MCAST RESEARCH & INNOVATION EXPO 24

The 6th MCAST Research & Innovation Expo

25th - 26th November 2024

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MCAST RESEARCH & INNOVATION EXPO 24

FOREWORD

MCAST

MESSAGE FROM THE PRINCIPAL

Mr Stephen Vella
Principal and CEO of MCAST

We are excited to announce the 6th edition of the MCAST Research and Innovation EXPO. This annual event has become a platform to showcase the results of ongoing research and development projects in various disciplines. We want to ensure that this event encourages researchers to engage and explore the latest advances in MCAST's vibrant research community.

MCAST has established itself as Malta's leading vocational and educational institution and is increasingly recognised for its contributions to applied research and innovation. This growing reputation relies on the tireless work of our academics to help us attract more talent and expertise, enrich our environment and inspire students in various fields.

The advancement of knowledge is at the centre of our mission as we educate, train and prepare students for personal and professional growth. Research and innovation at our College are important because they help students at all levels thrive in an environment that fosters discovery, exploration, problem solving, and creativity. They also provide opportunities for staff and students to engage with cutting-edge technology, utilise meaningful links with international universities, and increase visibility through publications and presentations.

The benefits of applied research extend far beyond our campus. As you will realise as you browse through these abstracts, research plays a central role in addressing societal needs and promoting industrial progress. In this edition, you will find a series of presentations spread across four thematic areas: "Cultural Contexts and Beyond", "Integrating New Approaches," "Industry Collaboration and Innovation", and "Reshaping Education". These areas were selected because they emphasise the impact of externally funded research on important areas such as scientific discovery, societal progress, environmental sustainability, financial systems and industrial growth. They emphasise how research influences curriculum development and shapes future educational pathways. We aim to strengthen our research agenda in areas directly related to current challenges, with a forward-

looking mindset that can foster innovation in academic and industrial environments.

My heartfelt thanks go to all the researchers and contributors presenting their work at this year's EXPO. My special thanks go to the management and staff of the Centre for Applied Research and Innovation for their commitment to ensuring the success of this year's edition.

THE R&I EXPO ORGANISING COMMITTEE

Dr Tatjana Chircop
MCAST Deputy Principal for Research & Innovation
Applied Research & Innovation Centre (ARIC)

Dr Tatjana Chircop is the Deputy Principal for Research and Innovation at MCAST. Her main areas of expertise are youth and community studies, vocational education (VET) and performing arts. Leading a team of researchers at the college, she has worked on researching challenges that students find in their educational journeys as well as innovative pedagogical tools which enhance learning, such as gamification. She has also led the initiative to introduce the role of student mentors at MCAST with the student mentoring service now having become an integral part of the services the college offers. In her role as Deputy Principal for Research and Innovation, she leads the Applied Research and Innovation Centre (ARIC) and the MCAST Library. Within ARIC, a number of Master's programmes are delivered, including the Master in Research Methods and the Master by Research, as well as the professional Doctorate programme. Over the years, she has also been involved in teacher training at MCAST, most recently through the innovative Master's degree in Vocational Education Applied Research 4.0. Prior to joining MCAST, Dr Chircop was a professional musician with the Manoel Theatre Orchestra and the National Orchestra and taught violin and pianoforte performance at the Johann Strauss School of Music. Subsequent roles included those of learning support assistant and community development worker. Within MCAST, Dr Chircop was a lecturer and later a Director of the Institute of Community Services, Head of the Foundation College and Deputy Principal for Arts and Social Sciences. Dr Chircop graduated with a BA Hons in English (University of London), a BA Hons in Youth and Community Studies (University of Malta), a MA in Youth and Community Studies (Brunel University), a Master in Intercultural EcoManagement of Schools (Università Ca Foscari), a Post-Graduate Certificate in Vocational and Educational and Training (MCAST) and a PhD (Brunel University).

Dr Lorna Bonnici West

MCAST Director for Research and Innovation
Applied Research & Innovation Centre (ARIC)

Dr Lorna Bonnici West is the Director for Research & Innovation at MCAST, instigating scientific research excellence initiatives across the organisation, in collaboration with a group of highly professional and proficient colleagues at ARIC. Dr Bonnici West, together with the ARIC colleagues, has been instrumental in steering research groups and themes, driving and supporting the adoption of research initiatives by institute academic staff and has been highly active in supporting research teams in the writing of research proposals for different funds.

Prior to her engagement at MCAST, Lorna worked as a principal clinical pharmacist at Mater Dei Hospital. Since January 2020 she joined MCAST as a Senior Research Officer supporting the Institute of Applied Sciences. Dr Bonnici West also holds the post of Visiting Senior Lecturer with the Department of Clinical Pharmacology and Therapeutics at the University of Malta.

Dr Bonnici West graduated in Pharmacy from the University of Malta in 2000. She read for a Master of Science degree in Clinical Pharmacy at the Robert Gordon University, Scotland, graduating in 2006, and was awarded a scholarship by the Malta Government Scholarship Scheme to read for a PhD at the Robert Gordon University, Scotland, graduating in 2015. In 2016, she was awarded a post-doctoral grant under the Reach-High Scholars Programme Scheme, part-financed by the European Union, European Social Fund.

Dr Judita Tomaskinova

MCAST Deputy Director for Research and Innovation
Applied Research & Innovation Centre (ARIC)

Dr Tomaskinova graduated in Environmental Management from the Matej Bel University in Banska Bystrica (Slovakia). Her associate professorship thesis, which was submitted within the sphere of applied and landscape ecology (at Mendel University in Brno, Czechia), dealt with the integrated management and supply of cultural ecosystem services in selected protected areas in the Maltese Islands. Her Ph.D. dissertation was in environmental management, specifically about the assessment of integrated protected area management and environmental education, and was written in collaboration with Dr Sean Prendergast (Peak District National Park, UK). As a background, she has more than 25 years' experience in the field of education, research management and project management. Judita has worked at the Slovak Museum of Nature Protection and Speleology for over fifteen years, and went on to hold a senior academic position at Matej Bel University in the Slovak Republic for over ten years. She subsequently moved to the Maltese Islands and worked as a Senior Researcher for the ReNature project within the MCAST Institute of Applied Sciences, and as a Research Project Manager within the Research Support Services Directorate at the University of Malta.

Her areas of research interest are broadly focused on the management of protected areas around Europe; ecosystem services; soil respiration in the context of climate change; phytoremediation; life-cycle assessment (LCA); environmental education, and education for sustainable development.

The ARIC Senior Research Officers Team

Dr Maria Cardona
MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Dr Maria Cardona graduated from the University of Malta with a BSc (Hons) in Chemistry and Biology, an MSc in Chemistry and a PGCE in Science. She advanced her studies by earning a PhD at the University of Padova, Italy, where she researched chemical systems that mimic natural cellular processes. Recently, she was awarded a Marie Curie Individual Fellowship, which allowed her to complete postdoctoral research at the University of Malta, focusing on unconventional materials that expand when stretched. Alongside her academic accomplishments, Maria gained valuable experience in the pharmaceutical industry, holding both administrative and analytical roles. Her teaching career spans various levels, including secondary, post-secondary, and undergraduate education. In 2019, she was appointed Senior Research Officer at the Applied Research and Innovation Centre where she supported research within the Institute of Community Services. She has recently resumed her post as an SRO after a study-related absence. Beyond her professional life, Maria is actively involved in voluntary work in areas related to social justice and in bridging science and faith. In her leisure time, she enjoys hiking and spending time with her family.

Dr Clara Chetcuti
MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Clara is an English-language teacher by profession, and by passion, she is an avid reader, dancer, and painter. She has been awarded a General Bachelor's in English and International Relations and has read for a Master in

Contemporary English Literature and Criticism, both with the University of Malta, which in turn led to her interest in avant-garde literature and art forms as precursors of Electronic Literature. Her PhD thesis, also carried out with the University of Malta and tracing the genealogies of Electronic English Literature, has brought her into contact with programming as a viable mode of literary expression, and led to her subsequent theoretical interest in Python and a short Professional Diploma in Digital Marketing. Clara also holds a Cambridge Certificate in Teaching English to Adult Speakers of Other Languages (CELTA) as well as a Postgraduate Certificate in Education (PGCE). Throughout her career, she has been privileged to exchange knowledge with a truly global student body in the ELT classroom for 14 years. She has competed in over 9 Model United Nations simulations, winning personal and team awards at each one. Co-founding and managing the voluntary organisation, the Malta Model United Nations Society (MaltMUN) for 6 years is considered one of her proudest achievements, together with publishing scholarly papers with CounterText (Edinburgh University Publishers), the Electronic Book Review (online) and the Electronic Literature Directory (online). Clara has also served for 2 years as Director of Studies for a start-up English Language School, and is now looking forward to fostering the spirit of collegiality she has already found in her MCAST colleagues as Senior Research Officer.

