find the best electives by both a college/university administration for any of the student there and by the same interested student herself/himself by solving mathematical problems for which standard software packages are widely available even for personal computers makes the results, presented by the authors, an effective tool. The use of this tool can make a difference in improving the quality of higher education in colleges/universities all over the world by raising interest to studying particular subjects by interested students there.

Jean Berlie

Researcher, Education University of Hong Kong, Hong Kong

Chinese Universities Students Abroad and Particularly in the USA

China's educated elite suddenly abandoned Confucian learning, the ancient civil service examinations, and finally in 1911 the imperial system. For Mao, the reference points became the CCP's rural Yan'an experience; the Russian revolution; and, specifically for education, the various components of the old reformers' critique of the established system. The extraordinary progresses of China's higher education (HE) were done after between 1990 and 2020 during the reforms of Deng Xiaoping and the post China's Cultural Revolution for the reforms of education is essential; the West and especially the United States are the most successful country in particular for China's HE's development and modernization.

In 1980-1990 when Chinese leaders were announcing the full range of reforms they were planning HE. The question then was whether American branches could be effectively grafted on a Soviet tree planted in a Chinese garden (Pepper, S. 1990. China's Education Reform. Berkeley).

During the 2020-21 school year, 317,299 Chinese nationals enrolled in US institutions, representing about a third of all international students studying in the USA.

The US (with 976,853 Chinese international students), Australia (509,160 students), and the UK (489,019 students) are the most popular destinations, receiving 33% of international students.

In the first six months of 2022, the US issued 31,055 F-1 visas to Chinese nationals, down from 64,261 for the same period in 2019, consequently the number of Chinese HE students going abroad is falling sharply. Another reason is China's economy which appears weaker in 2022. Finally, loss of confidence in President Xi Jinping's foreign policy judgment is palpable in supporting Putin even with care and this is not favorable for Chinese HE studying in America.

Keeping US–China relations on an even keel as the relationship reconfigures itself to better reflect current political and economic realities. HE students from both countries China and the USA will become future leaders in government, business, and academia; hopefully, greater mutual understanding developed through cooperative learning and cross-cultural exchange will help to soften

some of the current mistrust and pave the way for more reasoned and balanced conversations in the years ahead.

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&
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Study Motivation in Primary Schools in Sweden – What are Teachers' Perceptions and Responsibilities

In Sweden, about 25% of all students leave primary school without complete grades (of which 60% are boys). The reason for these low results is often referred to as students' lack of motivation (Skolverket, 2019). The most important ways to increase study motivation are a) good interaction between teachers and students and b) access to student health. To analyze a lack of study motivation in primary school, a perspective is thus required that not only focuses on the individual student but also takes into account the entire school and classroom situation. The starting point in this study is therefore that study motivation is about transaction (Perry, et al., 2006). Study motivation should not be understood only as an individual trait, but that it is about negotiations of meaning in social interaction. According to Perry et al. (2006) there are strong links between motivation and a) communicated expectations b) clear feedback on results, c) interaction between teacher and student and between students, d) positive climate and e) teacher leadership. Therefore, this study focuses on the teacher's perceptions and their responsibilities. This study is based on 9 group interviews with 26 teachers in classes 3, 6 and 8. The focus of the interviews was teachers' perceptions about what motivated students to study and what demotivated them. The empirical material was then analyzed with a thematic content analysis (Braun & Clarke, 2012). Subsequently, comparative analyzes were also performed between the three teacher groups. All teacher groups in this study highlight how important the teacher is for students' study motivation. Many teachers believe that students have primarily internal motivation for learning. However, there is no consensus among the teachers about what is important to the students. The core of the concept of study motivation is described relatively similarly; motivation is built up by interest, a desire, and a curiosity to learn. However, it is only the teachers for the youngest students who describe a desire to learn. The teacher's descriptions in high school are more detailed where they describe many inner driving forces such as challenging oneself and the importance of motivation to future studies. Experiences about what can increase students' study

motivation and reasons/explanations for any low study motivation largely show a complex interplay between results and motivation. The crucial difference turned out to be that the teachers in high school give increasingly more exemplary and in-depth explanations to subject issues and that the problem picture with study motivation is more complex and deepens the older the students get. The conclusions we draw are that motivation is an area that becomes more central and more challenging the older the student gets. To support students' study motivation, a much greater understanding of the phenomena among teachers is needed. Our recommendation is to focus on a broad front on all actors in school and listen to and take into account students' voices. In this study, we cannot see the requesting link according to the transactional perspective.

James Bryant
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The New Removal: The Struggle to Teach American Indian History in the CRT Panic

In May, 1946, Ira Hayes woke up, dressed, and began to walk. Hayes was a Pima Indian from the Gila River Reservation in Arizona. He was also one of the Marines captured in Joe Rosenthal's iconic photograph of the flag raising on Mount Suribachi during the battle for Iwo Jima. Hayes would walk more than 1,700 miles from his home to Weslaco, Texas. Hayes journey was for one very specific purpose — to correct the mislabeling of the Iwo Jima photograph by the U.S. government. In this era of panic over American public schools and parents' panic over the possibility that Critical Race Theory (CRT) is being taught in schools, Ira serves as a powerful reminder of the need for historical accuracy, and how such accuracy can result in the need to speak truth to power. Since 2021, there have been more than 137 educational gag order legislation across 35 American states. These laws seek to censor historical content, with some going so far as to turn parents into virtual bounty hunters with cash rewards for "turning in" educators who teach material that might make a student feel any discomfort. In Missouri, for example, legislation has been proposed which demands teachers present "an overall positive…history and understanding of the United States." These bills and the dark forces behind them are particularly dangerous for Indian Country and, especially, for American Indian children. The United States educational system has not just failed to teach American Indian history, it has long made stringent efforts to hide that history. This session will examine the challenges these laws present for an accounting of American Indian history with particular emphasis on the need to correct what is already a woefully lacking place for Indians within America's history curriculum. A recent (2015) study found that an astonishing 87% of American Indian historical information that is taught in American schools comes from a pre-1900 perspective, effectively erasing American Indians from 20th and 21st century America. This "invisibility" leads to stereotyping, historical ignorance, and breeds anti-Indigenous racism. This session will examine the place of history in correcting these failures and the needs for teachers to confront the new Removal.

Keitha Burnett

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Building a Model to Measure

The concept of "resiliency" is the buzzword in contemporary research to explain why some people can regroup and reemerge from adverse circumstances, in many cases, even better. The workplace would be better if we could predetermine or nurture the attributes that increase individuals' resiliency levels. Even though that much research would suggest that, to some degree, being resilient is innate. If the layers of innateness are pulled back, one can begin to see and understand decision-making is at the base or foundation of resiliency.

There are various approaches that have been drawn from to support our hypothesis: the least control one has of mastering one's environment, the greater the fall, and our postulates adhere to this concept. Psychological Meaning of Various Criteria for Positive Mental Health states, "…there are suggestions that environmental mastery be regarded as a criterion for mental health" (23). Environmental mastery is classified as one of the "6 distinct dimensions of wellness," as explained by Ryff and Keyes. They explain that individuals with higher environmental mastery "have a sense of mastery and competence in managing the environment." In comparison, individuals with a lower level of environmental mastery have "difficulty managing everyday affairs" (Keyes, 727). Managing one's environment effectively can have great benefits such as making "effective use of surrounding opportunities," while ineffectively managing one's environment can lead to one being "unable to change or improve surrounding context" in their lives or ultimately lack the sense of control over their external world (Keyes, 727).

To further this investigation, 50 high-profile individuals from a wide range of professionals who have endured a public "fall" will be the sampling population. It is important to reiterate that everyone encounters peaks and valleys in life. Even though nationally and internationally known individuals will be selected, the same principles can be applied to the general population. It is important to note that some of these individuals, as in the case of Hester Prynne in the *Scarlet Letter*, can rebound more than others because some falls are more intense or severe than others, coupled with how individuals "respond." Rebounding does not necessarily mean in terms of material gains or worldly status but terms of personal growth and fulfillment. The severity of the valley or fall could give us more insight into how

individuals can reduce some aspects of the severity of their falls in life. The independent variables that are determined to have an impact on the dependent variable, the severity of the fall, are 1) past experiences/childhood, 2) gaps in reality/perception, 3) mental and physical well-being, 4) patterns of negative behavior, 5) high value on pleasing others, 6) level of secrecy, 7) maturity, and 8) spiritually.

The primary goal is to test the indicators of our measurements of the "severity of fall." The severity of the fall is quantified by a five-point Likert scale ranging from very positive to very negative. Once the "severity of the fall" has been quantified, content analyses from interviews, editorials, and writings will be used to determine the degree of resiliency. Using logit-regression, the behavioral clusters can be identified, and a resiliency model that can enhance decision-making can be built.

Brantina Chirinda
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Mathematics Teaching in a Context of Historical Disadvantage

Prior to its independence in 1994, a system of racial and ethnic apartheid existed in South Africa that segregated the Black population from having economic, social, educational, and political opportunities afforded the White population. In education, White teachers received teacher training and in-service support at well-resourced urban universities, while most Black teachers started teaching without such supports and taught in segregated schools for Blacks before even completing secondary school. In this paper, I examine how South African secondary mathematics teachers characterised their professional development in the post-apartheid era, how they portrayed good mathematics teaching, and what challenges they identified as barriers to becoming a good mathematics teacher. I found that teachers characterised preparation in terms of their students' achievement, being qualified, professional development, and attitude towards mathematics. Ability to relate to students, having solid pedagogical content knowledge and considering the language of teaching and learning and the mathematics language were indicated as elements of good mathematics teaching. The challenges faced by teachers to become competent mathematics teachers included students' weaknesses in mathematical content knowledge, attendance policies, and issues related to student blaming. Implications from this study include prioritising quality professional development for mathematics teachers of Black students that focuses on developing teachers' pedagogical content knowledge. Professional development should also strengthen South African mathematics teachers' abilities to teach the mathematics register in English and support teachers to examine the detrimental effects of student blaming.

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Who Should Teach about Elections?: Pre-Service Teacher Views, Self-Efficacy and Preparation

A healthy democracy rests on the educational preparation of its citizens. To prepare children and young people for full civic participation, schools must teach knowledge, skills, habits, and practices not only for an active but also an informed citizenry. This study examines preservice teachers' perceptions of their responsibilities to teach citizenship education, and specifically elections. While elections represent just one example of civic participation, they hold significant power in determining who makes policies and laws.

