ATHENS INSTITUTE

Abstract Book

22nd Annual International Conference on Information Technology & Computer Science
18-23 May 2026, Athens, Greece

Edited by
Adrian Ionescu & Olga Gkounta

2026

Abstracts
22nd 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 *22nd Annual International Conference on Information Technology & Computer Science* (18-23 May 2026), organized by the Athens Institute.

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

The purpose of this abstract book is to provide members of the Athens Institute 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. Athens Institute 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 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 the Athens Institute's mission, the presenters in these conferences are coming from many different countries, presenting various topics.

Table 1. *Publication of Books of Abstracts of Proceedings, 2011-2026*

Year	Papers	Countries	References
2026	29	15	Ionescu and Gkounta (2026)
2025	34	19	Ionescu and Gkounta (2025)
2024	35	17	Ionescu and Gkounta (2024)
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 Athens Institute'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, Athens Institute has organized more than 400 international conferences and has published over 200 books. Academically, the institute is organized into 7 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 the Athens Institute 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.

Athens Institute'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 *22nd Annual International Conference on Information Technology & Computer Science*, accomplished this goal by bringing together academics and scholars from 15 different countries (Brazil, Canada, Cyprus, Finland, Germany, Israel, Italy, Japan, Peru, Singapore, Slovenia, Sweden, The Netherlands, Türkiye, 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

22nd Annual International Conference on Information Technology & Computer Science, 18-23 May 2026, Athens, Greece

Organizing & Scientific Committee

All Athens Institute's conferences are organized by the Academic Council. This conference has been organized with the assistance of the following academic members of Athens Institute.

1. Dr. Gregory T. Papanikos, President, Athens Institute.
2. Dr. Gohar Marikyan, Deputy Director, Sciences Division, Athens Institute & Professor, SUNY Empire State University, USA.
3. Dr. Adrian Ionescu, Head, Computer Science Unit, Athens Institute & Professor, Wagner College, USA.

FINAL CONFERENCE PROGRAM
22nd Annual International Conference on Information Technology & Computer Science, 18-23 May 2026, Athens, Greece

PROGRAM

Monday 18 May 2026

08:30-09:15
Registration
09:15-10:00 Opening Speech and Welcoming Remarks
Speaker: Gregory T. Papanikos, President, Athens Institute & Professor (Adjunct), University of Tennessee, Knoxville, USA.

10:00-11:30 Session 1
Moderator: Till Haenisch, Professor and Head, Informatics Study Program, DHBW Heidenheim (Baden-Württemberg State University), Germany.

1. **Jianhua Yang**, Professor, Columbus State University, USA.
   ***Title**: Broadening Cybersecurity Awareness for Middle School Girls via Outreach, Cyber-games, and Storytelling.*
2. **Stavros Georgakopoulos**, Distinguished Professor, Florida International University, USA.
   Constantinos L. Zekios, Assistant Professor, Florida International University, USA.
   Ricardo Sendrea, PhD Candidate, Florida International University, USA.
   ***Title**: A Multi-Fidelity Deep Learning Framework for Robust Computational Imaging.*
3. **Ayman Eldeib**, Associate Professor, Southern New Hampshire University, USA.
   Austin Bryan, Student, Southern New Hampshire University, USA.
   Mohamed Saad, Associate Professor, Minia University, Egypt.
   ***Title**: Genomic Analyzer: A Scalable and High-Performance Object-Oriented Application for SNP Analysis and Genetic Association Studies.*
4. **Hamid Farrokh Ghatte**, Assistant Professor, Antalya Bilim University, Türkiye.
   Seyed Mohammad Amin Abtahi, Assistant Professor, Antalya Bilim University, Türkiye.
   Muzaffer Koc, Assistant Professor, Antalya Bilim University, Türkiye.
   ***Title**: AI-Driven Multi-Modal Assessment of Building Vulnerability in Seismic Zones.*

11:30-13:00 Session 2
Moderator: Hamid Farrokh Ghatte, Assistant Professor, Antalya Bilim University, Türkiye.

1. **Nick Linardopoulos**, Associate Teaching Professor & Public Speaking Course Coordinator, Rutgers University, USA.
   ***Title**: AI, Communication and the Future of Teaching & Learning.*
2. **Mark van der Pas**, CEO, Uffective, The Netherlands.
   ***Title**: Enhanced Time Estimation Improvements in Agile Developments: A Seven-Year Natural Experiment.*

13:00-14:30 Session 3
Moderator: Terry Stockton, Assistant Professor, Grand Valley State University, USA.

1. **Jingzi Huang**, Professor & Associate Dean, College of Education and Behavioral Sciences, University of Northern Colorado, USA.
   ***Title**: Connecting Program Assessment of Teaching Talent Training in Higher Education to the Reality of the Schools: A Case Study of Assessment Development for a Teacher Preparation Program.*
2. **Jose Roberto Serra Martins**, Professor, Federal Institute of São Paulo, Brazil.
   ***Title**: Teaching Training for Science Teachers: From Self-Formation to the Operationalization of Projects.*

3. **Molly Tovar**, Educational Consultant, Trail Tree Consulting, USA.
   Kellie Thompson, Educational Consultant, Trail Tree Consulting, USA.
   ***Title**: The Importance of Training Teachers on Indigenous STEM Concepts in K-12 Education.*
4. **Michele Vaz**, Business Manager, McMaster University, Canada.
   Tom Wanyama, Associate Professor, McMaster University, Canada.
   ***Title**: Expanding Engineering Education through Outreach at the SEPT Learning Factory.*
5. **Sabine Khalil**, Associate Professor, Illinois State University, USA.
   Bahae Samhan, Associate Professor, Illinois State University, USA.
   ***Title**: User Adoption of Augmented Reality Exhibitions: Insights from a U.S. Study.*

14:30-15:30 Lunch

15:30-17:30 Session 4
Moderator: Jingzi Huang, Professor & Associate Dean, College of Education and Behavioral Sciences, University of Northern Colorado, USA.

1. **Arie Kizel**, Professor, University of Haifa, Israel.
   ***Title**: Expanding Buber's I-Thou to I-Virtual Space-Thou in Students' Relations.*
2. **Tamara Bell Boyle**, Founder, Organization Hopemore International, USA.
   ***Title**: A Longitudinal Study: How Prepared Did Educators Feel they were, to Teach Virtual – Prior, during, and after the COVID-19 Pandemic Quarantine?*
3. **Stephen Adofo**, Researcher, University of Eastern Finland, Finland.
   Sirpa Kärkkäinen, Senior Lecturer, University of Eastern Finland, Finland.
   Jingoo Kang, Research Fellow, University of Eastern Finland, Finland.
   ***Title**: Mock Examinations in Science Under High-Stakes Testing: Teachers' Perceptions, Practices, and Implications for Pedagogy, Equity, and Well-Being.*
4. **Astrid Schmied**, Education Research Scientist, National Institute of Education, Nanyang Technological University, Singapore.
   ***Title**: Adapting Critical Appraisal Tools for Context-Sensitive Systematic Meta-Reviews in School-Based Mathematics-Related Education.*
5. **Robert Mejias**, Professor and Director, Center for Cyber Security Education and Research, Colorado State University-Pueblo, USA.
   Morgan Shepherd, Professor, University of Colorado-Colorado Springs, USA.
   Raul Y. Reyes, Professor, University of Arizona, USA.
   ***Title**: Possible Determinants of Information Security Vulnerability Awareness (ISVA).*
6. **Elizabeth Diaz**, Associate Professor, University of Texas at Arlington, USA.
   ***Title**: miABCTamil: Bridging the Digital Divide in Tamil Language and Cultural Education Through Technology-Enhanced Learning.*

18:00-20:00 Session 5 – Visit Aristotle's Lyceum

It requires pre-booking

20:30-22:30 <u>Athenian Early Evening Symposium</u> (Sequence of Events: Ongoing Academic Discussions, Dinner, Wine and Water, Music, Dance)

Tuesday 19 May 2026

09:00-11:00 Session 6
Moderator: Larisa Rowe, Associate Professor, Connecticut State Community College, USA.