Dr Sarah Camilleri
MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Sarah describes herself as being a marine scientist, mostly experienced within research and environmental management in the Mediterranean context. Her experience in academic research was mostly earned between 2008 and 2015, through Master's and Doctoral programs in Water, Marine and Coastal Management at the University of Cadiz (Spain) and the University of Bologna (Italy); carrying out her research in fisheries management, wetland management, and spatial analysis/remote sensing applications. This was followed by a 6-year work stint as environmental officer

within the public sector, working in the implementation of international/EU/national policy linked to the protection of aquatic/marine environments and the sustainable management of maritime sectors. Sarah's involvement at MCAST started in 2020, with the supervision of MSc students at the Institute of Applied Science. In 2022 she joined ARIC as Senior Research Officer, acting as contact point for the Institute of Business Management and Commerce. Additionally she supports the implementation of research linked to the agriculture sector, marine conservation and the blue economy.

Dr Marco Montalto

MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Dr Marco Montalto is a senior research officer at the Applied Research and Innovation Centre (ARIC), supporting research within the Institute for the Creative Arts (ICA). He holds a Master's degree in the Science of Performative Creativity (M.S.P.C.; UM) and a Ph.D. in Cognitive Science (UM). For his Master's thesis he revisited the unfairly neglected topic of 'centricity' and use of 'the centre' in the context of human performativity. His PhD thesis was the first local study investigating human mirror neuron system (MNS) behaviour and gave original contributions to the nascent field of dance neuroscience. Employing tools such as near-infrared spectroscopy (NIRS) and electroencephalography (EEG), expert and novice human participants were monitored during expert and novice action observation. Although not joining the human-MNS sceptics' bandwagon, results did indicate that such a potential system in the human seemingly can only be triggered by prior effective training. When he is not conducting research, he is usually occupied with photography or busy reading.

Dr Francis Delicata

MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Dr Francis Delicata holds a PhD in Neuroscience from Aston University, UK, with over 9 years of academic research experience. His work has focused on brain physiology in various states of health and disease, particularly on conditions such as addiction, epilepsy, and dementia, investigating their underlying mechanisms. Utilising his experience in securing research funding and participating in European and international projects, he supports research initiatives at the Institute of Engineering and Transport (IET). IET projects target a wide-range of topics, including aerospace and aviation, AI in industry, wireless communication, renewable energy, autonomous technologies, and additive manufacturing

Dr Massimo Pierucci

MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)

Dr Massimo Pierucci holds a degree in Biological Sciences and more than fifteen years of research experience in the field of neuropharmacology and neurophysiology. During this period, he had the opportunity to supervise and co-supervise Undergraduate, Master and PhD students, offering both experimental and theoretical guidance, as well as gaining lecturing experience while teaching biological subjects at the Department of Psychology of the University of Malta. This experience has enabled Massimo to promote, support and structure research endeavours through the Institute of Community Services, thereby fulfilling his role of Senior Research Officer. The Institute has recently seen an uptake of different research activities, with projects spanning from sport, social and education research and taking into consideration the vocational education mission of the Institute.

The ARIC Design and Development Team

Ms Lisa Theuma
MCAST Researcher
Applied Research & Innovation Centre (ARIC)

Ms Lisa Theuma, with a passion for learning and exploration, has consistently involved herself in investigating the various fields within the vast world of game art and design throughout her education and aspires to cultivate her knowledge through her work. Lisa acquired her Bachelor's in Game Art & Visual Design from MCAST's Institute for the Creative Arts, and has set her sights on strengthening her skills and building innovative learning experiences, thus taking on the role of Ed-Tech Researcher. Lisa aims to apply her creativity to future research projects and support their development within the Applied Research & Innovation Centre, ultimately providing entertaining and educational experiences for others.

Mr Geoffrey Attard
MCAST Researcher
Applied Research & Innovation Centre (ARIC)

Mr Geoffrey Attard joined the ARIC Department at MCAST in 2022. He holds a Master's degree by research, completed in 2020, during which he developed an innovative educational technology toolkit, TangiBoard. Mr Attard graduated with First a Class Honours in Computer Science from Middlesex University. His diverse career spans projects in software and web development, mobile app and game development, electrical and electronics engineering, robotics, networking, artificial intelligence, computer vision, mechanical engineering, and educational technologies. Drawing from his military background, Mr Attard brings a mindset

of determination and resilience to his work, with a belief that for every challenge, there is a solution.

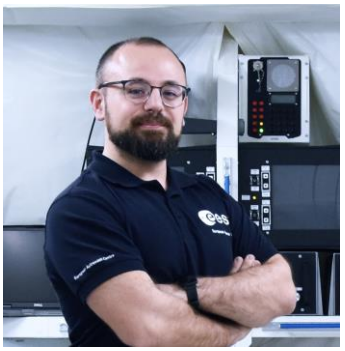
Mr Alistair Grima

MCAST Researcher
Applied Research & Innovation Centre (ARIC)

Alistair Grima is an environmental researcher and professional specialised in sustainability and research-based green infrastructure. He holds a Bachelor's degree in Biology from the University of Malta and a Master's degree in Environmental Sustainability from University College Dublin.
At MCAST's Applied Research and Innovation Centre (ARIC), Alistair plays a key role in supporting research projects by collaborating with fellow researchers and overseeing project administration. His contributions help ensure the effective use of project funds and the successful execution of research initiatives, maximising the impact of the research outcomes. Alistair's professional journey also includes several years with the Environment and Resources Authority, where he specialised in air quality and environmental noise. His work in this area played a critical role in meeting Malta's commitments under key EU directives, while also contributing to national environmental policy development.
In addition to his role at MCAST, Alistair holds an executive position at The Malta Chamber, where he contributes to sustainability-related policy analysis, project implementation, and EU-funded initiatives.

Mr Nikolai Anton Callus

MCAST Researcher
Applied Research & Innovation Centre (ARIC)



Nikolai A. Callus holds a degree in Interactive Media and Graphic Design from MCAST and a Master's in Digital Arts from the University of Malta, where his research concentrated on interactive and reality

technologies. He spent a year as a national trainee at the European Space Agency, working on cutting-edge projects involving virtual reality (VR), avatar creation, and simulation development. This experience allowed him to develop hands-on expertise in immersive technologies, specifically their application to simulation environments and space exploration.

Currently, Nikolai serves as an Educational Technology (Ed Tech) researcher at the Advanced Research and Innovation Centre (ARIC), where he focuses on the integration of interactive technologies, virtual environments, and immersive tools in educational settings. His research explores how these technologies can enhance learning experiences, bridging the gap between theoretical knowledge and practical applications. Nikolai's work aims to foster innovation in the field of educational technology, while also exploring broader uses of immersive tech in fields such as training, simulation, and entertainment.

Through his interdisciplinary approach, Nikolai is committed to advancing the role of interactive technologies in both academia and industry.

The ARIC Researchers Team

Ms Maria Ragia
MCAST EIT Hub Researcher
Applied Research & Innovation Centre (ARIC)

As a political science and international relations graduate, with a special interest in human rights and peace building, I find myself motivated to work in the field of human rights and social development. I have experience working on social inclusion through EU funds and therefore have a basic knowledge of project management. I am always eager to expand my knowledge and I highly value continuous education and learning.

Ms Pelin Uner
MCAST EIT-Hub Researcher
Applied Research & Innovation Centre (ARIC)

Pelin Uner currently works as EIT Hub Researcher at Applied Research and Innovation Centre at MCAST, coordinating the projects under the umbrella of the EIT Climate KIC and EIT Urban Mobility Hubs, in which MCAST is a partner. Her field of study at the university was Business Administration BSc. Pelin Uner started her career journey in 2012 in Budapest, Hungary working on EU projects centring in social subjects. She later on moved to Athens, Greece and worked for global corporations. In 2016, she started working in Malta as Business Development Executive in a law office, focusing mainly on foreign direct investment projects. Since she has joined the ARIC team in April 2022, she continues her work on several education, entrepreneurship and community-building projects and programmes which focus on sustainable urban mobility and addressing climate change.

Ms Rozela Franco

MCAST EIT Hub Researcher

Applied Research & Innovation Centre (ARIC)

With a background in Fashion Design (B.A.) and Sustainability in Fashion and Creative Industries (M.A.), Rozela Franco is currently a researcher at MCAST Applied Research and Innovation Centre, contributing to innovation ecosystems across multiple industries. Her research focus includes fostering entrepreneurship and regional development through projects like InnovationGUIDE, which connects rural innovation ecosystems in sectors such as agriculture, fisheries, bioeconomy and sustainable tourism. With a strong foundation in project management, she has played key roles in various initiatives, including the MICIE Mediterranean Island Cleantech Innovation Ecosystem project, EIT Climate KIC, EIT Food, EIT Urban Mobility and the Malta ClimAccelerator. Skilled in communications, social media marketing, event organisation, and graphic design, she combines technical and creative expertise to drive impactful solutions.

In her work, Rozela has collaborated with international organisations across Europe and beyond, contributing to projects that integrate sustainability and innovation, from cleantech to food safety. Her goal is to create sustainable, scalable innovations that address global environmental and economic challenges.