Designed in 2020, and conducted during a key presidential election in the U.S, this study aimed to increase preservice teachers' self-awareness of what they viewed as their role in teaching about elections as well as their understanding of why teaching about elections is important to a healthy democracy. Accordingly, the co-investigators designed interventions to use in their instruction in their respective contexts: one rural and one urban university-based teacher education program. Study participants (N=34) were co-investigators' students, undergraduate and graduate preservice teachers of elementary, middle and high school across content areas, and co-investigators worked with each other's students (and not their own) for the purposes of investigation. Data collected included pre and post surveys, observations of virtual class sessions, semi-structured interviews, and collection of course materials and student work. Much of the data collection centered on two course seminars designed with virtual, in-class exercises that engaged preservice teachers to identify their own views on voting as a citizenship responsibility and provided ideas and tools for how to approach teaching about elections in K-12 classrooms.

Our findings indicate that most participants (~90%) both believed that teaching about elections is important and stated that they were likely to teach about elections. Given the time period and context, this was not surprising. However, our data evidenced a shift (30%) after the intervention toward the belief that teaching about elections should

occur at a younger age. Another area of movement involved subject area: while most participants thought social studies and English language arts were ideal subject areas for teaching about elections before the intervention, participants expanded the range of subject areas in which they thought elections could be taught after the intervention to include more support for art, math, and science. The data also revealed that several social studies preservice teachers advocated for teaching about elections to be similar to "literacy across the curriculum," in other words, that it should be a responsibility of all teachers.

At a time when the authenticity of elections are being questioned in the U.S., this study presents important points in favor of expanding who can and should prepare children and young people for exercising their right to vote. Although small in size, our data provides evidence that helping teachers to understand how they can teach about elections can increase their sense of efficacy. Our data also shows great concern on a teacher's part to both protect their job security and teach about elections in an environment in which their views differ from the majority of those in their community.

Eti De Vries
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Major Transitions in Higher Education: A Case Study

It goes without saying that the world around us is changing rapidly. Global developments in energy transition, climate change, digitalization, population growth, and food supply ask for other knowledge and skills than is traditionally taught in education. SMEs in a more local environment ask for new knowledge and skills from students in higher education to be able to cope with the newest developments. Besides, students want to choose their own paths through education, to start at different moments during the year, to choose their learning activities, or to combine education with working experience. Local and global developments and students' personal needs have to be considered when designing education for the future.

These developments ask for major transitions in higher education. At the University of Applied Sciences, everything is set in motion to deal with all questions at stake. Global developments have led to four areas of focus for all education at the UAS: energy transition and circularity: sustainability for everyone, digital transformation, transition towards a healthy and active society, and strengthening of a viable and sustainable region. Local developments are shaped around so-called learning communities where mutual learning will take place together with different stakeholders in the region, such as knowledge partners, companies, organizations, lecturers, researchers, and students. For this major transition in higher education to take place, classrooms will be redesigned, support systems need to be adapted, and financial allocations need a rethinking. The role of the lecturers will change from instructional to more facilitating. Well-being and social comfort for students ask for new forms of bonding. All together, lifelong learning will shape this education of the future.

To address the needs of the students, education is designed in a different way: based on the principles of backward design and constructive alignment, an education in Human Resource Management has defined learning outcomes on the end level independent from the route of learning, established what students need to deliver to meet the learning outcomes and offered different learning activities to pass the assessment criteria. Students are able to choose their own learning activities, for example, previously gained experiences, MOOCs, or

courses at other universities. This way, students can shape the personal profile they want to show when entering the work field.

Nicholas Dimmitt
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A University Course on Innovative Approaches to Problem-Solving & Idea Generation with Design Thinking

This action research study examines the development of a university undergraduate course on *Innovation and Entrepreneurship*. An introductory course, the goal was to develop an entrepreneurial mindset that would help students be more innovative and creative in their choices and decisions. To introduce them to a mindset that develops and improves their problem-solving skills. A design thinking process was the methodology applied to the course content and activities so that students could solve challenging issues with inspired and inventive strategies to discover better solutions. There have been several iterations to the curriculum to customize and improve the relevancy of entrepreneurial issues and challenges for undergraduate students. This presentation will focus on how the power of design thinking has inspired positive change and effective solutions to entrepreneurial issues and challenges. The core question that has guided the development of this curriculum is *How can we inspire students to make the best decisions and choices that will create enhanced outcomes in their careers and personal lives?* Examples will be presented. Audience discussion and feedback will be encouraged.

Angeline Duma
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Cumulative Knowledge Building in Distance and Contact Sessions: A Comparison of Two Lessons in Technical Sciences on the Topic of Semiconductors for Grade 12

The COVID-19 pandemic posed an enormous challenge to the educational systems which have relied heavily on contact teaching. In the midst of the pandemic, distance teaching showed some rays of hope that somehow started the wheel of education. Although this was a temporary measure, the question arises whether the knowledge building of contact sessions can be similar or different from those given by distance sessions? The aim of the study was to explore how cumulative knowledge building takes place in Technical Sciences lessons taught through distance and contact sessions. Legitimation Code Theory (LCT) was used as a conceptual framework of the study. The study employed a qualitative case study approach, with pre-recorded video observations and document analysis serving as data collection methods. Pre-recorded videos were analysed using a translational device aimed at mapping the strengths of semantic density and gravity. The main findings of the study revealed that the contact session as compared to the distance session offers greater opportunities for cumulative knowledge building mainly because of the extended semantic gravity range and the teachers' ability to develop learners as knowers of science. The findings suggest that there is a need for distance teachers to adopt strategies that can extend the semantic gravity range. This further raised more questions about the extent to which distance sessions may cater for learners' engagement and the processes of building learners into the knowers of science.

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Psychological Wellbeing and Hope-Despair Scores of Undergraduate Students at the Centro Universitario de Ciencias de la Salud After One Year of COVID-19 Confinement

Several studies have shown that the COVID-19 pandemic had a negative impact on the mental health of society and particularly on students at different educational levels. Based on this, this quasi-experimental ex post facto, correlational and cross-sectional study identified the level of Psychological Wellbeing of Mexican students at the Centro Universitario de Ciencias de la Salud (CUCS - University Center for Health Sciences) of the Universidad de Guadalajara (University of Guadalajara) and its relation with Hope-Despair in the context of social isolation as a result of the pandemic.

The CUCS population consists of 13,526 undergraduate students. A sample of 412 participants was tested, with a 95% confidence level, who responded two instruments online: Ryff's Psychological Wellbeing (PWB) Scale and Pereyra's Hope-Despair Test TED-R.

It was observed that, after one year of social isolation, 31.1% of the sample scored at the lower end of the scale of wellbeing, and the rest scored on the higher end of it; and, with regard to Hope, 76.2% scored low and very low, and 67.7% scored normal to high levels of despair. It was also possible to identify that Psychological Wellbeing is significantly associated with most of the dimensions of Hope-Despair.

The results show that the lower the despair, the lower the wellbeing and vice versa, the higher the hope, the higher the wellbeing.

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The School after COVID-19:
An Approach to the Perceptions of the University Community about the Effects of the Pandemic

At the beginning of 2020, the COVID-19 that had appeared in Asia, began to spread throughout Europe, Africa and America, starting a pandemic that shook all of humanity (Organization of the United Nations, 2020). For more than two years we were forced to confine ourselves and stay away from common spaces. At the same time, the technologies that had been gradually adopted, came to position themselves as indispensable tools for those who wanted to survive in the work or school context.

Strategies for remote work, remote and automated control of processes and financial transactions were developed. Smart cities, the internet of things, augmented reality, virtual reality, cryptocurrencies, learning technologies such as classroom or video conferencing environments, became the focus of attention and began to mark the survival metrics of organizations.

Some jobs changed their modality; the use of classroom, meet, zoom, among other items, was completed to achieve continuity in the learning of those who were in a school grade; the teachers gave their classes remotely, but only a few enabled their camera and audio, which was justified because if they did not do so, the connection would be lost; evidence of being present was a name, number, or initial on a black background.

According to CENEVAL (National Evaluation Center for Higher Education, 2022), students report having a higher level of anxiety as a result of the pandemic, in addition to an increase in difficulties due to lack of budget to continue in school, other mental health problems and decreased performance. At the basic level, socio-educational inequalities increased, specifically in pre-school and primary and in disadvantaged environments. According to the same bulletin, the lack of money or resources is presented as one of the most factors related to school dropout.

This research work seeks to investigate in greater depth these effects and others that could be manifesting in the dynamics of high

school schools when considering diverse experiences. We start from the assumption that these effects could be altering the learning processes of the students, their performance and that of the teachers, the administrative and operational staff but, at the same time, developing new skills related to leadership in crisis.

The study will be exploratory and qualitative through semi-structured interviews and focus groups during the first quarter of 2023 with members of the school community of Preparatory School No. 11 of the University of Guadalajara, located in Jalisco, Mexico.

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Including Students with Disabilities in Higher Education: Preliminary Social and Academic Outcomes Provided through Peer Support

In an effort to develop a more inclusive university environment, a small liberal arts university in California sought to develop a peer mentor program to support students with disabilities. As noted in the literature (Crisp & Cruz, 2009), peer mentoring is a collaborative relationship between two individuals and may include formal and/or informal interactions, consist of short-term or long-term connections, and focus on the "the growth and accomplishment of an individual, assisting in professional and career development, role modeling, psychological support, and the development of personal and reciprocal relationships" (p. 528). Student-to-student mentoring is an evidenced-based practice to promote the inclusion of students with disabilities on college campuses. For students with disabilities, the impact of student-to-student contact is one of the most critical components of student retention rates in higher education (Tinto, 1993). Peer mentoring can play an instrumental role in students' acclimation to college-level academics and college life. Peer mentors are able to help familiarize students with higher education norms and institutional systems (Minor, 2007). In addition, peer-to-peer relationships provide students with opportunities to learn from a mentor who can help navigate the expectations, requirements, and procedures within academic departments on campus. Research suggests that peer mentor programs can improve the academic success of students with disabilities (Lindsay & Munson, 2018).

Upon receiving a grant from a local organization, a Peer Mentor Program was established in fall 2021 to improve students' academic success, social integration, campus/student life engagement, social skills, self-advocacy, and independent-living abilities. An average of twenty peer mentors and ten peer mentees were part of this program each academic year. Trainings and expectations were provided to mentors once a semester as well as a few social activities for meet and greets. When addressing the recruitment of peer mentors, the Peer Mentor Program sought to implement a 2:1 – 3:1 ratio of peer mentors

to student with disabilities, as recommended by Workman and Green (2019). Therefore, two to three mentors were paired with one mentee to ensure adequate academic and social supports were available. Surveys from both peer mentors and mentees regarding relationships, supports and experiences was collected once a semester, as well as the development of the Peer Mentor Training Manual as a final product. Responses were analyzed for themes as well as self-reported academic and social outcomes. Preliminary data mostly collected from mentors indicated they were able to spend 1-2 hours a week with their mentees, focusing on supporting academics in study skills tips and navigating college academic life. The mentors reported social outcomes of providing opportunities to participate in routine conversations, meet regularly (coffee, lunch) and friendship. Spring semester outcomes to be measured in May 2023.