1. **Tonya Callaghan**, Professor, University of Calgary, Canada.
   Jamie Anderson, PhD Candidate, University of Calgary, Canada.
   ***Title**: Trans Teachers and the Politics of Presence in Anti-Trans Educational Policyscapes.*
2. **Silvana Watson**, Professor Old Dominion University, USA.
   Tara Donahue, Director, Traverse Bay Evaluation, Traverse City, USA.
   ***Title**: Moving the Needle: Professional Development that Transforms Instruction for Multilingual Learners.*
3. **Daniel Thomas III**, Assistant Professor, Texas A&M University, USA.
   Langston Clark, Interim Department Chair, Department of Interdisciplinary Learning and Teaching & Professor, University of Texas at San Antonio, USA.
   ***Title**: Curriculum-Making in Black Hands: Humanities Education in Black-Led Schools.*
4. **Sandra Styres**, Associate Professor, Ontario Institute for Studies in Education, University of Toronto, Canada.
   ***Title**: Radical Imagining Indigenous Education: Centering Land-based Practices in Transformative Education.*
5. **Fathi Shamma**, Lecturer, The Open University of Israel, Israel.
   Tali Heiman, Professor, The Open University of Israel, Israel.
   Dorit Olenik-Shemesh, Professor, The Open University of Israel, Israel.
   ***Title**: The Mediating Roles of Religiosity and Social Cohesion in the Relationship between Volunteering and Psychological Resilience among Arab Adolescents in Israel.*

11:00-12:30 Session 7
Moderator: Jianhua Yang, Professor, Columbus State University, USA.

1. **Till Haenisch**, Professor and Head, Informatics Study Program, DHBW Heidenheim (Baden-Württemberg State University), Germany.
   Anke Hutzschenreuter, Professor, DHBW Heidenheim (Baden-Württemberg State University), Germany.
   ***Title**: Defining an AI-Literacy Course for Dual-Education Programs, Especially in Computer/Data Science: A Case Study.*
2. **Maria Krambia Kapardis**, Professor, Cyprus University of Technology, Cyprus.
   Georgios Spanoudes, Professor, University of Cyprus, Cyprus.
   ***Title**: Usefulness of AI Teaching Tools for Accounting Students.*
3. **Iyad Suleiman**, Lecturer, Tel Hai University, Kiryat Shmona, Israel.
   ***Title**: Potential Outcomes of Subsidized Medical Care: Evaluating Premature Birth Odds Ratios.*

12:30-14:00 Session 8
Moderator: Olga Gkounta, Researcher, Athens Institute.

1. **Makoto Tatsuta**, Professor, National Institute of Informatics, Japan.
   ***Title**: Normal Cyclic Proof Theorem.*
2. **Honorato Ccalli Pacco**, Professor, Universidad Nacional de Jaén, Peru.
   ***Title**: Modeling, Simulation, And Control in the Kefir Fermentation System as a Function of Culture Concentration using Fuzzy Logic.*
3. **Mauro Pullin**, Adjunct Professor, University of Padova, Italy.
   ***Title**: Approximate Rectangular and Trapezoidal Integration, with Implementation in the Java and Python Programming Languages.*
4. **Florian Pramme**, PhD Student, Ostfalia University of Applied Sciences, Germany.
   Tamás Kurczveil, Professor, Ostfalia University of Applied Sciences, Germany.
   ***Title**: A 5G Campus Network Architecture Enabling Cooperative V2X Communication for Autonomous Driving.*

14:00-15:00 Lunch

16:30-19:30 Session 9
Old and New-An Educational Urban Walk

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 the Athens Institute exclusively for the conference participants.

20:30-22:30
Closing Remarks by Gregory T. Papanikos: "Wine, Words, and Wisdom: An Ancient Athenian Dinner Symposium" followed by an Ancient Athenian Dinner

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Wednesday 20 May 2026
An Educational Visit to Selected Islands
or Nafplio & Mycenae Visit

Thursday 21 May 2026
Visiting the Oracle of Delphi

Friday 22 May 2026
Visiting the Ancient Corinth and Cape Sounion

Saturday 23 May 2026
11:00-13:00 – The Academic Discussion continues in the downtown open agora (close to the Aristotelian Lyceum)

Stephen Adofo
Researcher, University of Eastern Finland, Finland
Sirpa Kärkkäinen
Senior Lecturer, University of Eastern Finland, Finland
&
Jingoo Kang
Research Fellow, University of Eastern Finland, Finland

Mock Examinations in Science Under High Stakes Testing: Teachers' Perceptions, Practices, and Implications for Pedagogy, Equity, and Well Being

High-stakes testing through Ghana's Basic Education Certificate Examination (BECE) shapes instructional priorities. Schools widely use mock examinations to prepare learners the exams. This study examines junior-high science teachers' perceptions of mock examinations. We also examine effects on teaching, learning, and well-being. Four questions guided the inquiry on value, influence, preparation, and challenges. We conducted online semi-structured interviews with twelve criterion-sampled teachers. Interviews lasted thirty to forty minutes and were audio-recorded. Transcripts were anonymised and analysed using thematic analysis. Coder calibration, a decision log, consensus meetings, and team review strengthened credibility.

Teachers depicted mocks as rehearsal that enhances readiness and exam familiarity. Mock exams provided diagnostic feedback through script reviews and targeted reteaching. Motivation improved when feedback was constructive, timely, and solution focused. However, washback was ambiguous and often negative for pedagogy. Teachers reported accelerated pacing, topic targeting, and reduced practical and inquiry work. Preparation was intensive, with extended hours, extended days, and supervised study. Feedback windows were compressed with teachers marking at night and students lost sleep. Fee requirements and rural constraints introduced clear equity risks.

We recommend learning-oriented mock exams with Feed Up–Feedback–Feed Forward cycles. Post-mock practical or inquiry blocks are required to promote critical thinking. Fewer, well-spaced mock exams will allow feedback and recovery. Subsidising or capping fees and standardising mock exams and schedules will promote equity while reducing workload. Finally, BECE science requires revision to assess students' practical, critical, creative, and procedural competencies.

Tamara Bell Boyle
Founder, Organization Hopemore International, USA

A Longitudinal Study: How Prepared Did Educators Feel they were, to Teach Virtual - Prior, During, and After the COVID-19 Pandemic Quarantine?

In March of 2020, to reduce and attempt to eliminate the spread of the coronavirus (COVID-19) many education institutions "almost overnight" (UNICEF, 2021) had to "suspend face-to-face teaching in schools" (Engzella, Freya, & Verhagena, 2021) following their government's mandate, for the safety of their citizens. Governments were following the advice and guidance of the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO) (UNICEF, 2021). Nevertheless, students still needed to learn and teachers still needed to teach the students. However, how prepared did educators feel they were to teach virtual (i.e., asynchronous, synchronous, and simultaneous-synchronous-online)? This paper is a longitudinal study that examines educators' perspective on how prepared they felt they were to teach virtual prior to the COVID-19 pandemic quarantine (i.e., March of 2020) until the end of the academic year of 2021-2022 (i.e., June 2022). Three self-reporting questionnaires were posted on a social media platform to educators. Thus, taking their employer out of the equation. There were 20 participants who opened and completed the pilot questionnaire. Then 298 participants completed the self-reporting questionnaire, out of 299 who opened the self-reporting questionnaire. In addition, a last questionnaire was emailed to 126 of the 298 prior participants who said they would be interested in completing a follow-up questionnaire, in order to provide their perspective on how prepared they felt they were to teach during the academic year of 2021-2022 and their expectations for the 2022-2023 academic year. Ten emails were returned undeliverable. However, 44 educators completed the follow-up questionnaire. The respondents range from Pre-Kindergarten Teachers up to and including professors teaching PhD; and subjects ranged from general education to special education, from Family and Consumer Science to Advance Science including Chemistry, from Physical Education to Music. The following answers are some of the findings during the start of the COVID-19 pandemic quarantine. The participants were asked if the ever taught online. 33 participants stated they taught online, whilst 252 participants stated they have never taught online prior to COVID-19 pandemic quarantine. In addition, participants were asked "The training I received

prior to the start of COVID-19 pandemic quarantine (i.e., March of 2020) prepared me." Out of the 288 responses 5.2% (15 participants) "Strongly Agree", 6.9% (20 participants) "Agree", 12.8% (37 participants) "Neither Agree nor Disagree", 21.2% (61 participants) "Disagree", 53.8% (155 participants) "Strongly disagree". The participants were also asked "Did your education institution have any kind of teaching, learning, and technology (TLT) center available to support you during the COVID-19 pandemic quarantine (i.e., March of 2020 until June 2020, the end of the US academic year of 2019-2020)?" Out of the 297 responses 35.7% (106 participants) answered "Yes", 16.8% (50 participants) answered "I have no idea.", and 47.5% (141 participants) answered "No". Please note, the same questions were asked each year—hoping for improvement. In addition, the questionnaire asked if the participants' schools had a plan during and if the school offered any training during the summers.