PROGRAMME HIGHLIGHTS

Monday 25th November 2024

08:30 – 09:00	***Welcome Coffee and Registration***
09:00 – 09:30	***Opening Ceremony***
09:30 – 10:30	***Session 1 – Presentations***
	Reshaping Education
10:30 – 11:00	*Coffee Break*
11:00 – 12:30	***Session 2 – Presentations***
	Industry Collaboration and Innovation
12:30 – 13:30	*Lunch Break*
13:30 – 15:00	***Session 3 – Presentations***
	Industry Collaboration and Innovation
15:00 – 15:30	*Coffee Break*
15:30 – 16:30	***Session 4 – Presentations***
	Reshaping Education

Tuesday 26th November 2024

08:30 – 09:00	***Welcome Coffee and Registration***
09:00 – 09:30	***Welcome Speeches***
09:30 – 10:30	***Session 1 – Student Submissions/Workshop***
10:30 – 11:00	*Coffee Break*
11:00 – 12:30	***Session 2 – Presentations***
	Integrating New Approaches
12:30 – 13:30	*Lunch Break*
13:30 – 15:00	***Session 3 – Presentations***
	Reshaping Education
15:00 – 15:30	*Coffee Break*
15:30 – 16:30	***Session 4 – Presentations***
	Cultural Contexts and Beyond

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CULTURAL CONTEXTS AND BEYOND

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CULTURAL CONTEXTS AND BEYOND

A Systematic Review of Physical Activity Levels Among Maltese Children

Johann Zarb[1], David Mockler[2], Fiona Wilson[2]

[1]*MCAST Institute of Community Services*
[2]*Trinity College Dublin, Ireland*

BACKGROUND

Physical activity (PA) levels among Maltese children have been frequently described as poor. Reviewing past levels helps both inform and contextualise the current status quo as well as to elucidate temporal changes in this behaviour, aiding in the assessment of past public health programmes and policy.

OVERALL AIM

Among Maltese children, PA levels are commonly described as low or inadequate, yet a closer examination of the studies that underpin these claims often uncovers diverse methodologies used in the assessment of PA, as well as variations in the cut-off points for defining sufficient PA levels. To explore this further, a systematic review was conducted to review PA levels in Maltese children. In addition, the review sought to understand the varying methodological approaches utilised to assess PA in local literature.

With the objectives of the study being to:

1) *Examine PA levels and temporal variations among Maltese children.*
2) *Assess varying methodological approaches used to assess PA.*

Methods

Studies exploring PA in Maltese children were included with searches conducted between December 2021 and January 2022, and updated in March 2023 utilising various databases as well as University of Malta HyDi search engine. Assessment of the methodological quality of the studies was carried out using the Appraisal tool for Cross-Sectional Studies. Data pertaining to PA levels of children was categorised according to the collection methodology and cut-off points, and weighted analysis carried out using a Freeman-Tukey transformation to calculate the weighted summary proportion under the fixed and random effects models.

MAIN EXPECTED OUTCOME/S

The systematic review of the literature is/was expected to identify studies that investigated PA in Maltese children. The protocol of the study was registered on PROSPRO (https://www.crd.york.ac.uk/prospero/) (ID: CRD42022340960). In the

reporting of this review Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) guidelines and recommendations were used

RESULTS

A total of 251 records were identified, with 40 meeting inclusion criteria. Included studies had total of 22,197 participants with ages ranging 4-16. Various methodologies to assess PA were identified, including self-reported tools, accelerometer testing and fitness testing. Methodological rigour was strong, but notable omissions repeated across studies. PA levels were found to be poor, with less than a quarter of children meeting recommended WHO PA levels (22.58%, CI 21.77-23.40). Temporal decline in PA levels also noted. In addition, significant heterogeneity was noted across the assessed studies (Cochran's Q; 471.29).

Conclusion

Historically low PA levels noted in this demographic with troubling temporal dimension exhibiting sustained decline. Findings underscore the need to address these levels in this demographic, as well as that for continued surveillance. Emphasis is placed on the need for a more systematic approach to PA surveillance, with harmonisation of data collection tools within the realm of local PA research.

IMPACT OF RESEARCH

The results presented in the review serve to highlight historical low PA levels in this demographic. In addition, a troubling temporal dimension is evidenced, as PA levels never meaningfully ameliorated – in fact depending on the temporal period considered it can be argued that they have worsened or at best plateaued. Considering the time-period studied, one can also note that the children who participated in some of the earliest studies are now adults, and potentially parents of children participating in latter studies. Given that health behaviours are often established during childhood and transmitted through to adulthood, the persistence of poor behaviours across generations might lead to the establishment of trans-generational health challenges.

This temporal aspect further underscores the need to address these levels in this demographic, with surveillance as assuming a pivotal role in achieving this, as highlighted earlier. These initiatives have a key role in collecting information on PA, with the process described as being an "ongoing, systematic collection, analysis, and interpretation of outcome-specific data" (4). Within this context and with reference to the reviewed studies, emphasis on the need for a more systematic approach to PA surveillance becomes apparent, with necessity for greater efforts in harmonising data collection tools within the realm of local PA research. It is also imperative to adopt methodologies with heightened sensitivity, reliability, and reproducibility to ensure the robustness and comparability of

findings, with the authors recommending a more systematic approach to research methodologies, particularly advocating for the utilisation of comparable self-reported tools, such as validated questionnaires, and accelerometers.

KEYWORDS

Systematic Review, Physical Activity, Public Health

Training needs analysis for local government in Malta, a Council of Europe project

Francis Delicata[1], Shirley Ann Gauci[2], Marco Montalto[1]

[1]MCAST Applied Research & Innovation Centre
[2]MCAST Institute of Community Services

BACKGROUND

The modern local government in Malta and Gozo, established in 1993, under the Local Government Act, operates as a two-tiered system consisting of 68 Local Councils and 6 Regional Councils. This system is largely based on the European Charter of Local Self-Government and has evolved through various legislative amendments.

A collaboration between the Council of Europe (CoE) Centre of Expertise for Good Governance (CEGG), the Local Government Division (LGD) of Malta, and the Malta College of Arts, Science and Technology (MCAST) was established to carry out a revised Training Needs Analysis (TNA) for Local Councils in Malta. The TNA was carried out towards the end of 2023, and consisted of one-to-one semi-structured interviews and detailed online surveys, designed by CoE expert, Prof. C. Trutkowski. The interviews targeted various members of local government and a selection of external stakeholders of local government, while the online surveys targeted members of all local councils in Malta and Gozo. The data was analysed and compiled into a report, to serve as an update to the previously completed TNA report published in 2014. The work was conducted taking into account the key principles of the European Charter of Local Self-Government, in particular the principle of subsidiarity, as well as the CM/Rec(2007)12 and the recently adopted CM/Rec(2023)5 on good democratic governance, in particular Principle 8 (Leadership, capability and capacity), under the Fundamental 3 (The Practice of Good Administration).

OVERALL AIM

Ever since Malta set up its local government sector, the Malta LGD identified a clear need for ad hoc training to help local government key stakeholders improve their skills in order to deliver a service of excellence to the local citizens. The aim of the TNA exercise was to create a good framework document that identifies the training needs of the people working in the Local Government Sector, and to serve as an update to the 2014 TNA

MAIN EXPECTED OUTCOME/S

Implementation of this training plan will improve local public administration, help keep talented people on board, and give opportunities for career growth. Setting

up a special training unit for Local Government will help to formalise training, keep abreast of the changes in the field, and develop the skills and knowledge of the people working in the Local Government sector.

RESULTS

The TNA consisted of: (i) an explorative, qualitative investigation based on twenty-one individual in-depth interviews (each of approximately 90 minutes) with local council representatives and a selection of external stakeholders of local government; and (ii) a verifying quantitative questionnaire that was distributed in all (68) Local Councils in Malta and Gozo, drawing responses from 38 Mayors (comprising 56% of all Mayors in Malta and Gozo), and 54 Executive Secretaries (comprising 79% of all Executive Secretaries in Malta and Gozo).

The TNA emphasised the importance and strong demand for local councils in Malta and Gozo, and highlighted the sensitivity and complexity involved in the work. The results revealed that the majority of participants were open to training that should take place across all levels, acknowledging that it is through training that individuals, and local councils as a whole, can perform more efficiently in their role. The TNA identified key areas of interest and promoted the delivery of training sessions that specifically addressed the individual responsibilities and skills of the various roles, differentiating the needs of, for instance, mayors, councillors and executive secretaries. The concept of an ongoing, structured training system was encouraged, with the aim of serving as a Continuous Professional Development (CPD) accreditation.

IMPACT OF RESEARCH

Addressing the skills gaps identified in the TNA exercise will enhance governance and service delivery in local councils across Malta and Gozo. This may lead to improved management of infrastructure, increased public engagement, and greater administrative efficiency, while also assisting councils in adopting modern practices. By implementing the recommendations outlined in the TNA, councils can better align their functions with national and EU objectives, fostering enhanced governance and community satisfaction. Ultimately, the findings of the TNA report may be considered within the framework of a potential long-term National Training Strategy, which the Ministry could utilise in the formulation and implementation of public policy.