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&
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Nursing Students' Perceptions about Perinatal Mental Health Issues

The mental health of women in the perinatal period is the focus of attention around the world. A woman's positive mental health at this stage of life is very important, not only for her psychological well-being, but also for the well-being of the child, the family, and the community in general. Many studies emphasize the problems that women experience during pregnancy or after childbirth, also focusing on mental health problems. In this context, the attention towards the woman, both during pregnancy and after birth, should be very great, especially from the health professionals. The paper aims to explore the perception of the students of the professional master's study program in Health Psychology at the "Luigj Gurakuqi" University, Shkoder, Albania regarding their knowledge of the perinatal mental health problems, regarding their ability to identify and managing these problems. Nursing students have high levels of awareness related to perinatal mental health issues. Their perceptions about their knowledge related to perinatal mental health issues, related to their confidence in identifying and in managing them are good. Students think that they have the appropriate skills to assess and care for women with mental health problems, both during pregnancy and after, but, also, they need further training to improve their skills. It is necessary to carry out more extensive studies on this topic in our country to shed light on the Albanian reality. Also, it is necessary to revise the curricula, especially in general nursing education program, as well as carry out training for nurses related to the problems of perinatal mental health issues.

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A General Model for Representing Knowledge

Terms of the form $\{a_1, a_2, \ldots, a_n\} \rightarrow b$ have been proposed by Scott and Engeler, 50 years ago, as a model for Combinatory Logic. Since Combinatory Logic is computationally complete, i.e., Turing-complete, the model causes interest for domains dealing with knowledge, such as Artificial Intelligence. It has been used to model neural networks – how the brain works – and connecting the notion of computability with observability in natural science. We call them *Arrow Terms*. In Software Testing, arrow terms serve as representation for test cases that allow combination, and thus automated generation of more test cases for testing complex systems.

However, knowledge is not a well-defined notion. It is often referred as awareness of facts or as practical skills, and may also refer to familiarity with objects or situations. Knowledge of facts is distinct from opinion or guesswork by virtue of justification. Facts are usually described as a set of conditions, followed by a consequence. Formally, this resembles arrow terms. It is somewhat strange that a fundamental notion such as knowledge has no clearer definition. The arrow term model of knowledge closes this gap.

Knowledge about facts can lead to theories. Theories are *Attractors*. These are sets of arrow terms that can be approximated by control sequences, generated by a *Controlling Combinator*. The combination of arrow term sets turns out to be a powerful concept for explaining knowledge.

This contribution explains the intentions behind the model, with respect to the intuitionistic approach to mathematical logic, and presents an overview of what we currently know about arrow term models and their practical applicability.

Karen Fries
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Active Learning Strategies as a Tool for Inclusion

Students with disabilities often have fewer opportunities to respond and are often less engaged in tasks during large group instruction than peers who are typically developing. One possible technique for increasing students' academic engagement as a tool for inclusion is the use of active learning strategies, such as unison/choral responding, response cards, individual dry erase boards, guided notes, and peer tutoring. A literature review was conducted to examine existing literature with regard to the effectiveness of the active learning strategies mentioned above. Overall findings indicate active learning strategies, specifically response cards and unison/choral responses are beneficial when including students with disabilities in general education classes with peers without disabilities. Issues of inclusion for students with disabilities into general education classrooms have not disappeared over the years; indeed, general education teachers still often struggle with how to appropriately engage and include individuals with disabilities into their day-to-day curriculum. This struggle has intensified over the past few years with the transition to virtual learning, and then back to face to face learning, for many of our PK-12 students. Therefore, both virtual strategies, such as think boards and graphic organizers, along with the afore-mentioned strategies will have a focus in this interactive presentation, as methods to provide more active learning opportunities and possibilities for engagement for all students.

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Anxiety and Depression Factors Associated with Academic Performance in Students of a Public University in Mexico during the COVID-19 Pandemic

A research is carried out on factors that influence academic performance in a group of students in the third year of undergraduate students of Educational Sciences, from a public university in the state of Hidalgo in Mexico, after confinement due to COVID-19 pandemics. Despite the fact that cases of people infected with this virus still prevail in Mexico, the levels of severity or death have decreased. In a non-experimental, transactional design was used, a Likert scale is used, in order to analyze mainly variables related to the mental and emotional health of students and their academic performance. An approximate sample of thirty students participates, with an age between 20 and 25 years, more than 85 percent are women. All participants come from other states or towns near to the city of Pachuca in the state of Hidalgo, from medium-low economic resources, some of the students must work to continue studying. Mainly, variables related to anxiety and depression generated by confinement, as well as by the death of close relatives, and how these variables influence their academic performance were found. In the main results, students report that during the pandemic they suffered moments of anxiety, fear, loneliness, depression, they attacked other people, they felt claustrophobic, and they constantly reported stress. Regarding academics, it was found that the students were easily distracted, it was difficult for them to complete their homework on time, they worried about understanding the instructions of their professors, it was difficult for them to learn and study, they did not do their homework, and some of them dropped out of school to work and help his family financially. Finally, it is suggested that students with severe symptoms can be cared for in psychological and mental health centers belonging to this university, and at a lower level therapeutic support groups can be generated within the same classroom, this as remedial and preventive alternatives that help to improve the mental and emotional health of students and help them to

learn better, in the face of these highly difficult situations that are consequences of COVID-19. It is suggested that research be carried out where students are helped and trained to detect in time, prevent and overcome emotional and mental situations that may affect their learning and integral development.

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Senior Lecturer, Mid Sweden University, Sweden

How Does Relational Pedagogy Affect Students with Psychiatric/Psychological Disorder in Secondary School?

Students with psychiatric/psychological disabilities are increasing in Sweden and the rest of the world. Many of these students have had the experience of their disability interrupting or disrupting their educational path, and they need educational support to get back on track with their educational goals. As many as one out of three students who start Swedish secondary schools either fail or drop-out and therefore do not graduate after the normal three years of Swedish secondary school. Statistics report that the two most mentioned reasons for dropping out of secondary school were lack of motivation and psychiatric/psychological disabilities. Many of these students need support to develop strategies to handle and plan their studies. They face performance anxiety, hand in papers in time, not to miss any lessons, and concentration disabilities, which in turn could lead to psychosomatic problems such as headache, stomach ache, difficulty sleeping, stress, anxiety, self-injury, and panic attacks. Failure and setbacks affect their learning, as well as their self-esteem, and self-confidence, which can also reduce the motivation to study. The theoretical framework of this study is relational pedagogy. The overall aim of this study was to examine teachers' and students' experiences of relational pedagogy in relation to students experiencing psychiatric/psychological disabilities at secondary school when it comes to school attendance, truancy, and dropping out. The main purpose of relational pedagogy is to stimulate the learning of students by mentoring, coaching, and other student-focused activities. Due to the plurality and diversity of methods used in the empirical data collection, this study has a case study design. The data collection for this case study was based on surveys, individual interviews, focus group interviews, and documented reports on the specific students' absences, attendances, dropping out, and grading. The final collection consisted of individual interviews with eight involved students and focus group interviews with 10 involved teachers, and the final interviews were analysed by constructivist thematic content analysis to identify and report patterns, categories, and themes that illuminated both the students' and the teachers' opinions. The secondary sources consist of surveys, and documented reports on the specific students' absences, attendances, dropping out, and grading. The findings of this

study, indicated that the students have found strategies and methods to better cope with their educational goals, which improved the psychosocial learning environment. The students took greater responsibility for their schooling and worked more independently toward the educational goals they established. They expressed that to be seen, to be listened to, and to be respected increased the motivation to study. Relational pedagogy led to more students graduating, significantly less truancy, and fewer dropouts. The overall conclusion was that when the social relations between teachers and students improves and deepens their sense of well-being in the classroom, the students are more likely to reach their educational goals and are less likely to play truant or drop out.

Abigail Gonzales
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Ma. Nympha Joaquin
Professor, University of the Philippines, Philippines
&
Sheryl Lyn Monterola
Professor, University of the Philippines, Philippines

Popularizing Math: Application of Mathematical Thinking Processes in Citizen Science

Citizen science is a new scientific activity utilized by government and non-government organizations to generate knowledge and insights where the public can be involved. Unlike traditional science, citizen science allows the public to engage not as subjects of the study but as contributors to various research tasks such as data collecting, data processing, and result dissemination, to mention a few. As a result, Wiggins and Crowston (2011) refer to citizen science as "science with the people". Notably, experts in mathematics believe that there is a need for every individual to learn and understand mathematics (National Council of Teachers of Mathematics (NCTM), 2000; Kilpatrick et. al, 2001), which now demands to popularize mathematics. Because of the openness of the citizen science to the public, it has the potential to be used in popularizing mathematics, specifically the mathematical thinking processes. Thus, this study investigated the nature and scope of the application of the standard mathematical thinking processes in the different research activities performed in citizen science.

This study was conducted using grounded theory approach and purposive sampling method. The researcher devised a constructed criterion for selecting the sample. The grounded theory was carried out by coding in three stages, followed by memo-writing, theoretical sampling, and theoretical coding.

The main result of this study reveals that the five mathematical thinking processes, such as Problem- Solving, Reasoning and Proof, Communication, Representation and Connection defined by NCTM (2000) as process standards, were all applied in citizen science. Fundamentally, this study indicated that Problem-Solving and Connection were employed with most extensive depths and widest scopes. Individuals participating in citizen science, who are called citizen scientists, perform these two mathematical thinking processes in practically all the research activities assigned to them. However, Problem-Solving was executed more as a primary task, while

Connection was performed as a subprocess of the other mathematical thinking processes. Then, they were followed by Communication and Reasoning and Proof, which both have sufficient depths and have relatively wide scopes of application in participation of the citizen scientists. Finally, this study demonstrates that Representation has the least depth of application, although having a reasonably broad scope of use.

Based on these findings and conclusions, this study suggests that citizen science be used to popularize mathematics and enhance the public's mathematical thinking processes. Moreover, this study highlights that educators, parents, and other education stakeholders may also utilize the potential of citizen science to practice and enhance students' mathematical thinking in a novel method.

Desmond Wesley Govender
Professor, University of Kwa Zulu-Natal, South Africa
Irene Govender
Professor, University of Kwa Zulu-Natal, South Africa
&
Reginald Govender
Senior Lecturer, University of KwaZulu-Natal, South Africa

Students' Experiences of Learning to Code Using Robotics

Students have always found it difficult to learn the fundamental building blocks of computer programming, especially for new programmers with no prior experience at the school level. This research, which is an outgrowth of a bigger study, explores the use of robots to improve computer programming learning by posing the question, "How do students experience learning to program with robotics?" A series of workshops that stimulate hands-on learning and the use of tools in the learning process for knowledge growth were done, guided by experiential Learning. This study was conducted at a university in KwaZulu-Natal, South Africa. The participants were 75 students, the majority of whom were first years who had just begun a computer course and were unfamiliar with computer programming. The results demonstrated that when using a physical component like a robot, experiential learning has proven to be helpful in the progressive development of learning computer programming constructs. It is effective to employ microcontrollers that provide a robotic component and offering a physical attribute while learning to code. It is believed that the study's findings would aid in the creation of novel techniques for teaching computer programming using robotics.