Tonya Callaghan
Professor, University of Calgary, Canada
&
Jamie Anderson
PhD Candidate, University of Calgary, Canada

Trans Teachers and the Politics of Presence in Anti-Trans Educational Policyscapes

Parental rights policies are being adopted widely across North America and take the form of book bans, restrictions on queer and trans-inclusive curriculum, and restricting the rights of Two Spirit, Lesbian, Gay, Bisexual, Trans, Queer, Intersex, and Asexual (2SLGBTQIA+) youth. Driving these policies are conservative Christian political movements that engage in what Rasmussen (2023) refers to as "heteroactivism," which is tied broadly to natalist concerns about the traditional family, parental rights, free speech, and removing diversity, equity and inclusion from public spaces. "Gender ideology," as they call it, is constructed as a common enemy. Concerned parents unite under the banner to protest inclusive sexual health education, 2SLGBTQIA+ educational initiatives, marriage equality, access to washrooms for transgender individuals, and more (Carnac, 2020; Corredor; 2019; Korolczuk & Graff, 2018). These moral panics are rooted in misconceptions about the development of sexual orientation and gender identity (SOGI) and discourses of childhood innocence that position queer and trans identities as something children need to be protected from. Within policy landscapes that intend to root out the presence of 2SLGBTQIA+ curriculum and supports, transgender teachers protected by employment legislation can make visible and present the possibilities of trans futures in schools. This paper examines the 2023-2025 education policy changes that regulate 2SLGBTQIA+ identities and content in schools in the Canadian provinces of Alberta and Saskatchewan.

Drawing upon Foucault's discourse theory, we analyze how power operates through language and normative constructions of identity (Foucault, 1980). Educational policies often reflect societal efforts to monitor and regulate individuals' identities, primarily through legislation and institutional norms that marginalize diverse expressions of gender (Foucault, 1990). In the current landscape of anti-trans policymaking, trans teachers emerge as "thorny bodies" within educational systems. Our presence serves as a defiant challenge to conservative agendas aimed at obliterating trans futures, embodying the possibility of such futures within the very institutions designed to

marginalize them. Critical queer theories provide a lens for tracing anti-trans discourses in Alberta and Saskatchewan to their antecedents to understand how they have been sedimented over time. This theoretical framework is also used to examine how trans teachers may be positioned to resist these policies as living proof of trans futures in an education system that seeks to limit them.

This paper offers "thorniness" as a framework for resistance. We consider how thorniness can be strategically leveraged to disrupt dominant narratives and practices that uphold anti-trans ideologies. Strategies such as malicious compliance can transform compliance into a form of resistance by exposing the contradictions within educational policies that seek to erase trans existence and refusing to be complicit with them. Furthermore, by embracing thorniness, trans teachers can resist the wave of epistemic violence emerging from legislated trans erasure and spoil the pursuit of cruel joy that stems from the intentional misrecognition of trans and nonbinary people.

Honorato Ccalli Pacco
Vice President for Research, National University of Jaén, Peru

Modeling, Simulation, and Control in the Kefir Fermentation System as a Function of Culture Concentration Using Fuzzy Logic

Kefir is a fermented beverage consumed worldwide for its numerous health benefits, as it contains high nutritional value, including proteins, minerals, and vitamins, and possesses anti-inflammatory and antioxidant properties. This research paper addresses the "Modeling, Simulation, and Control of the Kefir Fermentation System Based on Culture Concentration Using Fuzzy Logic." Pasteurized milk is cooled to the fermentation temperature, and then the kefir culture is added at three different concentrations. Fuzzy logic rules are used to determine the qualitative relationships between different variables, allowing for precise control of the fermentation temperature and time. The output variable is pH, which indicates the completion of fermentation for each treatment. Fuzzy logic controllers offer higher performance compared to other controllers.

Elizabeth Diaz
Associate Professor, University of Texas at Arlington, USA

miABCTamil: Bridging the Digital Divide in Tamil Language and Cultural Education Through Technology-Enhanced Learning

This presentation introduces miABCTamil, an innovative educational application designed to address the critical digital breach in Tamil language and cultural learning resources for young learners and heritage language students. As one of the world's oldest classical languages with over 2,000 years of literary tradition, Tamil faces challenges in engaging digital-native generations, creating an urgent need for technology-enhanced pedagogical tools that honor linguistic heritage while embracing modern learning methodologies.

miABCTamil comprises ten comprehensive learning modules systematically designed to build Tamil language proficiency and cultural awareness: Tamil Alphabet, Tamil Sounds (phonetics), Tamil Colors, Geometric Figures in Tamil, Numbers in Tamil, Festivals, Write, Words, Complete and the flagship "I Can Read in Tamil" module. The application features dynamic vocabulary management through a dedicated module, Words, for adding new words and editing existing words, enabling personalized and evolving learning content tailored to individual learner needs. The Festival module enriches cultural understanding by showcasing the top ten festivals of Tamil Nadu, complete with traditional foods and customary clothing, connecting language learning to lived cultural experiences and strengthening cultural identity.

The application's innovative architecture integrates seamlessly with its sister platform, miabc online, enabling educators and parents to input custom texts that are processed through Bloom's Taxonomy-based technology. This integration automatically generates comprehension questions at varying cognitive levels—from basic recall and comprehension to application, analysis, and evaluation—creating personalized, scaffolded learning experiences that adapt to individual student progression and learning styles.

By combining systematic language instruction, cultural immersion, customizable vocabulary development, and AI-driven question generation, miABCTamil demonstrates how ancient languages can thrive in digital learning environments while preserving cultural identity for future generations. This presentation will showcase live

demonstrations, discuss pedagogical outcomes, and explore implications for heritage language education globally.

Ayman Eldeib
Associate Professor, Southern New Hampshire University, USA
Austin Bryan
Student, Southern New Hampshire University, USA
&
Mohamed Saad
Associate Professor, Minia University, Egypt

Genomic Analyzer: A Scalable and High-Performance Object-Oriented Application for SNP Analysis and Genetic Association Studies

Bioinformatics flourished in the biological and medical fields in the last decade by making use of the exponential growth in computer science expertise. It makes use of the available large datasets through big data analysis. Bioinformatics has many subcategories. One of the main subcategories is genomics that deals with Deoxyribonucleic acid (DNA). Single Nucleotide Polymorphism (SNP) is the most common type of genetic variation among people, where a single building block of DNA (a nucleotide) is different from the reference sequence. These variations are found in at least 1% of the population and can serve as biological markers, influencing disease risk, how a person responds to certain drugs, and their susceptibility to diseases like diabetes and heart disease. SNPs are required as the main input for Genome-Wide Association Study (GWAS) where the correlation between SNPs and phenotypes is demonstrated. This correlation is important for many medical fields such as disease susceptibility, disease progression, survival period, and drug response.

The human genome sequences have brought a wealth of data on genetic variation in the form of single nucleotide polymorphisms (SNPs). Recently, the steady accumulation of data from human genome sequencing studies has exposed a strong need for faster and more scalable implementations of key functions such genetic association. These data are accessible through public databases for students and researchers. This paper presents a new software application concerned with SNP analysis that has three main features: 1) is a bioinformatics tool for students/researchers to explore SNP datasets and extract information from data files; 2) to standardize the SNP datasets, which come from various resources with extremely different formats to be ready for further analysis. The meaning of standardization here is not an international standardization but a standardization for the tool itself. 3) to apply different association models such as multiplicative, dominant,

recessive, and codominant models to check the correlation between the SNP and the phenotype. It exports results in the selected visualization format such tables and graphs and provides detailed comparison between results of different association models.

This application is developed using object-oriented programming concepts to enable plug-and-play architecture and to support scalability, thereby facilitating the seamless integration of new techniques and to facilitate genomic analysis including genetic association studies that offer dramatic improvements in performance and compatibility.

Stavros Georgakopoulos
Distinguished Professor, Florida International University, USA
Constantinos L. Zekios
Assistant Professor, Florida International University, USA
&
Ricardo Sendrea
PhD Candidate, Florida International University, USA

A Multi-Fidelity Deep Learning Framework for Robust Computational Imaging

Computational imaging systems are increasingly used in sensing and diagnostic applications, but their underlying reconstruction problems remain challenging because they are highly nonlinear, sensitive to noise, and often dependent on large amounts of high-quality training data. These challenges become even more pronounced when measurements are limited or when test scenarios differ from those seen during training. To address this issue, this paper presents a multi-fidelity deep learning framework that combines physics-based modeling with data-driven refinement. Instead of relying solely on direct end-to-end prediction, the proposed approach begins with a low-fidelity reconstruction and improves it through a stacked neural-network architecture that also incorporates measured field information. The central idea is to treat low-fidelity reconstructions as structured prior information and then learn how to refine them toward higher-quality solutions. This strategy preserves useful information from conventional model-based imaging methods while also leveraging the pattern-learning capability of deep neural networks. The framework is inspired by multi-fidelity learning methods widely used in computational modeling and adapts them to image reconstruction through stacked U-Net-type subnetworks designed to capture complementary correction behavior. The proposed method is evaluated using representative soft- and hard-scattering scenarios with synthetic data. The results show accurate recovery of hidden dielectric profiles, including challenging out-of-distribution cases and noisy measurement conditions. In the tested scenarios, the framework achieves reconstruction errors below 10% while maintaining performance comparable to established supervised correction models. These results suggest that multi-fidelity learning can improve robustness and generalization in computational imaging without requiring fully data-intensive end-to-end training approaches. Overall, this work demonstrates how domain knowledge, approximate physical reconstructions, and deep learning can be

integrated into a unified computational framework for robust image reconstruction. From an information technology and computer science perspective, the contribution lies in showing how multi-fidelity machine learning can support reliable inference in imaging problems where data are scarce, noisy, or expensive to obtain. This approach points to a promising direction for future intelligent imaging and sensing systems that demand both computational efficiency and strong generalization. This work was supported by the U.S. Air Force Office of Scientific Research under Grant No. FA9550-21-1-0309.