KEYWORDS

Training Needs Analysis, Local Government, Local Councils, Council Of Europe, Governance

The project was funded by the Council of Europe.

The JPI Oceans Joint Action on Blue Carbon

Sarah Camilleri

Applied Research and Innovation Centre

BACKGROUND

Blue Carbon (BC) is defined by the Intergovernmental Panel on Climate Change (IPCC) as "all biologically-driven carbon fluxes and storage in marine systems that are amenable to management". To date, much of our understanding of BC dynamics comes from studies on vegetated coastal BC ecosystems (CBCE) such as tidal marshes, mangrove forests, and seagrass meadows. These coastal habitats, through drawdown and storage of carbon, have the potential to mitigate climate change, while their deterioration and eventual loss can result in significant release of CO_2 into the atmosphere.

In 2022, JPI Oceans (Joint Programming Initiative Healthy and Productive Seas and Oceans) - a pan-European platform which works for research and innovation for sustainably healthy and productive seas and oceans - brought together a group of experts to work on the JPI Oceans Scoping Action on Blue Carbon (BC). As the Maltese entity involved within JPI Oceans, Xjenza Malta sought to nominate local experts to represent Malta's interests within this BC initiative. Experts from the Malta College of Arts, Science and Technology and the University of Malta were selected to contribute to this work. Experts were to advise JPI Oceans on the need to develop a Joint Action on BC. A Joint Action is the central implementation mechanism of JPI Oceans and determines future action by associated countries in terms of collaboration and resourcing within the identified thematic area. The results of the scoping exercise were published in a Concept Paper which was presented to the JPI Oceans Management Board in April 2023. Based on the findings and the proposals presented in this Concept Paper, the JPI Oceans Management Board adopted BC as a new Joint Action.

Working group	Expected outcome	MT representative
Data repository	Enabling an information platform in collaboration with EMODnet that is accessible and usable for various stakeholders	University of Malta
State-of-the-art knowledge	Produce a report on the state-of-the-art in Blue Carbon science including gap identification to inform potential future research funding calls.	MCAST
Policy roadmap	Produce a policy roadmap for carbon removal in Europe that targets BC and aligns with legislative drivers.	MCAST

OVERALL AIM

The JPI Oceans Joint Action facilitates the development of enhanced European collaboration in addressing knowledge gaps about BC. The participation of Maltese experts within this initiative ensures that the work developed reflects habitats present within Maltese marine waters - most importantly seagrass meadows (Fig 1) and that decisions and proposals put forward by the expert group align to national policy and R&I priorities.

MAIN EXPECTED OUTCOME/S

As a first step, the Joint Action has developed a Knowledge Hub to facilitate the synthesis, exchange, and integration of knowledge on BC ecosystems across Europe. The Knowledge Hub is composed of 3 working groups, currently working toward the outcomes described in Table 1. The final report of the work of the Knowledge Hub is to be produced in November 2025.

A Joint Call for funding of R&I projects in the area is foreseen at a later stage. The topics to be funded by the call will be selected based on the gap identification exercise undertaken through the Knowledge Hub.

These two instruments make up the hybrid model used to implement this Joint Action as shown in Fig 2.

RESULTS

To date, the scoping exercise has led experts to the identification of a list of existing knowledge gaps, resulting in in the identification of six major topics in the field of BC research that need to be urgently addressed. These include:

- *The integration of all information on BC in the European Area in a comprehensive, accessible, and dynamic repository.*
- *Increasing efforts in mapping the extent of CBCEs across the European Area, Outermost Regions (OMR) and Overseas Territories (OSTs), including an exhaustive search of the scattered, already available information.*
- *Identifying main causes and hotspots of CBCEs vulnerability.*
- *Addressing specific knowledge gaps about emerging BC habitats such as macroalgae and subtidal sediments, standard methodologies for C-stock evaluation and more.*

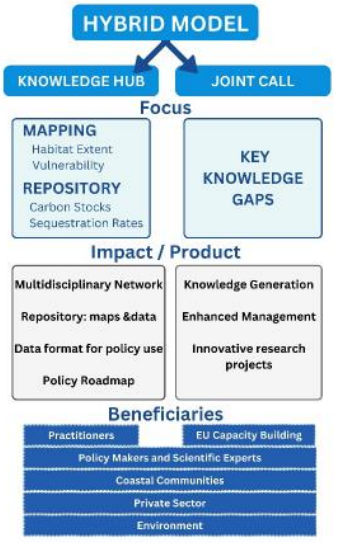
- *Exploring opportunities for policy action to facilitate recognition of CBCEs as key ecosystems and their potential inclusion in official EU and wider European Area mitigation strategies.*
- *Informing and involving decision makers and communities in the protection and restoration of their local coastal ecosystems, including embedding knowledge through formal education to empower communities.*

In addition, policy needs relating to synergies with existing policies across Europe, suitable management interventions (Marine Protected Areas, Marine Spatial Planning, Water Framework Directive etc.) and how they are implemented, as well as building co-benefits into policies were also identified in the policy dialogue as critical knowledge needs.

IMPACT OF RESEARCH

The expected impacts of the Knowledge Hub include:

- *Establishing a multidisciplinary network to enable knowledge sharing and best practices;*
- *Enabling a platform/database that is accessible and usable for various stakeholders that includes a database of habitat extent and vulnerability and a repository of carbon stock and sequestration rate data;*
- *Making data FAIR (Findable, Accessible, Interoperable and Reusable);*
- *Summarising the state of the art, including gap identification.*



The expected impacts of the Joint Call include:

- *Addressing key knowledge gaps as identified through the Knowledge Hub: not only in terms of habitat extent but also through the provision of novel and dedicated spatial products aimed at supporting climate/carbon removal action and policy e.g. CO_2 storage potential maps;*
- *Results in the generation of new knowledge and the advancement of BC science;*

- *Contributing to fulfilling existing policies, enhanced management, and the formulation of new transformative or modification of current policies and regulations as may be required;*
- *Facilitating knowledge transfer on current political goals linked to climate action to empower citizens and benefit local coastal communities through enhanced conservation and restoration.*

KEYWORDS

Blue Carbon, JPI Oceans, Marine Habitats, Climate Change, Seagrass

MEDSEAPLAN - Data and Scenarios for a Sustainable Mediterranean Blue Economy

Sarah Camilleri, Francis Delicata

MCAST Applied Research and Innovation Centre

BACKGROUND

MEDSEAPLAN - Data and Scenarios for a Sustainable Mediterranean Blue Economy – is a 3-year project (2024-2027), run by a consortium of 16 partners and led by the non-profit Blue Economy business association World Ocean Council (WOC). The project is based on a multi-actor and cross-border approach to using Maritime Spatial Planning (MSP) aligned with a sustainable blue economy in the Mediterranean. The sustainable management of marine/maritime sectors in line with environmental targets is reflected in a number of relevant EU policy tools including the Marine Strategy Framework Directive which strives for good environmental status (GES) in the EU's marine waters, and the Green Deal, which calls for a transformation into a modern, resource-efficient and competitive economy where net emissions of greenhouse gases are phased out and the EU's natural capital is protected. This mandate has been clearly addressed when the EU talks about its future desired Sustainable Blue Economy. The Blue Economy considers the ocean as 'Development Space' where MSP integrates conservation and GES with the sustainable use of marine space by the diverse range of economic sectors it sustains. Such an aspirational economic model can only work if economic activities are balanced with the long-term capacity of ocean ecosystems to support these while remaining resilient and healthy. MSP is thus a crucial tool to deliver a sustainable Blue Economy. Although the application of MSP in the Mediterranean may be considered as still in its infancy, two key challenges may already be observed: 1) insufficient data, large data gaps and data warehousing; as well as 2) issues with ensuring the effective participation of relevant stakeholders. Through the application of a novel conceptual framework tool linked to the Ecosystem-Based Approach (EBA), MEDSEAPLAN aims to improve data collection for MSP in a harmonised way and will act as an example throughout the region for stakeholder engagement in MSP processes.

OVERALL AIM

MEDSEAPLAN's main objective is to develop a comprehensive scientific knowledge-based tool for the application of the Ecosystem-Based Approach to be used in

Maritime Spatial Planning (MSP) processes with the intention to drive a Sustainable Blue Economy in the Mediterranean. MEDSEAPLAN will focus on assessing current and future data needs for regional MSP and creating relevant data inputs. It will also work on transforming this data into information that can be used by MSP planners in participatory frameworks during the planning process.