Haleema Haleema Sadia Mian
Senior Tutor, University of Manchester, UK

Understanding Postgraduate Students' Perceptions about their Inclusion in Transitioning to the UK Higher Education in the Post COVID-19 Era

Sadia et al. (2022) found that international students struggle in transition both to the UK and to the Postgraduate education context. Similarly, Anthony-Okeke et al. (2021) noted issues relating to student inequalities from both UK and International students when engaging with hybrid learning opportunities during the recent COVID pandemic. This article aims deepen the understanding of the post-COVID-19 inclusion of postgraduate students at the universities in England. The current project aimed to bring these two assertions together into a more rounded narrative to understand postgraduate students' perceptions of inclusion in transitioning to the UK university using photo-elicitation and qualitative approach. Eight participants, who were PhD students at the UK University, were requested to keep 4-6 photos of people, places and explain why they chose the photo, what is unique in the picture, and how they relate these pictures to their inclusion in transition. The narrative analysis of the photo-elicitation data helped us to understand how individuals visualise and narrate their transition. Participants viewed their relationship with PhD supervisors, friends, spouses, and colleagues as crucial for their wellbeing and inclusion. They bought images of their office table at home and in the University as the space to which they belong. In this regard, we found that the first-year PhD students had very little personalisation within their desk space compared to the second- and third-year students. Moreover, they discussed the experience of attending academic conferences, joining social activities, and exploring the city as essential for inclusion. Participants viewed food, either on its own or in a group, as a source of networking in academia. The findings enabled us to understand student needs of networking and ensure their better inclusion at the University.

Till Hänisch
Professor, DHBW Heidenheim, Germany

A Case Study on Using Microservice Patterns in an Embedded System

Microservices architectures, initially a consequence of devOps organization, are nowadays the most fashionable architecture for enterprise or web scale applications. By separating functionalities into small, easily understandable and maintainable parts, connected by a clearly defined interface, they provide a number of desirable characteristics. A microservice can be scaled, developed or updated independently from the others since the implementation of a service is by nature opaque. Organizing teams along services, the individual team can be small and communication overhead reduces to the absolute possible minimum, i.e., the interface.

These are the same characteristics that electronic components have, esp. ICs, the building blocks of practically every electronic system in use today. It is therefore even more surprising that this architecture pattern is not used to the same extent by electronics engineers, especially in embedded systems. Of course, there are ideas and publications about using microservices in embedded systems, but most of them deal with the case of running many or all services on a single computer, often even in the same image. This would be considered a monolith in normal systems.

This paper presents a case study of dividing an embedded system in several small – and easy – components, each of them running on a small and simple system, all of which are connected by simple interfaces, in this case serial connections. This system was developed during Corona lockdown, when there was a high priority on developing and testing parts, i.e., the microservice look-alikes. independently from others.

Danielle Herro
Associate Professor, Clemson University, USA
&
Cassie Quigley
Associate Professor, University of Pittsburgh, USA

Reimagining Computer Science Curriculum: Co-Designing Computational Thinking Lessons in Primary Classrooms

Many K-12 students, particularly those in under-resourced schools, lack opportunities to learn Computer Science (CS) and Computational Thinking (CT) in school. To expand access to CT and CS instruction, particularly for underrepresented students in rural and urban schools, two nationally funded research projects aimed to provide instructional materials and preparation in elementary schools to integrate CS CT into the curriculum. Specifically, the curriculum focused on one aspect of CS, data science. There is growing recognition that CS/CT is a critical skill for the future and that CS/CT instruction must begin before high school if students are to develop the foundational skills, interests and identities needed for 21st century careers and participation in an increasingly digital world (Reimer, 2019), Data science, in particular, is becoming a relevant area in K12 education because of its focus on analyzing and interpreting data. Recently, more state educational agencies have recognized the need for CS/CT integration in the PK-12 curriculum. In the US, many Department of Education's recently integrated CS/CT competencies into their K-12 standards (Code.org, CSTA, & ECEP Alliance, 2022). However, the ability of schools to address CS/CT competencies varies widely. Well-resourced schools can offer additional STEM, STEAM, or computer science classes while under-resourced schools are less likely to have these offerings (Zarch, Dunton, Childs, & Leftwich, 2020). The purpose of these projects was to co-design data science lessons that were contextually-dependent, relevant, and aligned with academic standards. In this presentation, we will present a variety of lessons co-designed with teachers, and discuss strategies for modifying them for other contexts.

Annalisa Ianniello
Researcher, University of Salerno, Italy
Felice Corona
Professor, University of Salerno, Italy
&
Tonia De Giuseppe
Associate Professor, Giustino Fortunato University, Italy

A Quantitative Study on Special Education Teachers' Life Satisfaction for Inclusive Education

Teachers are the architects of an inclusive society. School inclusion implies the redefinition of the concept of training all teachers to adequately recognize the needs of new educational emergencies. This requires the punctual reorganization of the knowledge, knowledge and skills that make up the professional baggage of school operators, adopting a plurality of cognitive approaches to make educational interventions more functional (Gaspari, 2017). To do this it is necessary that teachers, first, live a life of well-being and that they are satisfied with their lives.

A teacher who is satisfied with her life plays a vital role in the elevation of equal and inclusive societies. In this sense, this study aims to determine the life satisfaction perceptions of special education teachers in Italy. The study was conducted with a sample of 394 teachers from Campania, belonging to all school levels. (Preschool, Primary, Lower Secondary and Upper Secondary school). In this study the descriptive survey model was used. To collect the data, the Satisfaction with Life Scale developed by Diener, Emmons, Larsen & Griffin (1985), administered in the already validated Italian version, was used. The data were analysed with the SPSS program following the scoring indications of the instrument. The results show that most of the interviewees fall into the brackets expressing satisfaction (from very satisfied to averagely satisfied), while only 37 teachers (equal to 9% of the total) were below the average bracket (Corona & Ianniello, 2023).

Lena Ivarsson
Assistant Professor, Mid Sweden University, Sweden

Swedish Principals' Perceptions of Teaching and Learning for Gifted Students – Acceleration, Enrichment, and Coaching

In this study, principals' perceptions of teaching and learning for gifted students are identified and discussed with a focus on acceleration, enrichment, and coaching. These three areas have proven to be significant for the teaching of the gifted. The research questions include general questions about perceptions of giftedness and questions about how principals work to give gifted students the opportunity to develop and learn based on their conditions and needs, as well as the principal's view of the teachers' knowledge of special giftedness. Several of these research questions concern the areas of acceleration, enrichment, and coaching. The empirical material consists of a questionnaire with various statements about giftedness that the respondent must relate to, as well as several open questions where the respondents can freely describe their knowledge and perceptions about gifted students and their education. A constructivist perspective with a focus on both collaboration and individual learning based on the student's conditions and needs forms the theoretical basis. The method used is inductive thematic content analysis. Previous research has shown that acceleration, enrichment and coaching in different ways are significant for teaching and learning for gifted students. It is therefore of great importance that principals, who are responsible for the activities of the schools he/she is responsible for, are aware of these and enable the teachers to work with acceleration, enrichment and coaching based on the different needs of the gifted students. The present study shows that principals, despite a partial lack of knowledge about gifted students and their education, in general, still express perceptions about acceleration, enrichment and coaching. An image is built up of principals advocating enrichment in the regular class over acceleration, which in this study means that a particularly gifted student is given the opportunity to skip one or more classes. Coaching is touched on to a lesser extent, but on a few occasions, it is described how subject teachers in upper secondary school can be used for coaching.

Jacob Jenkins
Professor & Chair, California State University Channel Islands, USA
&
Thomas Clobes
Assistant Professor, California State University Channel Islands, USA

OER for Social Justice: Removing Educational Barriers for Historically Underserved College Students

Course material costs are an educational barrier for many college students, with a disproportionately negative impact on historically underserved populations. Colleges and universities have sought to alleviate this inequality through the use of Open Educational Resources (OER), yet there remains a dearth of research focusing on OER's perception among racial/ethnic minorities, low-income students, and first-generation college students. For each of these reasons, this study explored student perceptions of OER at a Hispanic-serving Institution (HSI) in Southern California. Qualitative results from over 500 undergraduate surveys revealed a vast majority of students preferred OER over traditional textbooks because of their cost savings and increased availability; however, students also disparaged OER because of issues regarding internet access, text quality, and site navigation. This study concludes with suggestions for how higher education might address OER's perceived shortcomings and capitalize on their perceived strengths to realize a more equitable college experience for all.

Carsten Lecon

Professor, Aalen University of Applied Sciences, Germany

Supporting Distributed Learning through Immersive Learning Environments

In the times of the pandemic, it was common for teaching to switch from the classroom to online places like for example video conference systems. But even now we still have – besides of the aftermaths of corona – challenges: For example, the current crisis is leading to much higher energy costs, which concerns the arrival to the training location and in particular external training (ride costs). Working and learning from home has also become more and more established.

To create a learning environment that is as authentic as possible, virtual 3D environments are an option. Virtual 3D environments are advantageous in many ways in contrast to 2D video conferences. Simple conversational situations are perceived as more natural than in 2D environments. The virtual environment can be design comfortable and friendly, so that this environment can trigger relaxation, silence and pleasure at the user. The induced positive emotions can be a decisive factor for collaborative working and self-regulated learning, which also is reinforced by the intensive flow and presence experience. In general, for collaborative learning and working, the spatial and social immersion are central characteristic of these environments as well as the appropriate usability. Spatial immersion means to feel being at another place as in reality.

These environments allow, for example, to implement cyber physical systems like digital twins. We will present a kind of cyber physical application in the context of a computer science course: A (virtual) robot has to be steered through a maze. To do this, a software template must be completed with the appropriate source code. Beforehand, the learners have to build a parkour using an editor. This learning scenario can be expanded to include a gamification concept, in which the learners have to go through the course as quickly as possible. In this case, the participants (represented as avatars) not only 'see' the moving robot in the virtual environment, but also each other. Since the processing of this task takes place as a group work, we address several areas of competences. The use of pedagogical agents is also being considered, for example, we try to find out what kind of programming error it is and then offer appropriate help.

We determine appropriate interfaces for the seamless integration of virtual 3D rooms into existing teaching/learning infrastructures.