Hamid Farrokh Ghatte
Assistant Professor, Antalya Bilim University, Türkiye
Seyed Mohammad Amin Abtahi
Assistant Professor, Antalya Bilim University, Türkiye
&
Muzaffer Koc
Assistant Professor, Antalya Bilim University, Türkiye

AI-Driven Multi-Modal Assessment of Building Vulnerability in Seismic Zones

Among the persistent challenges in the civil engineering the field, the realistic and scalable assessment of individual building vulnerability is a critical condition across large urban building stocks. This issue is particularly acute in seismic regions where existing structures do not conform to current seismic design codes. The last earthquake in Turkiye (2023, M7.8 and M7.4) claimed over 50,000 lives and damaged more than 160,000 buildings, highlighting critical gaps in seismic vulnerability assessment. Traditional and Conventional seismic vulnerability assessment techniques are often slow, labor-intensive, and lack the scalability required for timely disaster risk management. In general, it can be reported that as the seismic evaluation method gets more detailed and complicated (as in the case of code-level methods), the accuracy of the technique increases. This paper presents a multi-modal AI framework designed for rapid and automated evaluation of building seismic vulnerability. A notable innovation is the incorporation of a speech-to-speech Voice AI module, enabling hands-free, real-time data collection in the field. Empirical evaluation conducted on a dataset of buildings in Türkiye demonstrates that the presented model achieves a high recall in identifying collapsed structures, significantly outperforming traditional rapid visual screening methods in both speed and accuracy. The system enables comprehensive city-wide screening using non-experts, supporting proactive seismic safety. Therefore, the system can present a management and strategic resource allocation for building retrofitting and industrial facility protection. This technological advancement empowers engineers and policymakers with various tools for evidence-based seismic risk management, moving from reactive to proactive infrastructure protection strategies.

Till Haenisch
Professor and Head, Informatics Study Program, DHBW Heidenheim (Baden-Württemberg State University), Germany
&
Anke Hutzschenreuter
Professor, DHBW Heidenheim (Baden-Württemberg State University), Germany

Defining an AI-Literacy Course for Dual-Education Programs, Especially in Computer/Data Science: A Case Study

Generative AI, especially Large Language Models, has the potential to transform learning and evaluation processes. However, institutions often focus primarily on regulations to guarantee academic integrity rather than on enabling effective use.

This paper addresses three key questions arising when deploying generative AI in the classroom: (1) How can we teach students the skills necessary to use LLMs effectively for learning? (2) How can we establish a code of conduct that complies with university regulations while gaining student acceptance? (3) How can we bridge the gap between students' industry experience with AI and academic expectations?

We present a three-day AI literacy curriculum developed at DHBW (Duale Hochschule Baden-Württemberg) covering technical, practical, and legal aspects. The first part introduces AI fundamentals, including neural network and transformer architectures, as well as applications such as RAG systems and agentic AI. The second part is program-specific, addressing practical applications like AI-assisted scientific writing or code generation. The third part covers compliance topics including copyright, examination law, and university regulations, concluding with a community-based process for developing a code of conduct.

DHBW's dual-education model, where students alternate between university and industry partners, presents unique challenges: students bring extensive real-world experience using generative AI for tasks like software development and presentation preparation. This expertise makes predefined rules difficult to enforce and renders fixed curricula impractical. We therefore adopted an inclusive, community-based approach to developing guidelines—an approach that has proven effective in gaining acceptance.

By examining benefits and challenges, including academic integrity and accessibility, this paper provides a foundation for discussions about

AI integration in higher education. The curriculum is designed to be adaptable to other programs such as business administration, IT security, or mechanical engineering, and can be implemented as a Micro-Credential.

Jingzi Huang
Professor & Associate Dean, College of Education and Behavioral Sciences, University of Northern Colorado, USA

Connecting Program Assessment of Teaching Talent Training in Higher Education to the Reality of the Schools: A Case Study of Assessment Development for a Teacher Preparation Program

Among existing research studies regarding the evaluation of teacher preparation programs (TPPs), attention has been given to "the strengths and weaknesses of evaluation metrics based on rigorous criteria for accuracy and utility", which has alerted researchers to argue for strong equity to be established as an explicit goal and a desired outcome of teacher preparation evaluation (Cochran-Smith & Reagan, 2021). Meanwhile, in the context of the current broader accountability movement in education, it has become obvious that the evaluation of a TPP needs to be tied to the evaluation of its graduates by the school leaders in the reality of the field. Limited studies suggest that connecting TPP evaluations to evaluation rating of graduates is a promising development for program accountability and improvements. At the same time, as pointed out by Bastian *et al* (2017), if the TPP evaluation systems do not take school context into consideration, then the graduates who disproportionately work in high-need schools are likely to be rated lower than if such systems account for employment context.

For a TPP at the operational level, how to connect its assessments to candidates' performance in the field seems to be more relevant to program improvement for addressing the needs in the field. The current study tries to make contributions to the topic by examining how a TPP in an American university developed and implemented a program level assessment system that connects its TPP evaluation to the evaluation of its graduates by the school leaders in the context where cultural and linguistic diversity (CLD) in the school settings is the norm.

Two sources of data were used for this case study. One comes from the assessments developed and implemented by the concerned EPP. An electronic data management system specifically designed for TPPs in the nation, with the capability to tie specific performance indicators to the required standards when aggregating data, was used for data collection and aggregation. A second source of data is from the state's Department of Education, which provides comprehensive annual EPP data regarding all EPPs in the state. The relevant data used for the current study is regarding the employment context of the graduates and the evaluation

rating of new teachers by the school leaders. Collected data were analyzed and compared in the context of schools to identify strengths and weaknesses of the teaching talents prepared by the concerned EPP for the CLD reality of the schools.

The findings of the study show that it is possible to connect a TPP's evaluation system to how future employers evaluate its graduates. Additionally, equity needs to, and can be, intentionally taken into consideration for assessment design/implementation as well as data analysis so that assessment results can more meaningfully direct program improvement. Although the study is based on the situation in the United States, it is an international phenomenon that classroom teachers are facing ever increasing diversity in their k-12 classrooms. Thus, the study offers implications beyond the United States.

Sabine Khalil
Associate Professor, Illinois State University, USA
&
Bahae Samhan
Associate Professor, Illinois State University, USA

User Adoption of Augmented Reality Exhibitions: Insights from a U.S. Study

In recent years, interactive museums have grown in popularity, particularly during the COVID-19 pandemic. Notably, this trend has continued even as the pandemic receded, with museums increasingly adopting Augmented Reality (AR) technologies. AR has become an essential tool, not only transforming various sectors but also showing great potential for enhancing the tourism experience. This study investigates how museumgoers in the United States (US) are embracing AR, with the goal of enriching their engagement and responding to ongoing digital transformations. By applying the Technology Acceptance Model (TAM) framework from Khalil et al. (2024), we conducted a survey of individuals who had visited interactive museums in major US cities such as Los Angeles, New York, Seattle, Chicago, and Sacramento. Structural Equation Modeling (SEM) was used to analyze the data and identify patterns of AR adoption. While some of our results align with Khalil et al.'s findings from France, notable differences emerged in the behavior and preferences of US museum visitors. These discrepancies underscore the importance of regional and cultural factors in technology adoption, suggesting that AR implementation strategies may need to be tailored to local contexts. Furthermore, the study highlights the role of AR in shaping the future of museum experiences, potentially attracting a wider audience, and driving innovation in the cultural sector.

Arie Kizel
Professor, University of Haifa, Israel

Expanding Buber's I-Thou to I-Virtual Space-Thou in Students' Relations

This presentation explores the philosophical dimensions of adolescent communication in virtual spaces, examining how young people experience and construct meaning within WhatsApp communities. Moving beyond conventional research that treats technology merely as a communication medium, this study proposes that we are witnessing a fundamental transformation in human subjectivity due to technological interaction. The research argues that digital platforms function as philosophical factors that actively reshape young people's self-perception and interpersonal relationships.