MAIN EXPECTED OUTCOME/S

Some of the expected outcomes of the project include:

- *An assessment of the status quo of MSP processes in Mediterranean countries in relation to the Sustainable Blue Economy and Ecosystem Approach principles;*
- *Stakeholder engagement, including the involvement of industry stakeholders, national MSP authorities and National Data Agencies;*
- *Piloting data collection/management approaches for MSP e.g. hosting data collection instruments on industry vessels, the design of a floating data buoy and the development of a digital twin;*
- *Testing decision-making approaches including the development of scenarios for future MSP planning;*
- *The implementation of an ocean literacy programme and the development of policy recommendations for use by MSP national competent authorities.*

RESULTS

The project is in its very initial stages with ongoing first meetings between partners to ensure a common understanding of objectives and foreseen tasks. In addition to contributing to desk research and stakeholder engagement efforts, MCAST will lead the implementation of the ocean literacy programme. Ocean literacy (OL) is an understanding of the ocean's influence on you and, conversely, your influence on the ocean. An ocean-literate person understands the essential principles and fundamental concepts about the functioning of the ocean; can communicate about the ocean in a meaningful way; and is able to make informed and responsible decisions regarding the ocean and its resources. This endeavour will be based on (i) an OL gaps/needs analysis (ii) the design and delivery of educational content using innovative/interactive approaches (iii) and the set-up of a mobility and training programme for a number of OL ambassadors to visit testing sites, research institutions, and known sustainable businesses connected to MEDSEAPLAN project partners. MCAST will use the educational sector as a starting point through which to test and implement these actions, however discussions are currently ongoing with project partners to gauge the potential for this exercise to broaden its geographical/sectoral scope. Meanwhile, MCAST has

established contact with the Planning Authority, the national entity responsible for MSP implementation, ensuring their support and involvement throughout the project's duration.

IMPACT OF RESEARCH

The overall desired impact of MEDSEAPLAN is to establish more transparent and cohesive processes for MSP data collection and increase the inclusion of the maritime industry in MSP development to contribute towards a more sustainable Blue Economy. This will be achieved through:

- *a positive impact on MSP governance in the Mediterranean through the establishment of standard approaches integrating ecosystem-based management and blue economy principles;*
- *the improvement and homogenisation of data collection/management processes within MSP processes, and improving decision-making processes at national/regional scale;*
- *strengthened participation in MSP by industries where planners will be encouraged to think proactively about potential future impacts through the use of future scenarios, thus pre-empting future changes and propose solutions, consider trade-offs, plan transitions, etc. to integrate into more future-proof MSP;*
- *the improvement of awareness, knowledge and visibility of MSP processes.*

KEYWORDS

Maritime Spatial Planning, Blue Economy, Ocean Literacy

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MCAST RESEARCH & INNOVATION EXPO 24

Integrating new approaches

MCAST

INTEGRATING NEW APPROACHES

DSP applied to Graph Theory

Jason Debono

BACKGROUND

Digital Signal Processing (DSP) started in the 1960s. Today it is being used to process audio signals, images and videos that we listen to and watch every day. Recently some DSP techniques have been applied to the field of Graph Theory, which started about 300 years ago and which models systems by nodes that are connected together with edges. Many systems that we encounter in everyday life can be modelled as Graphs. Such systems can be road maps, computer networks and molecules used in molecular biology. More recent systems like computer animations and social networks are also very well-suited to being modelled as Graphs. Analysing the characteristics and properties of such graphs using DSP can improve the quality of the information extracted and the computational load needed to extract it.

OVERALL AIM

To apply DSP techniques such as the Discrete Fourier Transform (DFT) to Graphs and extract frequency domain information about the Graphs. This frequency domain information is used to identify sections of the graph that display localisation and sections that are stationary. Furthermore, this research probes other possible applications of combined DSP and Graph analysis techniques, such as face recognition, maps analysis, class labelling of outdoor maps and autonomous driving.

MAIN EXPECTED OUTCOME/S

Extraction of information about the chosen Graphs, including frequency domain information. Identifications of graph areas that contain localisation and other areas that are stationary. Analysis of certain subtasks that are carried out in Convolution Neural Networks (CNNs).

RESULTS

The Discrete Fourier Transform (DFT) has been applied to selected graphs and relevant information has been extracted. Plots were created to visualise this information. Graph sections having local characteristics and sections that are stationary have been identified.

IMPACT OF RESEARCH

Introducing Graph Theory as an interesting and promising new field that can be studied as part of the present DSP units at MCAST. This kind of graph analysis can be applied to Convolutional Neural Networks (CNNs) which are commonly used for image recognition. This application can also impact some of the units delivered to engineering students at MCAST, such as the Advanced DSP unit. Outside of MCAST, the results of this research can be applied to many important fields like network analysis, molecular structures, remote sensing / surveying, social networks, knowledge graphs and other areas in AI.

KEYWORDS

DSP, Graph Theory, DFT, Eigenvectors

MED-WET - Sustainable Water Irrigation and Supply for Agriculture

Francesca Busuttil[1], Malcolm Borg[1], Sarah Camilleri[2]

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BACKGROUND

The Mediterranean region faces significant water scarcity. High tourist activities during the summer months further stress the limited water reserves, at a disadvantage for agriculture. Additionally, population growth, changing food consumption patterns and climate change are expected to intensify stresses. This calls for more efficient and sustainable irrigation technologies that are widely applicable. This project, Improving MEDiterranean irrigation and Water supply for smallholder farmers by providing Efficient, low-cost and nature-based Technologies and practices (MED-WET), provides solutions to enhance irrigation efficiency as well as to increase freshwater availability by tapping into non-conventional water sources.

During this project, three low-cost, lean solutions that optimise natural resource use and income even at small scales are explored. "SLECI" (Self-regulating, Low Energy, Clay based Irrigation) technology is a self-regulating subsurface irrigation technique that uses the actual suction force of the surrounding soil for regulation of the system's water release via clay tubes. The second technology consists of a solar desalination greenhouse that will use saline and low-grade water to recuperate freshwater suitable for crop irrigation. Lastly, productive constructed wetlands are used for wastewater reuse and its transformation into reclaimed irrigation water.

Under this consortium, MCAST and the EcoGozo Directorate within the Ministry for Gozo are joined by the lead partner from Germany (Hochschule Wismar), as well as partners from Egypt (Heliopolis University for Sustainable Development), Morocco (Institut National de la Recherche Agronomique du Maroc and Sultan Moulay Slimane University) and Portugal (University of Beira Interior and Municipality of Fundão) during this 3-year project. MCAST is leading the capacity-building and dissemination activities to maximise project visibility, accessibility and impact.

MED-WET is 100% funded by Xjenza Malta through the PRIMA initiative of Member States, Associated Countries and Participating Countries. The PRIMA Programme is supported by the European Union.

OVERALL AIM

MED-WET aims to improve the irrigation efficiency of small farmers in the Mediterranean region and to make optimal use of scarce water resources for lasting food and water security. This is being done, amongst others, by:

1. *Developing new irrigation technologies and solutions widely applicable for smallholder farmers.*
2. *Equipping smallholder farmers with knowledge and skills to install, adapt and operate more efficient and effective irrigation options.*
3. *Increasing irrigation water availability from salinised and secondary sources.*
4. *Enhancing farm profitability and reducing the environmental footprint of pilot farming practices.*

MAIN EXPECTED OUTCOME/S

MED-WET supports smallholder farmers to adopt low-cost, sustainable solutions in irrigation and freshwater harvesting, to promote controlled water use with increased crop yield, to implement agricultural methods that restore ecosystem services for the long term, as well as contributing to value creation in rural areas. Higher water use efficiency shall be reached through more targeted and highly decreased water consumption through innovative irrigation systems and by tapping into largely unused non-conventional water resources.

RESULTS

WP1 involves project management and consortium coordination and is ongoing. Technology development and adaptation, as indicated in WP2, resulted in the development of pilot installation and monitoring plans. Ten pilot sites are currently in operation. The SLECI technology is being piloted in four sites in Morocco for the irrigation of date, olive and citrus trees; three sites in Portugal for the irrigation of peach and cherry trees; and two sites in Gozo for the irrigation of citrus and vines. The solar desalination greenhouse technology is being piloted in Gozo, and is being used for the cultivation of halophytes, lettuce and courgettes. In Egypt, constructed wetlands are being piloted to treat domestic and agricultural wastewater, with the reclaimed water subsequently used to irrigate bamboo fields. Data collection from all pilot sites is ongoing. Business development and stakeholder cooperation, as described in WP3, resulted in an environmental and policy analysis and a cost-benefit analysis. Impact evaluations, as mentioned in WP4, are ongoing with the evaluation of the results obtained from the pilot sites and comparison with existing irrigation solutions. WP5, led by MCAST, involves capacity building and dissemination. A communication and dissemination plan was developed. Several communication and dissemination strategies are currently

ongoing, such as updating the project website and social media channels, publication of articles for a non-scientific audience, distribution of project leaflets, participation in outreach activities, representation of the project during seminars, and communication with stakeholders.

IMPACT OF RESEARCH

MED-WET contributes to combatting the adverse effects of climate change on water security, agriculture and food security in the Mediterranean. The project contributes towards the achievement of SDG 6 (clean water and sanitation), more specifically indicator 6.4.1 (change in water-use efficiency over time). MED-WET also contributes directly to SDG 13 (climate action), 1 (zero poverty), 2 (zero hunger) and 12 (responsible consumption and production). MED-WET supports the achievement of the EU Green Deal, including the 'Farm to Fork' Strategy, the Circular Economy Action Plan, and the New EU Strategy on Adaptation to Climate Change. By enabling diversification, promoting regenerative systems with enhanced water efficiency by design, and applying water recovery technologies that provide ecosystem benefits including habitats, MED-WET contributes to the European Biodiversity Strategy and international strategies, such as the UNEP plans on Biodiversity and Agriculture.