In general, we will explain the possible uses of virtual 3D environments for teaching and learning purposes and also go into the restrictions – also based on our experience from some projects that have already been carried out.

Dawn Martelli
Associate Professor, Florida Gulf Coast University, USA
&
Vickie Johnston
Instructor, Florida Gulf Coast University, USA

University Literacy Festival: Students from Title I Schools Share their Social and Cultural Experiences through Writing

This presentation examines how young adult authors mentored high school students from Title I schools to construct college admission essays by sharing their social and cultural experiences through writing sessions at a university literacy festival. This qualitative case study analyzed students' college admission essays using grounded theory revealing four themes: overcoming barriers, clubs and programs, cultural and ethnic identity, and supportive role models. Students attended interactive authors' writing sessions and a university's writing center sessions to gain insight on discovering their unique qualities and meaningful stories to share in their college admission essays. Findings indicated that a university literacy festival was an effective way to promote writing strategies for college admission essays for high school students, especially to under-supported students.

Mihail Mateev

Assistant Professor, University of Architecture, Civil Engineering and Geodesy, Bulgaria

Using Digital Twins, IoT, and Anomaly Detection for Predictive Analysis in Construction Industry

Predictive analysis is a concept that provides very high value in modern industry. The construction industry is one of the areas where it is critical to know in advance the potential risk of failures or dramatic changes in maintenance cost. This kind of analysis was costly in the past because it needed specific custom logic for each solution.

Nowadays, cost-effective solutions for predictive analysis are possible using the Internet of Things (IoT), Digital Twins, and anomaly detection. Modern technologies allow applying a formal approach to build a powerful solution for predictive analysis.

This study offers a cost-effective and efficient approach to implementing solutions with predictive analytics, particularly in the construction industry. Research provides a reference architecture for predictive analytics for the building industry and shares results from the experimental setup used to demonstrate the effectiveness of this methodology.

Experimental results provide insights and suggestions for future steps that will extend the research.

Prototypes and experimental setup are implemented using the Microsoft public cloud – Microsoft Azure, Azure IoT Suite, Azure Digital Twins service, and Anomaly Detector (part of Azure Cognitive Services). The experimental approach is fully based on cloud technology and software as a service (SaaS) solutions for Mixed Reality, IoT, and Artificial Intelligence (AI).

Results are also considered, including the maintenance cost of the proposed solution.

Vicki McGinley
Professor, West Chester University, USA

Animated Case-Based Learning to Support the Teaching of Trauma Sensitive Practices

eLearning has infiltrated all aspects of education. Coupled with immersive case-based learning it is an effective tool to support students in gaining skills and knowledge they would otherwise have difficulties learning in higher education classrooms. Specifically, case-based studies within eLearning provides support for "content reinforcement, critical thinking, and reflection skills that text-based case studies" may not provide (Tripp et al., 2019). Animated case-based studies that depict a population that might be more challenging to reach, e.g., children with specific mental and physical disabilities and children who have experienced trauma, may come alive through this experiential approach. Narrative case-based studies that depict the characteristics, challenges and supports of children who have experienced trauma are available to practicing clinicians, however there are limited depictions of these children in within the K-12 classroom. As schools are requiring educators to become trauma sensitive and informed, and to incorporate research-based practices within their classrooms that address Adverse Childhood Experiences (Felitti et al., 1995) it is critical that educators gain those skills and knowledge. This presentation will present on technological case-based studies that addresses trauma, how it manifests itself in the classroom, and evidence-based practices to support children in a trauma-informed, sensitive way.

Douglas Moodie

Assistant Director, Kennesaw State University, USA

The Effect of COVID-19 on Student Outcomes by Demographic Groups

This study uses the complete data of every student in every course in the university to see how the outcomes varied by demographic group, for Spring and Fall 20020 and 2021. The university used different modalities for the different terms, such as in person, in person switching to pure online mid-term, synchronous online, asynchronous online, hybrid, flex, etc. These results were compared with results for 1995 to 1999, which were previously published. The demographic axes used were sex, ethnicity, age, major, level, previous GPA, etc. The results were possibly confounded by the President asking faculty to be easy on students as during these years.

Woon Lam Ng

Associate Professor, Nanyang Technological University, Singapore

Adopting Engineering Problem Solving Framework for Applied Art Training

In this paper, I will share my experience of how an engineering problem-solving framework can be adopted as an effective art pedagogy, especially for training applied art students. The major difference between applied art and fine art students from the perspective of training outcomes is the difference in their professional practice. While a fine artist involves in constantly exploring new ground, an applied artist is also required to perform a task to fulfill the field-specific demand. While a fine artist may create a sculpture for sole visual enjoyment, a product designer needs to produce a product for its physical application. A car has to be driven. A cup has to hold liquid. Therefore, to tailor the need of applied art students, a structural approach has its advantage. A new pedagogical approach borrows from the robust structure of engineering and scientific problem solving, the cause-and-effect diagram (also named the fishbone diagram) to develop a training approach for applied art foundation students. This engineering framework illustrates how a complex art-creating process can be deconstructed. Hence, variables can be introduced to make the overall creative exploration more efficient. A few students shared their experiences after participating in this art training approach.

Alison Nimmo
Head of Academic Development, Glasgow Caledonian University, UK

Searching for Resilient Academic Leadership –
Where it Resides and the Forms it Takes

The presentation presents the findings from a small scale lived experience study undertaken by a community of academics located in a range of universities in Scotland. Participants were all members of the Scottish Principal fellow Network and thus held professional recognition of their teaching and support of student learning (PSF, 2011). The study took place during the period of lockdown when most institutions were experiencing the challenges of the digital pivot in learning and teaching. Using conversation analysis and data collected from online digital tools including a jam board and padlet, the study looked at the meaning of resilience – individual and organizational – and how this as a form of academic leadership could be perceived in the lived practices of the participants and the process of the universities. A number of metaphors emerged in creating a shared understanding of the complex, nuanced and somewhat intangible nature of resilience academic leadership. The study proposes that the use of metaphors for resilient academic leadership can be used by others to explore the nature of academic leadership in their own institutions. The presentation argues that the forms of practice that symbolize resilient academic leadership differentiate this form of leadership form the more prevalent forms of managerial leadership found in the discourse of universities and policies. The study raises the question as to whether resilient academic leadership is an unrecognized organizational asset in our universities that can usefully be explored by those leading change in Higher Education Institutions across and beyond the UK.

Cem Özışık
Assistant Professor, İstanbul Kültür University, Turkey

Pedagogical Formation Students' Attitudes and Readiness towards Teaching Profession

Teacher education in Turkey is carried out through two different sources. The first one is the faculties of education, where the basic courses on education are embedded into an already existing teaching curriculum. The second source is called "pedagogical formation program", which means that the aforementioned basic courses on education are given separately to students from faculties other than education, whose curriculum does not contain any teaching courses at all. The students in this program can be undergraduate students in their senior years or graduates who might well be working as a teacher in some private institutions. This study aims to determine the relation between pedagogical formation students' attitudes and readiness towards teaching profession. A total of 85 students who are studying in the pedagogical formation program at Istanbul Kultur University in 2022-2023 Academic Year participated in the study on a voluntary basis. They are graduates from different departments, namely, English Language and Literature, Turkish Language and Literature, Biology, Mathematics, and American Culture and Literature. In order to collect data, two different scales were used. The first one is the "Attitude Scale Towards Teaching Profession", developed by Erkuş, Sanlı, Bağlı and Güven (2000), and the second one is the "The Readiness Scale Towards Teaching Profession" developed by Yıldırım and Köklükaya (2017). Data were analyzed through Pearson Correlation Test, T-Test, and One-Way Anova with a view to determining the relations based on various sub-dimensions, such as students' gender, age, the department they graduated from, the time they graduated, their teaching experience, if any, and the education level they worked at. Findings reveal that there is a strong correlation between students' attitudes and readiness towards teaching profession. As for the department the students graduated from, a significant difference is found on behalf of the graduates from Turkish Language and Literature Department both for attitude and readiness towards the profession.

Tuğba Özışık
Assistant Professor, İstanbul Kültür University, Turkey

The Information and Communication Technology Use of X and Y Generation Academicians

With the acceleration of digitalization in every area of life, the way and frequency of using information and communication technology have become a crucial factor in getting the most in what you do as a profession. One of those professions, where the need for keeping up-to-date is of utmost importance, is teaching at a higher education institution as an academician. Considering that most of today's university students were born in the millennium, catering for their needs in a way they can comprehend better will inevitably call for a lot of digital age knowledge. Unlike their students, today's academicians usually belong to two generations, namely, X and Y, born between 1965-1979 and between 1980-1999, respectively. With this in mind, it can be said that the digitalization processes the academicians and their students have gone through are very different from each other. Therefore, this study aims to determine the level of information and communication technology use of academicians both in their daily and academic lives, as well as comparing X and Y generation academicians. Data were collected through "Academicians' Access to Information and Communication Technologies Scale", developed by Battal and Kayaduman (2021). Academicians from X and Y generations, working at İstanbul Kultur University were given an online questionnaire. Apart from year of birth, data were also analyzed according to various aspects such as gender, the department academicians are working at, and the total number of years they have been teaching at a higher education institution. Findings reveal that Y generation academicians tend to use information and communication technologies more both in their personal lives and when conducting their courses, whereas X generation academicians prefer to keep a more traditional way, without much change in what they are used to.

Effie Papoutsis-Kritikos
Professor & Department Chair, Northeastern Illinois University, USA
Noreen Powers
Assistant Professor, Northeastern Illinois University, USA
&
Russell Wartalski
Associate Professor & Department Chair, Northeastern Illinois
University, USA

The Great Resignation's Effect on Higher Education: Moving Forward in a Post-COVID World

Introduction

In March 2020, colleges and universities experienced significant shifts in the teaching and learning landscape due to the onset and implications of the COVID-19 pandemic. Institutions found themselves in a precarious position to make swift and significant changes to university teaching and advising practices to ensure the safety and welfare of students, faculty, and staff. At the same time, another phenomenon was taking place, which was The Great Resignation. In November 2021, more than 4 million people resigned from their jobs due to the implications (Smith, 2022).

The Great Resignation was exacerbated by COVID-19 and produced further complications during the pandemic and endemic times. It is essential that the factors leading this movement be understood because of the novelty of the issues and effects. Wage instability, toxic work environment, lack of health and financial benefits, job dissatisfaction, lack of transparent remote work policy, increased workload for remaining faculty, loss of administrative support, and concerns for personal health welfare were leading causes noted for the Great Resignation (Cook, 2021, Smith, 2022) significantly impacting higher education. For individuals working in higher education, the working conditions and supports paralleled the business context.