The study reveals that adolescents experience virtual spaces in ways that remarkably parallel Martin Buber's concept of "I-Thou" relationships. Participants consistently describe WhatsApp; Philosophy with Children; Marin Buber; I-Thou WhatsApp as enabling authentic, intimate dialogue while providing psychological safety. They reported that the virtual environment allows for more personal disclosure than face-to-face interactions, creating opportunities for genuine encounter and mutual recognition.

The research demonstrates that these virtual communities function as dialogical spaces in the Buberian sense, facilitating true community formation based on living, reciprocal relationships. Participants experienced the WhatsApp environment as enabling breakthrough from individualistic isolation, allowing them to explore fundamental questions about human nature and relationships.

The study reveals that WhatsApp communities serve quasi-therapeutic functions, providing emotional support and practical guidance for adolescents facing various challenges. Unlike school environments that emphasize evaluation and categorization, these virtual communities offer non-judgmental spaces where vulnerability and authenticity are welcomed and supported.

The research findings suggest expanding Buber's dialogical philosophy to accommodate contemporary technological reality. Rather than viewing virtual space as separate from human relationships, this study proposes an "I-Virtual Space-Thou" model that recognizes technology as integral to modern relational experience. Virtual space becomes not merely a conduit for communication but a constituent

element of the encounter itself, enabling forms of dialogue and intimacy that may be impossible in purely physical contexts.

Maria Krambia Kapardis
Professor, Cyprus University of Technology, Cyprus
&
Georgios Spanoudes
Professor, University of Cyprus, Cyprus

Usefulness of AI Teaching Tools for Accounting Students

Traditional teaching of financial accounting is complicated due to old-age methods of teaching, simplistic methods of education, and insufficient participation of students. Over the years, researchers have commented on the 'accounting student pipeline', the weak current state of accounting education, plus perceptions that accounting is a difficult subject. Furthermore, researchers have documented that whilst some universities made progress in the 1990s and 2000s, accounting education has remained unchanged for more than 50 years despite the persistent 'crisis in accounting education'. Hence the pressing need for accounting educators to address the above challenges. Utilizing AI teaching tools and making accounting education more engaging and relevant will contribute towards its improved understanding of accounting. Instructors need to increase the students' involvement, enhance the impact of learning, and encourage the quality training of financial accounting talents. These can be achieved through interactive AI teaching tools.

Research utilizing age-appropriate pedagogies have found that AI literacy development may provide a more holistic learning environment at higher education levels. AI learning objectives address three dimensions: a) learning framework synthesizing understanding of concepts, processes, principles, and applications, and b) social and emotional framework integrating motivation and attitudes towards learning. The use of AI teaching tools in accounting teaching at higher tertiary levels not only optimizes teaching methods but also improves classroom design, enhances student-teacher interaction, and provides data for teachers to study the understanding of students. Furthermore, AI, when used in teaching, can improve the quality and efficiency of financial management professional talents cultivation, reduce the human management cost, and provide students with the knowledge to adapt to the current economic situation.

Studies demonstrate that students with higher conscientiousness (e.g., self-discipline) and Grit (particularly Perseverance of Effort) engage more deeply with AI tools, leading to greater academic gains. These traits predict consistent tool usage, which in turn improves performance in

structured tasks like accounting. Additionally, emotionality may reduce engagement, as highly anxious students tend to avoid AI interfaces. Importantly, sex and educational background play roles, with females and students in quantitative fields (e.g., Finance) benefiting disproportionately. These findings suggest that AI tools do not operate uniformly; instead, their impact cascades through a network of individual differences, where personality and cognitive strengths shape the trajectory of learning success. Future designs should personalize AI interactions based on these learning profiles to maximize efficacy.

The research findings reported constitute an original contribution to this direction. More specifically in studying 104 undergraduate accounting students who utilized AI teaching tools it was found that (a) those students who used the AI teaching tools performed better in Financial Accounting rather than Management Accounting; (b) there was no significant finding relating to their gender or if they were repeating students; (c) AI teaching tools benefited the students with high Grit, specifically high perseverance of effort, more than those with low Grit; and (d) a student's entrance course to the university correlated significantly with their AI teaching tools, usage, which in turn was associated with their final mark.

In conclusion, AI teaching tools were found to be associated with higher marks in Financial Accounting rather than Management Accounting, whilst also helping students with high Grit to perform better in studying and achieve higher marks. Finally, better students when using AI teaching tools outperformed weaker students. Thus, AI teaching tools can be beneficial in improving students' performance in accounting courses. Our findings contribute to the flourishing literature of AI integration in educational settings.

Nick Linardopoulos
Associate Teaching Professor, Rutgers University, USA

AI, Communication and the Future of Teaching & Learning

This presentation will analyze the different ways and through artificial intelligence (AI) technologies were purposefully taught and incorporated in a large lecture introductory communication course. Using the AI Assessment Scale model (AIAS), the course assignments and associated content modules were modified to reflect the strategic and ethical use of AI as a key component of effective communication skills with a direct connection to the course learning outcomes. Accordingly, the presentation will provide a comparison of the assignments and content before and the incorporation of the AIAS, assess the impact of the AI aspect in the course learning outcomes and student perceptions and provide recommendations for the broader implications for teaching and learning when using AI activities as part of the course curriculum.

Robert Mejias
Professor and Director, Center for Cyber Security Education and Research, Colorado State University-Pueblo, USA
Morgan Shepherd
Professor, University of Colorado-Colorado Springs, USA
&
Raul Y. Reyes
Professor, University of Arizona, USA

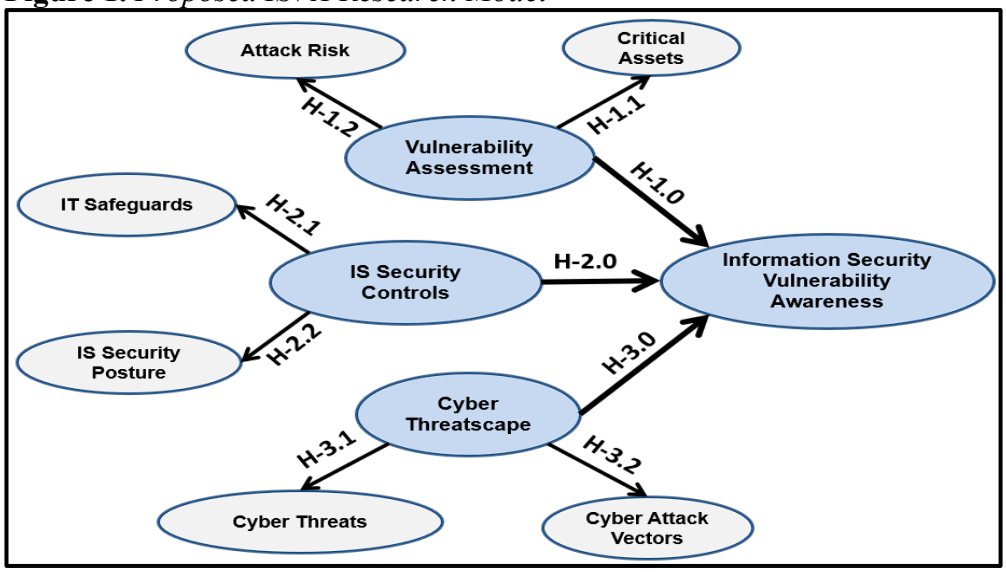
Possible Determinants of Information Security Vulnerability Awareness (ISVA)

The proliferation of new and emerging technologies, particularly driven by artificial intelligence, has rendered information systems increasingly complex, thereby presenting challenging cyber threats and system vulnerabilities that require urgent attention. Additionally, most IS architectures may not be agile enough to quickly assess or mitigate these cyberattacks vulnerabilities, hindering the use of appropriate IT safeguards in a cyber-safe manner.

Our research proposes a multi-criteria model in analyzing possible factors that influence information security vulnerabilities awareness (ISVA). Drawing from prior cybersecurity and vulnerability assessment research, this empirical field study develops a research model to analyze possible determinants influencing information security vulnerability awareness. Three constructs were analyzed to explore their association to ISVA: *vulnerability assessment, assessment of IS security controls*, and *knowledge of an organization's cyber threatscape*. The data analyzed was obtained via a survey questionnaire instrument. Confirmatory factor analysis and structural equation modeling were used to validate the proposed research model (see proposed research model in Figure 1).

The results of our proposed research model indicate significant correlations between these three second-order variables and ISVA. *Vulnerability assessment*, and *knowledge of an organization's cyber threatscape* generating the highest correlations with ISVA while *IS security controls*, generated lower correlations with ISVA. This research proposes that organizations may increase their awareness of information security vulnerability by better assessing their IS security vulnerability, their organization's IS security safeguards, and expanding knowledge of their organization's cyber threatscape.