The direct impact reaches even beyond the Mediterranean via agrifood value chains reaching all over Europe and North Africa. Throughout the entire project, collaboration between EU and African partners and target stakeholders will facilitate cross-fertilisation of techniques, spanning cutting-edge technologies and sustainable traditional methods. In addition, business development and exploitation activities support each partner to bring their innovations to market, and to launch follow-up research and innovation activities. MED-WET will involve 200 students as researchers (early career, Masters, PhDs), enable partners to disseminate in trade-press, trade-fairs, and conferences. Each of the pilots will also enable the creation of local innovation systems, local incubators of cooperation between science, end-users and finance providers bringing forth new business models for replication and further experimentation. MED-WET co-develops the local innovation systems in cooperation with end-users, as end-users directly provide inputs on needs, problems and possibilities of the technology under experimentation, and help articulate design specifications, while the field tests provide insights on unexpected side effects of new configurations, promoting real embedded sociotechnical transition.

MED-WET will increase profitability of smallholder farming by enabling them to significantly cut production costs. Enhanced water availability for irrigation and cost reductions resulting in funds freed for investment in the farm enable crop

diversification including the cultivation of higher value crops as well as equipment for improved post-harvest handling and increased ability to pay for certifications and other aspects enhancing access to market. MED-WET provides solutions targeted specifically at smallholder farmers in rural areas, thus the benefits of MED-WET for business competitiveness and growth contribute to inclusive rural development.

KEYWORDS

Agriculture, Irrigation, Nature-Based, Water, Mediterranean

Project MED-WET is funded by the Xjenza Malta through the PRIMA initiative of Member States, Associated Countries and Participating Countries under grant agreement number PRIMA-2020-02A.

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XJENZA MALTA

UNDERSTANDING THE EMPLOYMENT NEEDS OF FULL-TIME VOCATIONAL STUDENTS AT ICS: EXPLORING THE IMPACT OF EMPLOYMENT ON STUDENT PERFORMANCE

Dr Shirley Ann Gauci

MCAST Institute of Community Services

BACKGROUND

The impact of term-time employment on full-time students is a growing concern internationally due to evolving student needs and its effects on academic performance (Perna, 2023). Many undergraduates face significant expenses for tuition and registration fees (European Commission [EC], 2023a; OECD, 2023). In the United States, costs can reach up to €40,000 annually for tuition and accommodation (OECD, 2017), while European fees are generally more manageable (EC, 2021), with some universities waiving fees or charging minimal registration fees (EC, 2014). Despite this, travel and lodging expenses remain high, driving students to seek part-time employment. In Europe, both EU and non-EU students can work while studying (EC, 2023b). Eurostat (2018) reports that 46% of young people in the EU worked while pursuing higher education in 2016, compared to 70% of U.S. college students over the past 25 years (Carnevale et al., 2015).

In Malta, most undergraduate students are exempt from tuition and registration fees, with approximately 19,000 receiving maintenance grants (EC, 2014; Parliamentary Question 507 – 14, 2017). Many live with their parents until around age 30, avoiding rental costs (Arena, 2022; Chetcuti, 2014; Eurostat, 2023). Gozitan students, who must relocate to Malta for their studies, receive additional grants for rent and travel (Servizz.gov, 2023a; Servizz.gov, 2023b). However, these expenses can still be burdensome, causing some students to drop out (Early School Leaving Unit, 2017; Chircop et al., 2022).

Research shows that student employment, especially full-time, can negatively impact academic performance (Zhang & Yang, 2020). Part-time jobs often include extra duties, leading to reduced sleep and impaired concentration, affecting academic achievement (Nhi, 2022; Summer et al., 2023). This is supported by Fenech and Raykov's (2018) study of Maltese university students. Conversely, Yanbarisova (2015) and Kosi et al. (2013) suggest that limited, study-related part-time work can be beneficial or at least not detrimental to academic success. Fenech and Raykov (2018) also found positive outcomes for students in study-related employment.

OVERALL AIM

International studies have primarily focused on university students, leaving a significant gap in research on tertiary vocational students. Locally, limited research exists and thus, the researchers, both from the Institute of Community Services (ICS) at MCAST, aim to address this gap by investigating the employment needs of full-time vocational students and their impact on academic performance.
The central research question is: What are the employment needs of full-time vocational students and how do these needs affect their academic performance?
Thus, the objectives were: to conduct a needs analysis to investigate the employment needs of full-time vocational students; to explore the impact of employment on students' performance; and to identify any improvements and adaptations in student support.

MAIN EXPECTED OUTCOME/S

This study investigated a specific phenomenon within a particular context and among a distinct group. It employed the phenomenological method outlined by Fisher and Stenner (2011) because it effectively combines quantitative and qualitative research methodologies, allowing for qualitative insights to provide a comprehensive understanding of the quantitative data. A cross-sectional study design was chosen, utilising a mixed-method approach. Data collection consisted of two phases. First, a focus group with Key Informants at ICS (including Deputy Directors, Institute Coordinators, and Mentors) to establish a contextual understanding leading to the preparation of a comprehensive quantitative needs assessment. Secondly, all (n=193) students pursuing MQF Level 6 in Health and Social Care, and Early Years were given the opportunity to participate in a needs assessment (Likert-scale questionnaire). One hundred thirty-three (133) questionnaires were received, hence a response rate of 69%. This was followed by one-to-one semi-structured interviews with a random sample of 10 students among the participants who took part in the needs assessment. The interviews served to gain a deeper informed understanding of the quantitative findings. There were two main expected outcomes. Firstly, the elicitation of those student employment needs of the students that compel them to engage in term-time employment and any underlying factors. Secondly, an informed understanding of the impact that employment has on the wellbeing and academic performance of the students.

RESULTS

Results have been analysed by using the principles of convergent parallel design, emerging from the mixed method approach. The quantitative results were triangulated with qualitative data, thus serving as the reality check of the study. The objective was to assess if the understanding constructed conformed with the

evidence. The majority of research participants do work part-time whilst reading for their undergrad degree. Despite reporting no tuition fees, most students declared that part-time employment is needed to buy study resources and mitigate living costs. Monthly expenses range from €50 to €300 for the former, and up to €500 for the latter. It seems that this is one of the reasons for working part-time, but others included financing social activities and personal appearance, as well as helping with family finances. This opened up students' widespread financial challenges, which are leading them to keep on living with their family or guardians. Many students claimed that they knew peers who had discontinued their studies due to financial constraints and others who were working more than the official part-time hours, thus underscoring the impact of economic pressures on academic pursuits. Concerns about the adequacy of institutional financial support, and lack of related information within MCAST, were also raised by participants. However, many declared that even if they received a supplementary maintenance grant, they wouldl keep on working part-time. It seems that if they did not work part-time, this would not affect their basic needs, such as causing skipped meals and lodging problems, but some still expressed concerns. Others declared that they would be excluded from their social life. The majority declared that they feel no peer or family pressure to work. Participants engaged in part-time work expressed mixed feelings, however, some viewed it as a tool for more autonomy or for gaining more experience in their area of study. Strikingly, the majority reported negative impacts on their well-being and mental health. Notwithstanding all this, students felt that they still managed to attend lectures punctually and maintain concentration in class. It is unclear whether working part-time affects academic performance or not. Many recommended that MCAST takes the lead and organises study-related apprenticeship/placement schemes during summer with better salary and lecture schedule adaptations to strike a balance between the employment and academic needs of full-time vocational students at ICS.

IMPACT OF RESEARCH

This research has a significant impact on three of the above fields:

1. *Scientific Research*

This study contributes significantly to the existing body of knowledge on the interplay between employment and academic performance, particularly focusing on an under-researched population: full-time vocational students. The mixed-method approach provided a clear picture of the employment needs of full-time vocational students reading for Level 6 degrees in these two courses, while the interviews offered nuanced insights that challenge and extend current understandings predominantly derived from university student populations. The

findings will inform future studies on the differential impacts of employment on various student demographics and highlight the specific needs of vocational students, paving the way for targeted interventions and support systems.

2. *Society*

Although this is a small-scale study conducted with only two cohorts within one institute, the findings shed light on a considerable portion of the student population: vocational students following Undergraduate degrees. An informed understanding of their needs, challenges and concerns serves to enlighten educational and social authorities to provide the students with effective support structures tailored to their needs, some of which were also recommended by the students themselves. These would enable students to achieve a fair level of financial independence while preserving their health and well-being.

3. *Curriculum*

The findings suggest that for most students, working while studying resembles a double-edged sword offering them a degree of independence while taking a toll on their academic performance. Based on the recommendations of participants who must work while studying, it is suggested that curriculum organisers structure the content more systematically to allow students the flexibility to work either in the morning or the afternoon, thereby providing them with dedicated blocks of time for employment. Based on the recommendations of participants who must work while studying, it is suggested that curriculum organisers structure the content more systematically to allow students the flexibility to work either in the morning or the afternoon, thereby providing them with dedicated blocks of time for employment.