Purpose Statement

The purpose or aim of this concurrent presentation is to examine how the implications of The Great Resignation affected administration, faculty, students, and programming in higher education in a post-COVID world. The faculty presenters focus on several aspects of the changes that occurred in higher education due to the "Great Resignation." We investigate "which strategies are most effective in addressing issues specific to The Great Resignation?" Speakers will

present research-based strategies for practice and methodology used in determining those outcomes. The points are derived from both anecdotal and research-based information to support the effects the "Great Resignation" had on higher education, specifically administration, faculty, students, and programming. Context-specific examples of higher education experiences (data) and recommendations for strategies will be shared in this presentation.

Results/Conclusion

To address the organizational challenges of The Great Resignation, colleges and universities need to consider implementing data-driven retention practices focused on faculty, staff, and students. From an operational perspective, employee benefits should be scrutinized, and flexible work schedules made available to provide work-life balance. Moreover, student voice must be included in program planning to optimize course offerings, teaching modalities, and student satisfaction that maintains program quality. In addition, research indicates that strategies for successful practice include faculty collaboration and brainstorming regarding issues and strategies that have worked well, check-ins for administration, faculty, and students, continuous needs assessment, and identifying and advocating for appropriate resources.

Denise Patmon
Professor, University of Massachusetts Boston, USA
Oris Bryant
Educator, Noble & Greenough School, USA
&
Surbhi Puri
PhD Candidate, University of Massachusetts Boston, USA

Preparing Teachers to Teach Writing to Diverse Students in the U.S. and India

Given the population shifts in the world today with people moving and resettling with their families sometimes in direct response to the COVID-19 global pandemic, to escape war, to provide better opportunities to their children, or to work and live in a different place – teachers are faced with an ever more diverse population of children to instruct. Pre-service and in-service teacher education opportunities are greatly needed to prepare teachers for the changing demographics of the students who appear before them in their classrooms in this post-pandemic/fog-pandemic context. The purpose of this panel presentation and discussion is to provide an inside view of how one professor has worked with teacher educators at all levels (PhD candidates, teacher practitioners and other educators) to influence how the teaching of writing can be used to include all voices – immigrant, refugee and citizens alike – in the classroom learning and teaching laboratory. Communication can be a process of liberation, transformation, and healing as related to restoring mental health, relationship building, and skill building in one's cultural environment.

Ron Phillips
Associate Professor, Nipissing University, Canada

First Nation Education in Canada: A History of Underfunding

On Dec. 16, 2021, Hon. Marc Miller, the Canadian Minister of Crown-Indigenous Relations, announced that the federal government was not going to appeal a Canadian Human Rights Tribunal (CHRT) ruling that the federal government must compensate First Nations children and their parents for their treatment in the First Nations but federally funded child welfare system. Essentially, the CHRT ruled that the federal government expected the First Nations child and families agencies to follow provincial/territorial levels of programs and services yet failed to provide these agencies with the provincial/territorial funding levels. The lack of adequate funding resulted in program and support shortcomings for these agencies that resulted in many First Nations children being removed from their homes and communities. The federal government through its funding formulas denied on-reserve First Nation children and families comparable provincial/territorial levels of programs and services. The total cost of the compensation was estimated to be $40 billion. However, federal government policies of focusing on provincial/territorial levels of programs and services while refusing to adequately fund First Nations to provide provincial/territorial levels of programs and services is not limited to child and family services. The federal government of Canada has expected First Nations to provide provincial/territorial levels of education without the provincial/territorial levels of funding. No one has explained how this is possible. Education on reserves/First Nations has been underfunded for years. This paper will provide a brief history and the consequences of the underfunding. Recommendations are included.

Stephen Quigley
Lecturer, University of Pittsburgh, USA
&
Cassie Quigley
Associate Professor, University of Pittsburgh, USA

(Un)disciplining Environmental Education: Using the Finnish Nature School Model to Explore Knowledges through Multimedia Storytelling

This presentation will provide a cross-cultural experience for the audience by immersing them into Finnish Nature schools through multimodal storytelling to communicate as a method for unpacking environmental issues for themselves and their user as they experiment with new ways to engage the public in the understanding of these issues as an ethico-politico aesthetic concern. The reason Finland serves as a useful backdrop to these stories is that Finnish schools adopt a holistic approach to understanding environmental education which contrasts with the U.S. approaches, where environmental education is almost solely taught during science courses and touched on only briefly through earth science standards (e.g., changes in the earth's surface structure through volcanic activity). Comparatively, it is not uncommon for U.S. students in grades K-5 to receive little to no environmental education at all. Consequently, the many complicated and interconnected topics that contribute to climate change are often never synthesized or examined by students at this level nor fully grasped by U.S. K-12 students in general.

In other parts of the world, environmental education is infused throughout a curriculum that transcends history, science, technology, and math. Many of these systems, Australia and even now in parts of China, for example, model themselves on Finland's nature schools, where the environment takes a central focus beginning with students at very young ages (ages 3 and 4) partaking in nature studies. Nature studies offer students an opportunity to engage in their communities over sustained periods of time learning about their environment including what sustains it, what disrupts it, and humans roles in the environment. By un-disciplining environmental education, Finnish citizens have some of the most advanced content knowledge as it relates to climate change, and their policies, cultural practices, and aesthetics reflect that knowledge. Despite efforts, the ability to mimic these nature schools in the US has achieved little success.

This presentation will document the (un)disciplining of environmental education in Finland and use this knowledge to address our own ethico-politico aesthetic orientation. Participant will experience virtual reality, 360 views, and other digital media as a way to immerse them in nature schools and highlight the ways these experiences and digital media can be exported to their contexts.

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&
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Quality Testing in Aluminium Die Casting – A Novel Approach Using Acoustic Data in Neuronal Network

Various processes are known in the quality inspection of aluminum die casting. For example, the density of the parts can be measured or X-ray images or images from the computer tomograph are analyzed. All common processes lead to practically very usable results. However, the problem arises that none of the processes is suitable for inline quality control due to their time duration. Therefore, a concept for acoustic sound testing in non-destructive material testing is presented here.

This work presents a new efficient process of quality control. This process is based on the processing of sound data in a neural network to detect possible quality differences of aluminum castings.

Sound samples recorded in an acoustics laboratory form the basis of the present study. Each of the 240 aluminum castings was checked for its condition using X-ray images. This allows the parts to be grouped without doubt into the three quality classes. These are divided into the categories "Good" without defects, "Medium" with air inclusions ("blowholes") and "Poor" with cold flow marks.

For the processing of the generated sound samples, a Convolutional Neuronal Network was chosen. It receives as input the visual representations of the sound samples in the form of the computed Mel-Frequency Cepstral Coefficient. The training of the neural network was performed with both complete and segmented sound samples ("windowing"). The method with the complete sound samples examines them in full length and in windowing random two-second segments of the sound samples are taken and processed.

The evaluation of the generated models was done with a test data set consisting of 120 sound samples. The results of both models are very promising. Both models show an accuracy of 95% and 87% percent, respectively. For better comparability, a 10-fold cross-validation was performed. The model processing the full sound samples performed best in the comparison with 95% accuracy.

The results show that a new process of acoustic sound testing can be realized using a neural network. The model is able to classify the aluminum castings into the appropriate grades.

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Transforming CS Curricula into EU-standardized Micro-Credentials

The European skills agenda (2020) names Micro Credentials as an important tool for citizens to develop future skills demanded by employers. They serve the purpose of supporting life-long learning and international validity of certificates for distributed learning in time and space. To document this personal record, platforms like Europass are developed and rolled out. To enable the recognition of courses including their assessments, it is essential to define outcomes, competences, and skills in a standardized manner that everyone can interpret at an international level. In the EU, qualification frameworks define levels of achievement in the different Bologna cycles. Dublin Descriptors define one such framework by describing levels of learning through "generic statements of typical expectations of achievements and abilities associated with qualifications that represent end of each of a Bologna cycle". These levels can be used to structure the learning outcomes within module descriptions from basic facts, their application, or critical reflection and communication on the given topics. A significant component of this standardization is a controlled vocabulary that defines the different skills. The ESCO classification provides such terms for some areas.

In addition to providing personalized learning paths, such a standardized structure forms the basis of learning data that can support comparative studies as well as best practices. Open educational resources can be indexed uniformly as a function of best-practices. Any such comparative study is very difficult without these standards. In particular, these micro-credentials pave the way for learning paths definitions that will be multidisciplinary in future. One such example is "Data Science" that combines domain knowledge, technology, and mathematics. Such a degree is highly personalized and enabled through micro-credentials. Using EU-standards for micro-credentials supports unification of module descriptions on several levels: (1) Learning outcomes formulation (skills) sorted by level (Dublin Descriptors) (2) Teaching content formulation (knowledge) (3) groupings into smaller,

modular and stackable components, and finally (4) assessment and activities.

Currently, most universities do not follow common standards when describing competences and skills in module descriptions. "Traditionally higher education was relatively explicit about the knowledge (outcomes) to be achieved, or at least the knowledge covered by the curriculum. It was however somewhat less explicit on the skills or competences required for the award a given qualification. Competences, such as those of critical evaluation, were and are embedded or implicit in the assessment values and practices." [Bol, p. 65] Principally, module descriptions are difficult to standardize across modules and even more so across majors as their authors differ and are often untrained in this matter. The current process therefore frequently leads to inconsistencies.

In this case study, a few representative examples (from very simple to highly complex) are converted from the existing more or less "free form" definition to using Dublin Descriptors and ESCO terms. In our paper, we will describe a detailed process of moving from our traditional module description to an EU-standard Micro-Credential. The process will serve as an example to share a methodology that can be used by readers in order to follow guiding steps for their own modules. We will point out lessons learned and pitfalls to avoid along the way, and elaborate on the following steps:

1. Analysing Learning outcomes (LO) in Modules
2. Assigning Dublin Descriptors to LO
3. Associating ESCO Criteria and standardizing formulations
4. Amending ESCO Criteria (in case they are incomplete)
5. Creating stackable sub-Modules (Micro-Credentials)
6. Editing the online Micro-Crediential

Rajni Shankar-Brown
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Education and Justice:
Navigating Complexities and Creating Social Change

Social, economic, and educational disparities continue to widen around the globe, and poverty is rising at significant levels. Economic inequality adversely affects educational systems and student learning. Poverty and housing injustice, paired with intersectional inequities, create extensive barriers and challenges to academic achievement and student wellbeing (Shankar-Brown, 2021). According to the Institute of Global Homelessness (2018), child poverty is situated at the "intersection of public health, housing affordability, domestic violence, mental illness, substance misuse, urbanization, racial and gender discrimination, infrastructure, and unemployment." Furthermore, in addition to economic challenges, public school districts are experiencing increasing racial, ethnic, linguistic, gender and sexuality, cultural diversity across the United States and around the world. With increasing forms of diversity and social inequalities such as food insecurity and homelessness, educators face a multitude of challenges and opportunities (National Center for Educational Statistics, 2019; U.S. Census Data, 2019; Institute for Global Homelessness, 2018). Educators must actively and collectively work to build equitable, inclusive, and responsive learning environments for students in preK-12 schools and in higher education.