Figure 1. *Proposed ISVA Research Model*



Florian Pramme
PhD Student, Ostfalia University of Applied Sciences, Germany
&
Tamás Kurczveil
Professor, Ostfalia University of Applied Sciences, Germany

A 5G Campus Network Architecture Enabling Cooperative V2X Communication for Autonomous Driving

This paper presents an integrative approach for developing and evaluating Vehicle-to-Everything (V2X) communication architectures supporting autonomous driving in 5G campus networks. The work focuses on Cellular V2X (C-V2X) Day-2-Use-Cases and investigates how 5G standalone (SA) networks can enhance communication performance in safety-critical scenarios. Key aspects include ultra-low latency, high reliability, and real-time data processing through Mobile Edge Computing (MEC) and network slicing.

A dedicated 5G campus network is being deployed at Ostfalia University of Applied Sciences in Wolfenbüttel, Germany. Within this environment, Road Side Units (RSUs) equipped with radar, LiDAR, and camera sensors provide collective perception by sharing sensor data with connected autonomous vehicles via Collective Perception Messages (CPMs). This setup enables cooperative perception and decision-making across vehicles and infrastructure.

An autonomous shuttle service operating on a defined campus route serves as a demonstrator platform. The system integrates conventional onboard sensors with V2X communication to evaluate the benefits of 5G-enabled coordination in complex urban scenarios, including low-visibility intersections and unexpected obstacles. Experimental investigations focus on four main research questions: (1) communication performance improvement using 5G-SA and slicing compared to existing technologies, (2) effectiveness of V2X Day-2-Use-Cases in intersection management, (3) real-world latency behavior of Ultra-Reliable Low-Latency Communication (URLLC), and (4) MEC contributions to real-time decision support and traffic safety.

Preliminary results are expected to demonstrate that 5G-based V2X significantly enhances reliability and responsiveness in autonomous driving tasks. The findings will contribute to defining architectural design guidelines for future cooperative intelligent transport systems (C-ITS) and highlight the role of 5G networks as an enabling technology for connected and automated mobility within smart city infrastructures.

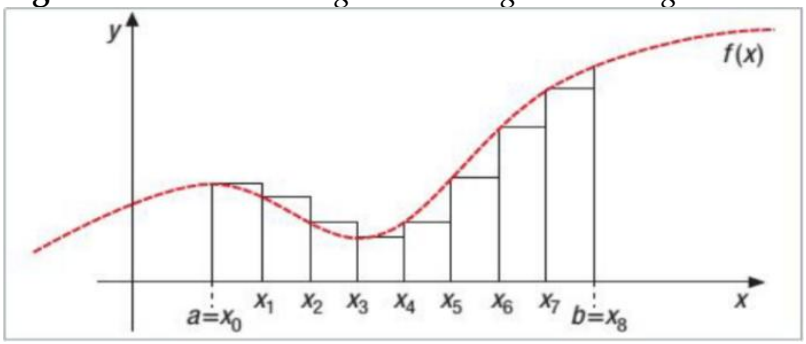
Mauro Pullin
Adjunct Professor, University of Padova, Italy

Approximate Rectangular and Trapezoidal Integration, with Implementation in the Java and Python Programming Languages

This work describes how to calculate the definite integral of a function, which cannot be integrated analytically, using the rectangle method and the trapezoidal method, with implementation in Java and Python programming languages.

In the rectangle method, the region to be integrated is divided into n rectangular parts all having the same width h=(b–a)/n, where h is called the integration step.

Figure 1. *Numerical Integration Using the Rectangle Method*

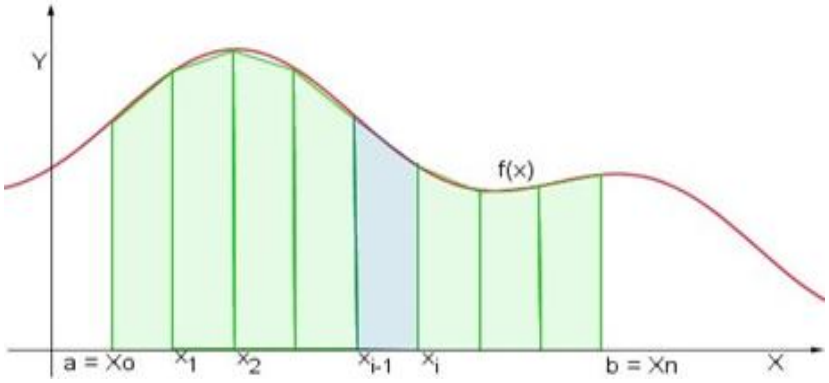


Unless there is an error, the sum of the areas of the rectangles equals the area under the curve with the equation y=f(x). It is intuitively understood that the error decreases as the number n of intervals increases.

In the trapezoidal method, the interval of integration [a,b] is divided into n equal parts, and the area of the trapezoids with height h=(b–a)/n and bases given by the value of f(x) at the ends of each subinterval is calculated.

In the trapezoidal method, the interval of integration [a,b] is divided into n equal parts, and the area of the trapezoids with height h=(b–a)/n and bases given by the value of f(x) at the ends of each subinterval is calculated.

Figure 2. *Numerical Integration Using the Trapezoidal Method*



The computer implementation was carried out in the Java and Python programming languages, because they are very powerful and versatile.

Jose Roberto Serra Martins
Professor, Federal Institute of São Paulo, Brazil

Teaching Training for Science Teachers: From Self-Formation to the Operationalization of Projects

Recently, teachers from various fields have become increasingly interested in continuing education courses, both to develop skills and abilities and to build knowledge about new teaching approaches. Within these perspectives, I chose emerging contaminants and green chemistry as motivation for developing contextualized teaching materials, inspired by transdisciplinary approaches and guided by the logic of human development, for a continuing education course for science teachers, as I stated in my doctoral dissertation. In the first phase of the research, the course was structured, and the instructional materials, targeted at educators and discussed with advisors, were written. In the second phase, the transdisciplinary approach was contextualized and presented to the educators attending the training course, recording their narratives about the teaching materials and their problematizations. In the third phase, the teachers proposed thematic activities to their students and collected data to develop, in the fourth and final phase, an analysis of the thematic activities, particularly the results of the mediated discussions and the proposed interventions at the school (or community) level through work projects. I developed the research methodology based on two research scenarios: in the first—during the training course—I explored the three phases of transdisciplinary self-training with the teachers, problematizing their positions regarding hetero-training, eco-training, and self-training, collecting data in a field notebook; in the second scenario, I analyzed the teachers' narratives and positions, based on the analyses and results obtained from the thematic activities and work projects, facilitated by the teachers and developed by their students, which are part of the final course assignments. The analysis and discussion of the data obtained in the four phases demonstrated that, although the strategies used by the teachers were similar, the results were quite different, revealing that the teachers who used the transdisciplinary approach were able to construct, together with their students, concepts more consistent with complex thinking. Thus, it is possible to affirm that: (1) from a pedagogical perspective, most students were successful, albeit partially, in constructing (or reconstructing) concepts related to thematic activities; (2) from the perspective of self-education, the most significant results were achieved by students who positively contributed to the process, associated with teachers who

focused on mediating the teaching/learning process rather than guiding it; (3) in the social sphere, work projects were developed that will potentially bring benefits to society as a whole. In conclusion, there appears to be a direct relationship between the results obtained by students, the self-education process, and the use of the transdisciplinary approach by educators, notably aiding in the development of complex thinking and the reconnection of knowledge.

Astrid Schmied
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Adapting Critical Appraisal Tools for Context-Sensitive Systematic Meta-Reviews in School-Based Mathematics-Related Education

Mathematics-related education in school-age populations must be supported by high-quality evidence to ensure effective and equitable instructional practices. While previous reviews have examined the impact of mathematics interventions, less attention has been given to the methodological rigor of the evidence synthesis process. In particular, there is a need to explore how appraisal frameworks are adapted and applied to enhance the credibility and relevance of findings in this field.

The primary focus of this study was the adaptation and application of Critical Appraisal Tools for Systematic Reviews and Research Syntheses to evaluate the quality of included reviews on mathematics-related education. A systematic search across eight databases spanning neuroscience, educational psychology, and artificial intelligence identified 100 peer-reviewed studies focused on school-age learners. The checklist was adapted in line with a systematic meta-review protocol to ensure alignment with the aims and structure of this synthesis. For example, within the PICO framework (Population, Intervention, Comparator, Outcome), the Comparator component was omitted because many included studies lacked explicit comparison groups. Additionally, the response options, such as "unclear" and "not applicable," were refined and customized to better reflect the context and reporting characteristics of the included studies. Further adjustments were made to enhance the assessment of methodological transparency, reporting consistency, and applicability to school-based mathematics education.