KEYWORDS

Vocational Students, Student Employment Needs And Performance, Mixed Method Research Design, Malta, Higher Education

The Ceramic Narrative Experiment

Claudia Anne Chircop

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BACKGROUND

One of the primary reasons behind undertaking this research was to dedicate a few hours each week to experimentation, learning new things, seeking inspiration, and regenerating my love for what I do. Preparing lessons can be time-consuming, and delivering them week after week, year after year, may sometimes lead to a routine that can breed complacency, which is not at all what I aspire to. I place great value on lifelong learning. I realised that in order to maintain passion in the classroom and pass that on to students, I needed to set aside time for exploration, embrace mistakes, and rejuvenate my interest with fresh perspectives.

I believe that one of my major roles as a lecturer is to inspire. With this goal in mind, this research is the culmination of a structured yet adaptable journey, leaving space for serendipity and wonder.

Subsequently, I made some observations to consider how these concepts could be put into practice within the classroom setting. These reflections are integrated within a journal.

OVERALL AIM

My interest in ceramics and animation sparked the idea for this research, exploring their potential combination. As I delved into experimenting with both media, a common thread emerged: the narrative embedded within each artwork. Whether it was a 3D ceramic vessel, a static 2D illustration destined for animation, or a fusion of the two, the focus consistently gravitated towards how textures influenced mood, the emotions evoked by colour palettes, and the storytelling conveyed through depicted subjects. Therefore, this research aims to explore how aesthetic perception can manifest through animation and ceramics, ultimately forming a narrative expression.

MAIN EXPECTED OUTCOME/S

Typically regarded as separate forms of artistic expression, animation and ceramics will be the focal point of this new artistic exploration combining the two

media, aiming to explore different ways of narrative expression. This study's inspiration stemmed from introducing a temporal dimension to an inherently static art form. Thus, the objective is to explore this notion by utilising ceramics as a canvas for animation in various ways. It is also interesting to see the potential development of cross-departmental possibilities: Fine Arts and Digital Arts. I am very fond of these two departments mainly due to my Bachelor's in Fine Arts at MCAST back in 2010 and my Master's studies in Character Animation at the University of the Arts London in 2013.

RESULTS

The results of this research include a series of experiments and final ceramic pieces, overlaid with animation snippets. Each snippet is designed to tell a story, evoke emotions, capture flow, and mimic nature. Every animation is paired with its audio, aiming to enhance the storytelling. Additionally, a journal was kept throughout the creation process, noting potential classroom experiments and documenting ideas for lessons with students.

IMPACT OF RESEARCH

This research spans three distinct areas: animation, ceramics, and storytelling, intersecting various educational and industry sectors. In ceramics, it investigates a range of materials, including different clays like stoneware and earthenware, and various glazes and engobes. The study explores how different colours and textures can enhance the expression of emotions and moods through art. It also innovatively uses ceramics as a canvas for animation, presenting new challenges and opportunities for digital arts beyond traditional mediums like paper or screens.

Storytelling, an essential aspect of both personal and industrial communication, benefits from this research by exploring new methods of narrative delivery. This multidisciplinary approach is valuable for both education and industry. Moreover, the study includes comprehensive notes, reflections, and ideas for workshops that can be conducted with students, enhancing their learning experience and fostering creativity.

KEYWORDS

Animation, Ceramics, Narrative

modernAKIS: Modernising Agriculture Knowledge and Innovation Systems

Sarah Camilleri, Massimo Pierucci, Lorna Bonnici West

Applied Research and Innovation Centre

BACKGROUND

In times of increasing pressure on the use and management of natural resources and high political and societal ambitions with respect to sustainable ways of food production, the European Union (EU) has defined visionary goals (e.g. European Green Deal) to tackle climate change and sustain a healthy way of life. Within this context, the timely access and integration of rapidly evolving scientific knowledge, innovation and technological developments across actors who participate in agricultural value chains is key to a successful transition towards the European vision. This is also reflected in the 2021-2027 Common Agricultural Policy (CAP) that stipulates the importance of effective Agricultural Knowledge and Innovation Systems (AKISs). AKIS refers to the networks, organisations, and processes that facilitate the generation, exchange, and application of agricultural knowledge and innovations within a given agricultural system. Such a framework is supported by AKIS actors (i.e. actors from R&D institutions, advisory services, farmers/producers, policymakers, agribusiness, private sector and NGOs) as well as physical and digital platforms that allow effective knowledge sharing and support innovation. However, the AKIS concept is not yet widely known and the capacity of decision makers to implement this approach remains underdeveloped. Effective knowledge flows are often challenged by the diversity of AKIS systems at national/regional/local levels, and the decentralisation and privatisation of agriculture services (e.g. advisory services, education and training activities) contributing to an increasing pluralism of actors. Such challenges set the scene for the work undertaken by this project. With the involvement of a diverse range of partners from all 27 EU member states (including ministries, universities, chambers etc.) and spanning over 7 years (2022-2029) the project looks at making the AKIS approach an effective tool for all actors of agrifood systems. This abstract provides an overview of the project's objectives and its achievements to date.

OVERALL AIM

The project's main objective is to improve AKIS actors' capacities to leverage individual, organisational and systemic resources needed for the transformation

towards more coherent and efficient AKIS systems, contributing to the transition towards the sustainable management and use of natural resources in farming and forestry.

MAIN EXPECTED OUTCOME/S

The main outcomes expected include: (i) the provision of a new know-how to be used by policy makers and other AKIS actors, to improve knowledge flows and develop a well-functioning AKIS in their country (ii) supporting Member States' benchmarking in order to choose the most effective AKIS interventions adapted to local/regional/national situations (iii) the provision of approaches to better connect actors, policies, projects and instruments to speed up innovation and the uptake of knowledge.

RESULTS

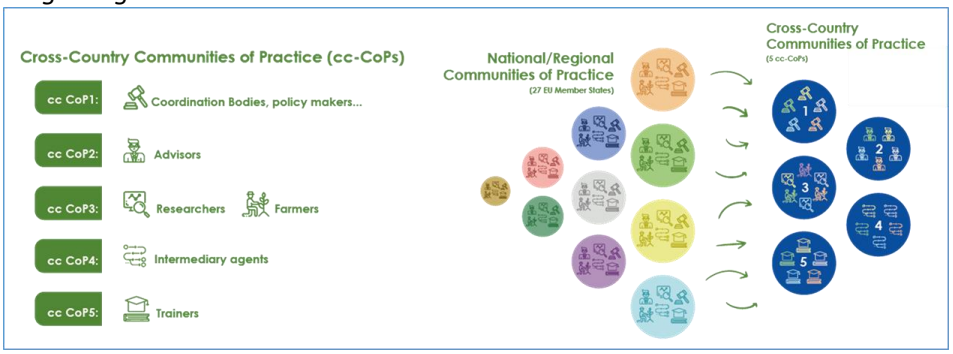
The following are some of the recent project developments:

1. *AKIS Coordination Bodies General Assemblies (AKIS CB GAs) take place biannually targeting the participation of project partners and nationally designated AKIS CBs. The latest of these events took place in April 2024 in Madrid and focused on the integration of advisors into the AKIS.*
2. *In February 2024 the AKISConnect.eu platform was released, serving as the project's tool for data management, particularly for storage and dissemination of communication/educational material. In addition to accommodating the modernAKIS network, the platform is now hosting the ATTRACTISS project network, with the aim to capitalise on potential synergies. ATTRACTISS is a Horizon Europe project, which aims to empower innovation support services as a pathway for a more sustainable agriculture & forestry sector.*
3. *The setting up national/regional Communities of Practice (CoPs) - multi-actor sub-groups working towards supporting specific objectives of the AKIS network - is well underway, with progress levels varying across member states. Whilst some countries have already established their national CoPs, in others the process requires further discussions, most often in view of the absence of a formally established AKIS CB, which was intended to have a central role for the establishment of the CoPs. MCAST is currently liaising with local actors for an understanding of the potential set-up of Malta's national CoPs and aims at holding the next meetings towards the end of 2024.*
4. *The consortium is constantly working on building educational content and organising capacity building activities targeting the AKIS network. These include a collection of ready-for-practice solutions for the implementation*

of the AKIS strategies within member states. The practices are feeding the networking and capacity building activities of the project. MCAST has also supported the translation of content pertaining to eLearning modules which will be available in all the consortium languages.