Research demonstrates that educational leaders and teachers are critical for ensuring positive student outcomes and success, but school administrators and teachers often report feeling inadequately prepared for the current complexities of education and increasingly unequal landscapes (Mitani, 2018; Shankar-Brown, 2017; Coalition for Teacher Equality, 2016; Miller, 2013; Jordan, 2012; Papa, 2007). These growing challenges are contributing to high educator turnover rates and critical shortages in schools (Mordechay & Orfield, 2017; Jacob et al., 2015; Gates et al., 2006). Instead of deeply addressing and dismantling social inequalities among students, educational practices are frequently perpetuating inequalities and increasing opportunity gaps (Beckett, 2018; Rangel, 2018; Manna, 2015; Fuller, 2012; Shankar-Brown, 2022, 2018; Gorski, 2018). A research study by the National Association of Secondary School Principals (NASSP) and the Learning Policy Institute (LPI) reveals that U.S. public schools with higher percentages of students living in poverty and students of color are more likely to

experience administrative and teacher turnover, which compounds justice issues affecting already vulnerable students (Levin and Bradley, 2019).

This interactive presentation will discuss growing educational complexities with global connections and provide insights moving from theory-to-practice. In the context of current educational inequalities, particularly poverty and homelessness, the presentation will illuminate equity-focused leadership and educational practices to help in transforming challenges into opportunities. Current social inequalities impacting students in prek-12 and higher education will be examined through an interdisciplinary lens. To ensure equality, educational systems must prioritize equity and build inclusive learning spaces that provide diverse learners with dynamic supports and resources. Practical examples of effective equity-focused educational will be shared, along with extended learning resources.

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Successful and Emerging Cyberbullying Control Programs: A Narrative Review of Seventeen Interventions Applied Worldwide

The advent of the internet has channeled our lives to more online-related tasks and has become a pre-requisite now. One of the concerns with high internet usage is multiplication in cyber-associated risky behaviors such as cyber aggression and/or cyberbullying. Despite efforts and interventions that have been taken, the rate of cyberbullying and hatred messaging is still on the rise worldwide. Cyberbullying is an emerging issue that needs immediate attention from many stakeholders. The aim of the article is to review existing successful and emerging interventions designed to control cyberbullying by engaging individuals (*Standalone, Cyber bullying Sensitization Program, Informational Motivational Behavioral Skills, Prev@cib*), through teachers' professional development (*P.E.A.C.E, ViSC, Relationships to Grow, Media Heroes, Asegúrate*) and adopting a whole-school approach (*KiVa, Olweus Bullying Prevention Program, MARC Antibullying Program, CON Red Program, TABBY Anti bullying Program, Cyber Friendly Schools, No Trap*). Many of the interventions deal with traditional school bullying and are modified for encountering cyberbullying issues on the basis of the similarities both types of bullying behavior share, such as constituting unjustified aggression, being based on power imbalance, and persevering over time. Despite similarities, there are also differences such as cyberbullying requires technological expertise, that the unidentified perpetrator does not usually see the victim's reaction instantly, that the roles of bystanders are more complex and that there are differences in intentions. It is difficult to protect oneself against cyberbullying as nasty messages or content can be sent to mobile phones, computers, or social media anytime and anywhere within seconds. The review presents strengths and limitations of the programs, and suggestions to improve the existing interventions. Preparing interventions with a strong theoretical framework, integrating applications of theories in interventions, promoting proactive and reactive strategies in combination, beginning with baseline needs

assessment surveys, reducing digital time and digital divide among parents and children, promoting the concept of lead trainer, peer trainer, and hot spots, focusing on physical activities and use of landmarks are some of the recommendations proposed by the authors. In addition to face-to-face intervention sessions, it is suggested to update and combine existing interventions programs with games and apps to evaluate this combination.

Glenn Svedin

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High Achievers and Gifted Students in the Swedish Compulsory School System, 1842-2022

During the 21th-century, the question of high achievers and gifted students' learning has received increased attention in both research and educational debate in Sweden. This article analyzes how the so-called formulation arena has reasoned about and viewed these students' educational- and school situation, and what opportunities for organizational and pedagogical differentiation that the school's curriculums has specified and recommended. Previous pedagogical and psychological research has often claimed that high-achievers and particularly gifted students have been ignored by decision-makers and in school curriculums. In the article, that image is problematized and nuanced. Instead, it is demonstrated that Swedish curriculums throughout the 20th-century, and especially during the first three decades of the cohesive compulsory school from the 1960s-1980s, provided several opportunities for, and demanded, both organizational and pedagogical differentiation, for example based on students' achievements, interests, and giftedness. Furthermore, it is demonstrated that those statements and demands in the curriculums firstly had roots in previous curriculums from 1919 and 1955, and secondly, was strongly recommended by both contemporary pedagogical research and school commissions.

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Drone Delivery Optimization in Mixed Fields

Drone usage is an exciting new area of research and technological growth. For example, drones are now used in areas like environmental protection, public safety, and even smart agriculture. Considering that drones are environmentally friendly, fast, and cheap to operate, interest in drone usage as delivery agents is rising as well. We focus on delivery in more realistic landscapes, with buildings and open areas in the delivery area.

We modeled the drone delivery area with a two-dimensional grid, with the grid lines being streets. The set of requests for deliveries is a subset of grid points i.e., street intersections. We label each cell as a park or a building; drones can fly in straight lines over the parks but must follow 10streets around buildings because of aviation laws. Thus, in our model the delivery area has a mixed Euclidean and Manhattan distance metric.

In this paper we present our work on finding the shortest path between two points in our grid. Using our mixed Euclidean and Manhattan grid, we developed a heuristic algorithm to determine shortest paths between two points. We evaluate the efficacy of our heuristic algorithm by comparing the results of a brute force algorithm, A* and ours on 100 100x100 grids with buildings randomly dispersed in number and placement. We show that our algorithm runs faster than brute force (about 12,000 times faster). We also prove that our algorithm gives at most a square root two approximation of the true shortest path, where the square root two bound is exhibited only on certain types of grids. The heuristic algorithm runs about 100 times faster (1.1 seconds versus 0.01 seconds) and gives approximations almost as good as A*.

Currently, we are working on algorithms to determine the best locations to place pods with drones that can service a subset of requests on the grid. The number of deliveries a pod can make is constrained by the battery life of the drones.

Icarbord Tshabangu
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Examining Citizenship Education through the Lens of Interculturalism: A Review

The unprecedented increase in migration during the last fifteen years has brought enormous challenges, especially to countries within the European Union. According to the most recent figures from the International Migration Report, (United Nations 2016) the total number of migrants reached 244 million, up from 222 million in 2010 and 173 million in 2000. Nearly two thirds of international migrants live in Europe (76 million) or Asia (75 million). The often-negative reaction to this and the rise of Far Right and Neo-Nazi movements has brought deep divisions in its wake, especially in disadvantaged communities and in the UK these ideologies have gained more traction because of the Brexit vote. Furthermore, the issue of migrants who have been in a country long term, often feeling alienated and marginalised, is not being addressed satisfactorily. It is against this backdrop that the issue of interculturalism is being considered as a positive way forward by exploring intentional creative approaches promoting diversity as an advantage and working for positive societal change. The part that educational institutions play in this socio/economic climate in preparing for the future is becoming increasingly important. This paper will examine three aspects of interculturalism which will signpost more effective ways of exercising intercultural leadership, firstly explaining the emerging concept of interculturalism, followed by defining the characteristics and dimensions of cultural understanding. Finally, the practical implications of this will be considered in the application of intercultural competency and leadership within the educational context. It is noted that without appropriate policies, which place intercultural competence at the heart of all education, no sustainable societal change is possible (Neuner 2012).

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Motivations and Needs of the Students of the Master's Degree in Gerontology of the University of Guadalajara

In the face of a growing population of graduate students with multiple needs and various psychosocial problems, it is essential to formulate alternatives that increase the efficiency of graduate programs, the allocation of resources and the adequacy of educational provision on a more solid basis. Therefore, the analysis of the needs and motivations of graduate students should be a common practice in Higher Education Institutions, for the structuring of curricular programs, avoid desertion, ensure terminal efficiency and employment. Thus, the purpose of the present project is to analyze the motivations and needs of the students of the master's degree in gerontology since these affect the formulation of perspectives and challenges for the management of their postgraduate degree.

Data collection was carried out on students enrolled in the Master in Gerontology in calendar 2022A, by a questionnaire divided into two parts. The first, contemplated sociodemographic characteristics of the participants such as: age, gender, marital status and profession. In the second part, the scale of motivations and needs at graduate level (Vázquez Arias et al., 2020) was applied, which includes a series of motivations for admission and permanence in the postgraduate, needs, problems and factors to successfully conclude its postgraduate degree.

Results. Motivations: Getting better job opportunities motivated me to get into graduate school 86.7%; the future projection of graduate school motivated me to enter 100%; my interest in the curriculum boosted my income 93.3%; reaching a new level of education influenced my admission 80%; developing my potential as a student favors my education 86.7%. Needs: Feeling safe inside the university premises is important for my training 93.3%; openly expressing my disagreements with the coordination of the postgraduate course facilitates my training 66.7%; that the coordination gives greater attention to my physical and

psychological health contributes to my training 80%. Problematics: In my graduate degree, internships are performed according to the curriculum 86.7%; teachers have sufficient knowledge 93.3%; there is a subject on the central theme of postgraduate studies 100%; the classes are well prepared by the teachers 60%. Factors for a successful conclusion: The support and advice of my thesis director are essential for completing the postgraduate course: 93.3%; the support of my teachers is indispensable to finish graduate school 86.7%; to be committed and have the will, is fundamental to finish in time and form the postgraduate 100%.

Conclusions: The participating students show a profile characterized by having a fairly wide age range and being mostly women. In general they are intrinsically motivated and show a desire for improvement and an interest in knowledge. In addition to prevailing in them security needs. We identify certain problems with the classes and in general they consider that their personal commitment is the main factor in successfully completing their postgraduate degree. Studies like this are important for better organizational management of graduate programs. In the face of a growing population of graduate students with multiple motivations, needs and psychosocial problems, it is essential to formulate alternatives that increase the efficiency of graduate programs.