Each study was appraised using the adapted checklist, enabling a structured evaluation of trustworthiness, relevance, and reported outcomes. The appraisal process revealed variability in methodological quality and highlighted the importance of context-sensitive adaptations when applying appraisal tools in systematic meta-reviews.

This study demonstrates how Critical Appraisal Tools can be effectively adapted for use in systematic meta-reviews, contributing to more rigorous and transparent evidence synthesis and strengthening the evidence base for mathematics-related education in school settings.

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Tali Heiman
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&
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The Mediating Roles of Religiosity and Social Cohesion in the Relationship between Volunteering and Psychological Resilience among Arab Adolescents in Israel

Despite growing interest in volunteering's impact on psychological resilience, empirical research remains limited regarding the interplay of volunteering, religiosity, and social cohesion among minority adolescents in multicultural societies. This study examines dynamic relationships among volunteering, religiosity, social cohesion, and psychological resilience among Arab adolescents in Israel.

The study surveyed 520 Arab adolescents, using five validated instruments. a demographic questionnaire, the Youth Volunteering Questionnaire (Szold Institute, 2018), the Religious Level Questionnaire (Van Tienen et al., 2011), combined items from the Connor-Davidson Resilience Scale and Brief Resilience Scale, and a researcher-developed Social Cohesion Questionnaire Results revealed significant positive correlations between volunteering and psychological resilience, and between religiosity and psychological resilience.

Multiple regression analyses indicated that both religiosity and social cohesion partially mediate the volunteering-resilience relationship, with social cohesion emerging as the stronger mediator (27% of the effect, compared to 18% for religiosity).

Findings suggest volunteering contributes to psychological resilience development through multiple pathways, including direct effects and indirect effects mediated by religiosity and social cohesion The study bridges an important gap in understanding how cultural, religious, and social factors interact to influence resilience development in minority adolescents.

Iyad Suleiman
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Potential Outcomes of Subsidized Medical Care: Evaluating Premature Birth Odds Ratios

The main goal of this work is to conduct a potential outcome analysis and calculate Odds Ratio estimators, involving T as a binary indicator of a pre-existing environmental condition of the mother- having or not having a private medical care. Although it may be hard to consider T as a trivial treatment (i.e., "prescribing a drug") and usually is an outcome of income level and age, I believe that due to the high detail of covariates in the dataset it is possible to isolate its effect. Meaning, ignorability can hold -while conditioning on x, the joint distribution of (Yo, Y1) is independent of T. In other words, I believe that there are generally no unmeasured confounders.

Sandra Styres
Associate Professor, Ontario Institute for Studies in Education,
University of Toronto, Canada

Radical Imagining Indigenous Education: Centering Land-based Practices in Transformative Education

It is well documented that many Indigenous students remain underserved by mainstream models of education and continue to struggle in K-12 classrooms. This paper draws upon the author's work and the ways lifelong and holistic learning manifests within Indigenous educational paradigms. The author also discusses radical imagining Indigenous education and the ways trauma informed dignity driven practices informs her work as a scholar with Indigenous ancestry. Further, in this paper the author explores the concept of circularity as a foundational worldview that reflects the interconnected, relational, and resilient nature of Indigenous ways of knowing. She also considers circularity and the development of the 8 R's as an anti-colonial/de-colonial framework that disrupts and resists colonial educational narratives within mainstream learning contexts. She then offers some insights in visioning forward in order to discuss where this work can be expanded. Additionally, this paper serves to deepen and expand the ethical and transformative dimensions of Indigenous education. The overall goal of this paper is to radically re-imagine Indigenous education to build educational systems that honour Indigenous brilliance, uphold Indigenous sovereignty, and create spaces where all learners, and especially Indigenous students, can thrive.

Makoto Tatsuta
Professor, National Institute of Informatics, Japan

Normal Cyclic Proof Theorem

Inductive definitions are important in computer science as well as mathematical logic. In computer science, inductive definitions can define useful recursive data structures such as lists and trees. In mathematical logic, Inductive definitions may also increase the proof theoretic strength for given logical systems. An inductive definition is a way to define a predicate by an expression which may contain the predicate itself. The predicate is interpreted by the least fixed point of the defining equation. Martin-Lof's system of inductive definitions given in Martin-Lof (1971) is one of the most popular systems of inductive definitions.

Recently, Brotherston and Simpson proposed a cyclic proof system (Brotherston & Simpson 2011), which is an alternative formalization of inductive definitions. They investigated Martin-Lof's system LKID of inductive definitions in classical logic for the first-order language, and the cyclic proof system CLKIDomega for the same language, showed the provability of CLKIDomega includes that of LKID, and conjectured the equivalence. This conjecture was partially solved by Berardi & Tatsuta (2017) by showing that if both system have Peano arithmetic, the provabilities of CLKIDomega and LKID are equivalent.

In this paper, for the system CLKIDomega, we define a normal cyclic proof as a cyclic proof that satisfies (1) each bud has companion in the same path, and (2) for each bud, there is some number q such that there is a progressing trace from the q-th inductive atomic formula in its companion to the q-th inductive atomic formula in the bud. Then we prove that for a given cyclic proof, there is a normal cyclic proof with the same conclusion.

In Oda et al. (2023), they proved that for a given cyclic proof, there is a normal cyclic proof with the same conclusion, where that paper defined a normal cyclic proof as a cyclic proof that satisfies only the condition (1) each bud has companion in the same path.

Our new theorem is stronger than that in Oda et al. (2023), since our theorem shows that we can find the position q that is increased by a progressing trace. Our result would be the first step to establish new proof transformation from a cyclic proof into a Martin-Lof's inductive proof, which will be more efficient proof transformation than that given in Berardi & Tatsuta (2017).

Daniel Thomas III

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&
Langston Clark
Interim Department Chair, Department of Interdisciplinary Learning and Teaching & Professor, University of Texas at San Antonio, USA

Curriculum-Making in Black Hands: Humanities Education in Black-Led Schools

As debates over history, literature, and ethnic studies intensify in the United States, Black teachers increasingly face institutional barriers to teaching the humanities in meaningful and culturally sustaining ways. While prior research has focused largely on public and charter schools, far less is known about how Black educators work within Black-led independent schools—institutions historically rooted in self-determination and community autonomy.

This presentation draws on a Spencer Foundation–funded qualitative multi-case study of two contemporary Black-led independent schools to examine how Black humanities teachers design, interpret, and enact curriculum amid ongoing attacks on Black knowledge. Data sources include classroom observations, semi-structured interviews with teachers, families, and board members, instructional artifacts, and student focus groups using photo-elicitation methods.

Preliminary findings suggest that Black teachers in these settings experience greater pedagogical freedom to center Black history, civic engagement, and cultural critique, while aligning instruction with community-defined educational aims. These teachers function not merely as implementers of curriculum, but as intellectual stewards shaping how Black youth understand race, citizenship, and belonging.

By centering teachers' practices within autonomous Black institutions, this study contributes to international conversations on educational sovereignty, culturally relevant pedagogy, and the protection of the humanities in politically contested contexts.

Molly Tovar
Educational Consultant, Trail Tree Consulting, USA
&
Kellie Thompson
Educational Consultant, Trail Tree Consulting, USA

The Importance of Training Teachers on Indigenous STEM Concepts in K-12 Education

The underrepresentation of Indigenous students in Science, Technology, Engineering, and Mathematics (STEM) fields, coupled with the achievement gaps they experience, presents a significant challenge for the educational system. Research consistently shows that Indigenous students score lower on standardized STEM assessments, highlighting the need for more culturally responsive and inclusive teaching methods. This study explores the importance of training K-12 educators to integrate Indigenous STEM concepts into the curriculum, with the aim of improving academic outcomes for Indigenous students, enriching STEM education for all students, and promoting broader societal benefits. The study focused on the effectiveness of professional development workshops designed to incorporate Indigenous perspectives into K-12 STEM education. Pre- and post-training surveys, follow up surveys, and Likert scales were used to assess changes in participants' knowledge of Indigenous concepts and their intentions to incorporate these ideas into their curricula. Results and key findings indicated a significant increase in participants' understanding of Indigenous knowledge, with many expressing a commitment to regularly integrating these perspectives into their lessons. Teachers also reported greater confidence in using culturally relevant content to improve student learning outcomes. This research underscores the positive impact of professional development in fostering the inclusion of Indigenous knowledge in STEM education and highlights the need for ongoing support to overcome curriculum implementation challenges. The study offers valuable insights for educators, administrators, parents, and counselors working to increase Indigenous students' interest in STEM fields and improve their educational experiences. Key recommendations include curriculum development with Indigenous input, teacher professional development, fostering community and tribal partnerships, and providing support for Indigenous students through mentorship and extracurricular programs.