Deon Vos
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Multiculturalism, Interculturalism, Secularisation and School Autonomy: Responses to Hyper-diversity in Education in the BRICS Countries (China)

The concepts of multiculturalism, interculturalism, secularisation, and school autonomy receive a lot of attention in the BRICS member states. The ideal of the BRICS member states is to give full recognition to a multicultural and diverse population, but still emphasize the importance of unity within each member state. The principle of creating space for diversity is important, but if the ideal of unity within a country is not harmed. The concept of diversity includes the following: different religious beliefs, different languages and dialects, different cultures, different traditions, customs, rituals and ways of seeing, different value systems, different clothing, different types of food as well as the way in which food is prepared, different ethnic groups and the variety of gender, race, and age. A further ideal is to use a decentralized education system to establish effective education and autonomy. As in the case of all the BRICS member countries, it is not an overnight and simple activity to establish the ideal of recognition of the otherness or diversity within a country. This is a well-thought-out, slow, and extremely complex activity. The only principle that is supposed to apply is effective communication between all stakeholders, understanding of each other's contexts, the formation of compromises as well as the uniform and collective ideal of recognition of diversity within the unity of a country. In the case of China, concerted efforts are being made to realize this ideal. As in the case of all the BRICS member countries, this ideal of China is a time-consuming and extremely complex process. It is important for humans to protect and even defend the uniqueness of a community within the larger population. This principle of people has led to many wars, where the lives of millions of people have been destroyed.

Elize Vos

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Guidelines for Developing Self-Directed Readers and Learners in Natural Science

Research, completed in 2021 with a group of Natural Science learners at a South African school, will be discussed. The problem statement was that these learners could not read and learn Natural Science texts in a self-directed manner and comprehension of was thus lost. As a result, it had a huge impact on their academic performance.

Multimodal reading, viewing, and learning strategies were investigated with the aim of integrating these strategies into lessons to help these learners becoming self-directed readers and learners of Natural Science texts. The cognitive development phase of adolescent learners was researched to determine what type of thinking learners use to comprehend the world around them.

A document and thematic analysis were done of national and international assessment bodies to estimate the level of literacy and numeracy of South African learners. Reading comprehension issues were investigated, and it is shown that it is caused by a lack of reading comprehension instruction in learners' home language, and a variety of sociocultural variables. A document analysis of the South African Curriculum and Assessment Policy (CAPS) for these learners' Home Language indicated that language skills, such as reading and viewing, are essential for academic performance. Furthermore, the document analysis of the Natural Science Curriculum and Assessment Policy indicated that Natural Science learners in the Senior phase are presented with various domains of knowledge connected to specific subjects in the Further Education Training phase (FET). As a result, it is critical for Senior phase learners to be familiar with these different domains of knowledge to make subject choices at the end of this phase that will eventually affect their career choice.

The constructivist teaching-learning approach, based on scaffolding, was used to create a lesson series. Within the interpretivist research paradigm, the study used a qualitative research method. A variety of data-gathering techniques and convenience sampling were used. The data-collecting methods were based on content and thematic analysis of a complete literature review and documents, from which themes, which help to curriculate the lesson series, emerged. In addition, the effectiveness of the study was determined by analyzing the eight learner-centered lessons and observation checklists, pre-

journal entries, reflective post-journal entries and the pre- and post-tests.

The core contribution is that a specific group of Natural Science learners in the Senior phase is empowered to read and learn a variety of texts (with the purposeful integration of multimodal reading, viewing, and learning strategies) self-directed. Furthermore, guidelines were compiled for Natural Science teachers that explain how they can integrate multimodal reading, viewing, and learning strategies in lessons to develop Natural Science learners into self-directed readers and learners.

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Quality and Transformation through the Lens of Transnational Online Graduate Students and Their Instructors

This research study explored the factors contributing to student success and challenges encountered by transnational Greek students during a graduate program undertaken at an open, online distance education university in Canada. Transnational distance education, defined as the movement of academic programs and providers between countries, is a strategic practice that contributes to the internationalization of higher education. While there are many studies on transnational education, little is known about the transnational student learning experience and the practices necessary to support intended outcomes, including preparing post-graduates with essential skills and competencies for employment and lifelong learning within their local communities, country of origin, and globalized economy. The six-member female research team includes three former transnational students from Greece who graduated from a Master of Education (Med) program between 2018 and 2019, a transnational doctoral student and two faculty members.

Methodological Approach

An analytical approach to collaborative autoethnography (CAE) was chosen. CAE is a qualitative research method that uses diverse data and rigorous self-reflection and reflexivity on individual and group experiences within socio-cultural contexts. An analytic CAE research agenda aims to improve theoretical understandings of broader social phenomena.

Data Collection and Analysis

Data were collected from interactive interviews, documented teaching and learning practices, socialization experiences, and student-created archival materials. Data analysis and interpretation were facilitated by NVivo using an inductive values coding approach. Our findings describe graduate competencies, intellectual, socio-cultural and employability benefits to transnational student stakeholders, and contributions made by graduates to their profession and communities. Recommendations for improving the quality of the online transnational learner experience are offered.

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Impact of Positive Behavioral Interventions and Supports on Student-teacher Relationships

This presentation will report on research that builds on previous studies by the authors into relationships between teachers and their students, relationships that can have a powerful impact on classroom management. The current research investigates whether Positive Behavioral Interventions and Supports (PBIS) might have a positive effect on teacher-student relations and a negative impact on discipline referrals. Previous studies have been limited to teachers working in Grades preK-8; this research investigates all grades preK-12. The presentation will give interim results of the study and will make the research instruments available to conference attendees.

Deirdre Wilson
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Blending Google Docs with the Face-to-Face Modality to Facilitate the Collaborative Writing Process

Web-based writing tools and peer collaboration are gaining recognition as promising pedagogical strategies for supporting writing skills development. Yet, there is a notable lack of research detailing the complexities inherent in integrating these practices into the teaching and learning process of an ongoing course. The study described herein sought to fill this void by exploring how an experienced high school English teacher facilitated a narrative writing unit over a 7-week period; the unit culminated with a collaborative writing project, in which the students worked in pairs (and one triad) and used Google Docs to write a story about the future. To facilitate triangulation, a variety of data sources were collected, including field notes derived from 16 class observations, ongoing reflections written by the teacher, pre- and post-project interviews with the teacher, focus group interviews with the students, and the students' shared Google Docs. A detailed analysis of the data revealed that the teacher used a variety of strategies that align with sociocultural perspectives on writing. Notably, the teacher blended the use of a mediating tool, Google Docs, with extended opportunities for students to write collaboratively while sitting face-to-face with their peers and teacher in the classroom. The affordances and constraints associated with the aforementioned pedagogical strategies will be discussed, alongside recommendations for using web-based writing tools as part of a face-to-face course.

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Show Don't Tell:
A University of Hawaii Self-Study on Using ePortfolio Versus Thesis as the Master's Degree Capstone Assessment

University of Hawaii graduate-level instructors share self-study findings on the use of ePortfolios as the culminating capstone master's degree assessment in the PACMED Program. The PACMED Program facilitates a hybrid online master's degree program for candidates across four nations: the US Hawaiian Islands, American Samoa, Federated States of Micronesia, and the Republic of Marshall Islands. PACMED endeavors to provide meaningful place-based and culturally responsive courses and projects in these Pacific regions, where the majority of the candidates speak English as a second language and continue to value indigenous cultural practices. The PACMED Program earned the 2022 Pacific Circle Consortium Award and the 2020 University of Hawaii Diversity Award for fostering international cooperation between educational research and development institutions in the Pacific Region through collaboratively produced curriculum materials, broader issues of policy development, and relevant educational research. A collaborative, multicultural program, PACMED was created on the foundational United Nations Declaration of Rights of Indigenous Peoples (2007) that Pacific leaders are willing and able to solve Pacific problems. The ePortfolio is being tested as an instructional intervention to replace traditional master thesis papers as a place-based and culturally responsive assessment. ePortfolios provide **a** detailed description of candidates' achievements aligned to professional teaching standards. This involves a reflective practice where candidates are empowered to showcase their understanding of professional standards, cite relevant research literature to support the standards, contextualize examples of how they met the standards, and include a self-evaluation of the effects of their professional practice to prompt continuous improvement. Attwell (2005) summarized seven benefits of ePortfolios in that participates a) recognize learning, b) record learning, c) reflect on learning, d), validate learning, e) plan new

learning, and, f) assess learning. Presenters will discuss exploratory self-study findings of ePortfolio use including a) collaboration with local departments of education and community organizations, b) documentation of state and federal professional teaching standards, c) validation of place-based and culturally-responsive projects, d) citation of relevant research literature, e) integration of instructional technology, f) development of candidates' metacognition and efficacy, g) formation of connections across academic disciplines with place and culture, and, h) promotion of candidates through evaluation and accreditation processes.

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Comparing Student Performance in Face-to-Face, Hybrid, and Online Modalities in Psychology Courses

As non-traditional teaching formats such as online and hybrid have become more prevalent, especially since the COVID-19 pandemic, it is increasingly important to examine the effectiveness of these modalities. Previous research studies have been conducted comparing the student outcomes in online vs. face-to-face classes. In general, results from these studies are somewhat mixed and inconclusive (Arias, Swinton, & Anderson, 2018; Cavanaugh & Jacquemin, 2015; Paul & Jefferson, 2019). However, not much research has examined the efficacy of the hybrid format in comparison to face-to-face or online. The purpose of the current study was to determine whether there were significant differences in student performance among these three teaching modalities in two psychology courses: Introductory Psychology and Lifespan Developmental Psychology. Both courses are required for psychology majors and minors, and both are offered every semester, enrolling a large number of students, and both are offered in all three modes. The dataset, obtained from the record office of a comprehensive southeastern university in the United States, included a total of over 200 sections of Introductory Psychology course with a total of 10845 students enrolled (f2f=7625, online=2318, hybrid=902) and 100 sections of Lifespan Developmental Psychology course with 5529 students enrolled (f2f=3038, online=1286, hybrid=1205). These data were from the four years before the COVID-19 struck the world, from fall 2015 to fall 2019. Students' course grades were used as the academic performance indicator. Demographic information such as age, sex, previous GPA, previous experience with online courses, and minority status was also used in the analyses. ANOVA analyses show different results between these two courses with regard to teaching modes. Ad hoc paired t-tests indicate that for Introductory Psychology course, students in hybrid sections obtained significantly higher course grades than those in online (t=2.15, p<0.05) and f2f (t=3.65, p<0.01) sections, and students' course grades in online sections were significantly higher than those in f2f (t=1.82, p<0.05) classes. However, for Lifespan Developmental Psychology course, students in f2f sections obtained the highest course grades, followed by online and hybrid sections. These findings are aligned with the previous studies that showed inconclusive results. Further, correlational analyses show that among all the

demographic information collected, students' previous GPA was significantly positively related to their course grades regardless of teaching modes (r=0.50, p<0.01), which is consistent with previous research findings. These and other relevant results will be presented and discussed in the presentation. These results will provide some useful information regarding effective teaching formats and student performance for college faculty who teach Psychology courses.

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