Mark van der Pas
CEO, Uffective, The Netherlands

Enhanced Time Estimation Improvements in Agile Developments: A Seven-Year Natural Experiment

This study presents a seven-year natural experiment investigating time estimation accuracy in agile software development. Building on prior work, we monitored estimation performance before and after targeted feedback interventions, which exposed teams to their historical estimation errors and encouraged calibration. We compared human estimators to two AI models using metrics including Mean Absolute Error (MAE), Mean Squared Error (MSE), Forecast Bias, Percentage Forecast Bias, and Mean Absolute Percentage Error (MAPE). Results show that humans initially exhibit substantial inaccuracy, particularly underestimating larger tasks. However, structured feedback leads to measurable improvements in estimation accuracy and reduced bias over time. The AI models performed competitively, often surpassing humans in MAE and MSE, but were sensitive to changes in context. Our findings demonstrate that while human estimators are prone to error, their accuracy can be improved through feedback, and AI offers a valuable complementary approach for agile teams.

Michele Vaz
Business Manager, McMaster University, Canada
&
Tom Wanyama
Associate Professor, McMaster University, Canada

Expanding Engineering Education through Outreach at the SEPT Learning Factory

This paper presents a case study on the strategic deployment of the W. Booth School of Engineering Practice and Technology (SEPT) Learning Factory at McMaster University as a platform for community engagement, experiential learning, and the cultivation of socially conscious engineers. Traditionally, learning factories are designed as controlled environments where students simulate industrial practices, explore smart manufacturing, and apply Industry 4.0 principles. While these uses remain valuable, they often overlook the potential to connect technical education with pressing societal needs. The SEPT Learning Factory extends the conventional model by embedding outreach-driven product development into both curricular and co-curricular activities. In doing so, it demonstrates that technical training and community engagement can coexist as mutually reinforcing elements of engineering education.

Projects developed within the Learning Factory intentionally address authentic community challenges while building technical competencies. For example, students design and manufacture walking canes, which serve as exercises in user-centered design while also enhancing accessibility for underserved populations. Water filtration systems, created in collaboration with health initiatives in East Africa, provide practical experience in low-resource innovation and technology transfer. Similarly, the design of radio-controlled (RC) cars for high school STEM outreach allows students to apply mechatronics and systems integration while also practicing leadership, mentorship, and science communication. Collectively, these initiatives highlight the versatility of the Learning Factory as a site for both technical mastery and civic engagement.

The model is anchored in experiential, situated, and transformational learning theories. Students learn by doing, reflecting, and iterating; they gain knowledge in authentic contexts shaped by community needs; and they develop broader ethical and professional perspectives as their assumptions about engineering are challenged. The approach fosters social cohesion, motivation, persistence, and deeper

technical learning, while simultaneously strengthening teamwork, communication, problem solving, innovation, and professional identity. In this way, the Learning Factory helps students cultivate both technical expertise and civic responsibility.

This outreach-centered pedagogy also aligns with global imperatives such as the UN Sustainable Development Goals and the competencies demanded by Industry 4.0. Engineers today must design smart, interconnected systems that are not only efficient but also equitable and inclusive. The SEPT Learning Factory prepares students for this hybrid skill set by merging digital fluency with social awareness. Its role in international collaborations—such as the Learning Factories World-Wide (FWW) project under the International Association of Learning Factories—further demonstrates the scalability of this model across diverse contexts, including institutions in the Global South.

In conclusion, the SEPT Learning Factory illustrates how outreach-driven product development can serve as both a pedagogical innovation and a mechanism for social impact. By integrating technical excellence with empathy, ethical reasoning, and interdisciplinary collaboration, the model produces graduates who are not only technically proficient but also deeply aware of the societal contexts in which engineering solutions operate.

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Moving the Needle: Professional Development that Transform Instruction for Multilingual

Although linguistic diversity in U.S. schools is increasing, professional development (PD) for in-service teachers often remains fragmented and disconnected from classroom realities. This presentation explores a PD model designed to effectively improve instructional practices for multilingual learners (MLs). Based on adult learning theory and culturally and linguistically responsive pedagogy, the model combines structured literacy principles, explicit language instruction, and scaffolded academic discourse routines across various content areas. Using a mixed-methods approach, we examined the impact of a year-long PD initiative implemented across elementary settings. The PD included interactive workshops, collaborative planning, and other activities, such as student case studies, for over 80 in-service educators. Quantitative data included pre- and post-measures of teacher instructional knowledge and practices. Qualitative data were gathered from focus groups, reflective artifacts, and project assessments. Results indicate statistically significant improvements in teachers' use of evidence-based practices to teach MLs. The presentation will detail the key design elements that "moved the needle," including coherence across initiatives, distributed leadership structures, protected time for collaborative planning, and ongoing support. Participants will leave with a research-based, scalable framework for designing PD that fosters teacher practices beyond surface-level strategies toward lasting instructional change for multilingual learners.

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Broadening Cybersecurity Awareness for Middle School Girls via Outreach, Cyber-games, and Storytelling

In USA, national economic security is highly dependent upon a strong cybersecurity workforce. Almost all aspects of the infrastructure depend upon the operation of computers and networks. The security of these systems is imperative to the health and protection of our national infrastructure and information assets. Protecting data and information on computing systems has become even more critical and challenging than ever before. Since the emergence of the Internet and the widespread adoption of web technology, expertise in information assurance has become necessary for many IT professionals. For those working in government agencies, educational organizations, industry, and other businesses, the need for security-skilled workers has doubled from 2021 to 2022.

The United States has experienced a serious shortfall of skilled cybersecurity professionals, especially females. To improve the number of female professionals in cybersecurity, one efficient way to cultivate interest in cybersecurity is when they are younger, such as middle school girls. In this paper, we explore the approaches to broaden cybersecurity awareness among middle school girls by exposing them to cybersecurity topics. Most middle school girls have some computer science (CS) skills, but they need cybersecurity knowledge. We faced the challenge of teaching young students with no CS and little Math background cybersecurity concepts and skills in as little as one week. To engage middle school girls in a one-week cybersecurity schedule, we facilitated a learning-centered classroom and designed a cybersecurity education curriculum via outreach, cyber-game playing, and storytelling. Our methodology for broadening cybersecurity awareness in female students is "learning via seeing, playing, and telling".

Columbus State University (CSU), GA has held the summer camp of "Broadening Cybersecurity Awareness for Middle School Students vis GenCyber Outreach, Games, and Storytelling" four times under the support of the National Security Agency, USA since 2017. The goal of the summer camp was to increase the students' interest in cybersecurity careers and knowledge, fostering their leadership skills as cybersecurity ambassadors. In 2021 and 2023, we only recruited middle school girls as summer campers. By targeting female students, we expect this will ultimately contribute to building a diverse workforce and promoting

appropriate online etiquette amongst the participating middle school students in the community of Columbus, GA, and its vicinity areas of Alabama. The girls participating in the program can apply what they learn from the summer camp in their Internet surfing and continue the camp via Women's Cybersecurity clubs within their schools, as well as influence their peers to pay more attention to cybersecurity awareness. The summer camp is designed in three phases: three-day Pre-camp, five-day summer camp, and one-day post-camp.

References

Ionescu A, Gkounta O (2026) *Information Technology & Computer Science. Abstract Proceedings of the 22nd Annual International Conference.* Athens: Athens Institute.

Ionescu A, Gkounta O (2025) *Information Technology & Computer Science. Abstract Proceedings of the 21st Annual International Conference.* Athens: Athens Institute.

Ionescu A, Gkounta O (2024) *Information Technology & Computer Science. Abstract Proceedings of the 20th Annual International Conference.* Athens: Athens Institute.

Ionescu A, Gkounta O (2023) *Information Technology & Computer Science. Abstract Proceedings of the 19th Annual International Conference.* Athens: Athens Institute.

Petratos P, Gkounta O (2022) *Information Technology & Computer Science. Abstract Proceedings of the 18th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2021) *Information Technology & Computer Science. Abstract Proceedings of the 17th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2020) *Information Technology & Computer Science. Abstract Proceedings of the 16th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2019) *Information Technology & Computer Science. Abstract Proceedings of the 15th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2018) *Information Technology & Computer Science. Abstract Proceedings of the 14th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2017) *Information Technology & Computer Science. Abstract Proceedings of the 13th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2016) *Information Technology & Computer Science. Abstract Proceedings of the 12th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2015) *Information Technology & Computer Science. Abstract Proceedings of the 11th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2014) *Information Technology & Computer Science n. Abstract Proceedings of the 10th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2013) *Information Technology & Computer Science. Abstract Proceedings of the 9th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2012) *Information Technology & Computer Science. Abstract Proceedings of the 8th Annual International Conference.* Athens: Athens Institute.

Papanikos GT (2011) *Information Technology & Computer Science. Abstract Proceedings of the 7th Annual International Conference.* Athens: Athens Institute.