IMPACT OF RESEARCH

The project will achieve impact through an iterative cycle of collection-organisation-delivery of new topical knowledge ready for practice. Key AKIS actors can access this knowledge through the knowledge exchange platform and apply it in their context to achieve better knowledge flows and thus a better functioning AKIS. Knowledge will pertain to AKIS models, strategies, governance solutions, and types of AKIS interventions beneficial to achieving CAP objectives. Network interactions will enable actors to draw on practice-oriented knowledge for integrating advisors and innovation



support into the AKIS and incentivising researchers to deliver practice-ready knowledge. Key AKIS actors in modernAKIS can draw from the comparative analyses of the 27 member states to understand where they can improve their AKIS. Subsequently they can extract and take advantage of new know-how and practices being experimented in AKISs models and strategies applied across the EU from the knowledge exchange platform. The project will enable the capacities of relevant coordinating bodies to monitor, measure and improve the organisation/functioning of their AKIS. These activities will help them to identify, share and learn strategies and mechanisms for a well-functioning AKIS. The project provides a forum for such bodies to discuss and exchange knowledge on all aspects of systemic change management.

- *Scientific impacts include benefits to scientists and practitioners who aim to develop tools/enhance the management practices of complex socio-political ecosystems, especially with a focus on knowledge of management and actor networks.*

- *Economic impacts are also expected through reduced systematic access costs for participants of AKIS. Further, the lessening of informational asymmetry is expected to incentivise the adoption of innovative and cooperative practices with individual pay-offs. Also, the benchmarking against better practices may trigger interventions which provide additional incentives and revenues for advisors, researchers, innovators.*
- *Social impacts are also foreseen as the AKIS network will increase awareness, understanding, knowledge and capacities for system change of key AKIS actors. Long-term improvements in trustful relationships are also expected. Meanwhile by setting up an EU-wide network of key AKIS actors - building on existing networks, projects and policies, modernAKIS will accelerate the uptake of innovative AKIS governance models interventions as well as of practice-oriented knowledge.*

KEYWORDS

Agriculture Knowledge And Innovation, CAP Strategy, AKIS Coordinating Body, Advisory Services, Communities Of Practice

Funded by the European Union

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Non-Invasive Diagnostic Techniques for Abiotic Stress Detection: International Collaborative Research on Glycine max (L.) Merrill

Judita Tomaskinova

Applied Research and Innovation Centre

BACKGROUND

Soil degradation and contamination represent significant environmental challenges, impacting ecosystems and agricultural productivity. Approximately 4% of global agricultural land suffers from degradation, including chemical deterioration such as nutrient depletion, salinisation, pollution, and acidification, as well as physical damage like erosion and compaction. These abiotic stressors—particularly salinisation, acidification, and industrial pollution—negatively affect vegetation, potentially leading to plant death on an individual or population level. Sustainable land management is essential for mitigating these issues and contributes to several UN Sustainable Development Goals (SDGs), including SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 13 (Climate Action) (FAO, 2021, 2022). Plants subjected to these abiotic stressors exhibit physiological changes, particularly in Photosystem II (PSII), which is crucial for photosynthesis. Chlorophyll fluorescence is an effective, non-invasive diagnostic tool for assessing PSII function and plant health. Parameters like the maximum quantum efficiency of PSII (Fv/Fm) provide insights into stress responses caused by abiotic factors such as salinity, acidity, and heavy metals. This approach enables early detection of stress before visible symptoms, such as chlorosis or leaf necrosis, appear. By monitoring these changes, researchers and agronomists can take timely corrective actions to mitigate the negative effects of abiotic stressors on crop productivity, improving agricultural sustainability under adverse environmental conditions.

This study focuses on Glycine max (L.) Merrill (soybean), evaluating the effects of abiotic stressors on chlorophyll fluorescence and overall plant vitality. Part of a collaborative project involving multiple institutions, it aims to offer practical, real-time solutions for monitoring crop health, with a particular emphasis on mitigating crop losses due to environmental stressors. The research supports precision agriculture by integrating advanced biophysical techniques, contributing to the sustainable management of agricultural systems under increasing pressures from climate change and soil degradation.

OVERALL AIM

The primary aim of this collaborative project is to assess the impact of abiotic environmental (chemical) stressors in the soil environment—such as salinity, acidification, and inorganic elements from industrial waste (red mud containing

aluminium)—on chlorophyll content and fluorescence in the photosynthetic tissues of Glycine max (L.) Merrill, cv. ES MENTOR. This will be done using a non-invasive diagnostic model for detecting abiotic stress in soybeans by examining the relationship between fluorescence signals and chlorophyll content.
In controlled pot trials during the 2023 growing season, we applied increasing doses of these stressors and evaluated their effects on the effective and maximum quantum yield of PSII (yield Y(II) resp. Fv/Fm test). These tests are commonly used to detect plant stress.
By utilising advanced biophysical techniques, this research seeks to establish a real-time monitoring system that enables early detection of environmental stress in crops. This diagnostic model will not only enhance our understanding of plant stress physiology but also provide a practical tool for farmers and agronomists to optimise crop performance under various environmental conditions. The project aligns with broader goals to promote sustainable agriculture and mitigate the impacts of climate change on food production.

MAIN EXPECTED OUTCOME/S

In a controlled pot experiment, targeted abiotic stress conditions (salinity, acidification, and industrial pollution from red mud) were simulated to study their effects on chlorophyll content and fluorescence in soybean (Glycine max L.). The project aims to refine existing diagnostic methods to better understand soybean tolerance to stressors, offering insights to improve crop management and yields. It focuses on enhancing non-invasive techniques for real-time stress detection in agriculture. The research also promotes global collaboration and knowledge sharing through the open-access publication, contributing to sustainable farming practices under challenging environmental conditions.

RESULTS

This research is part of a collaborative project funded by the national Research Networking Scheme (RNS-2024-014). The project brings together expertise from the Malta College of Arts, Science, and Technology (MCAST), the Spanish National Committee of the International Union for Conservation of Nature (CeUICN), and Matej Bel University (MBU), under the recently concluded NetMed project (IPAS-2023-030).
Preliminary results show a strong correlation between chlorophyll fluorescence signals and chlorophyll content in soybeans subjected to various abiotic stressors such as salinity, acidification, and industrial pollution. This correlation provides critical insights into plant stress physiology and confirms the potential of using these measurements as reliable indicators of early stress detection in a non-invasive manner. While the research builds on established methods, initial findings

suggest that these refined techniques could be effectively applied in real-time field conditions, enabling rapid stress detection without extensive labor or resources. The collaborative nature of this project has also enhanced interdisciplinary research capabilities by integrating biophysical, agricultural, and environmental sciences. The insights gained from this study are expected to lead to further validation and refinement of diagnostic techniques, not only for soybeans but also for a broader range of crops and environmental conditions, contributing to more sustainable agriculture and improved crop management practices globally.

IMPACT OF RESEARCH

Though the project is ongoing, its anticipated impact is significant. The refinement of a non-invasive, real-time diagnostic method for detecting abiotic stress in crops has the potential to transform how farmers and agronomists monitor plant health and manage environmental challenges. By enabling early detection of stress, this approach will support more efficient, sustainable agricultural practices, particularly in regions where environmental factors frequently threaten crop productivity. Additionally, the project's interdisciplinary and collaborative nature underscores the critical role of international partnerships in addressing global agricultural and environmental issues. By integrating academic research with practical applications, the project not only advances scientific understanding but also promotes global sustainability efforts. The open-access publication of the project's findings will play a key role in facilitating widespread dissemination, ensuring that researchers, policymakers, and practitioners around the world can freely access and apply the knowledge. This approach is essential for promoting global collaboration and accelerating the adoption of sustainable agricultural practices, fostering innovation and progress in addressing environmental and agricultural challenges.

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KEYWORDS

Abiotic Stressors, Glycine Max (L.) Merrill, Chlorophyll Fluorescence, Soil Acidification, Soil Salinity

Fluorescence and chlorophyll content as criteria for diagnosing abiotic environmental stress of Glycine max (L.) Merrill financed by the Research Networking Scheme (RNS) 2024 of Xjenza Malta.

STREAM services deliver on-demand satellite data

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[5]THINK Design Ltd
[6]Prehnit Ltd, Croatia
[7]DELTARES, Netherlands

BACKGROUND

Scientific endeavours and timely technological solutions are gaining unprecedented momentum to address growing challenges for sustainable development, climate-related targets, and higher performance in applied research, innovation, and economic excellence. Quality data is the common ingredient, delivered where and when it is needed, operationally in real-time or in delayed mode, to generate information, knowledge and added value for multiple applications. As more users rely on information deriving from multiple data sources including satellites, the non-professional users are also increasing in numbers with their pertinent demands. Technology is leading to a step shift in the value addition chain of data, transforming data into information, knowledge, and intelligence, providing sophisticated user experiences online, with faster delivery and service elaborations on a wider range of more affordable smart mass media like smartphones, tablets, and other wireless devices. In particular, remote-sensing data is increasingly becoming an essential resource in applications to improve the quality of life and safety of citizens, for risk assessment, environmental monitoring, surveillance, scientific discovery as well as economic exploitation.

OVERALL AIM

STREAM (www.stream-srf.com) is a Xjenza Malta Space Research Fund project that is providing prototype data services to bring satellite earth observations closer to users. It provides on-demand data with access through dedicated downstream services over the web, smartphones and tablets. It takes advantage of the technology step shift in the value addition chain of data, transforming data into information, knowledge, and intelligence, providing sophisticated user experiences on the spot, with faster delivery and service elaborations on a wider

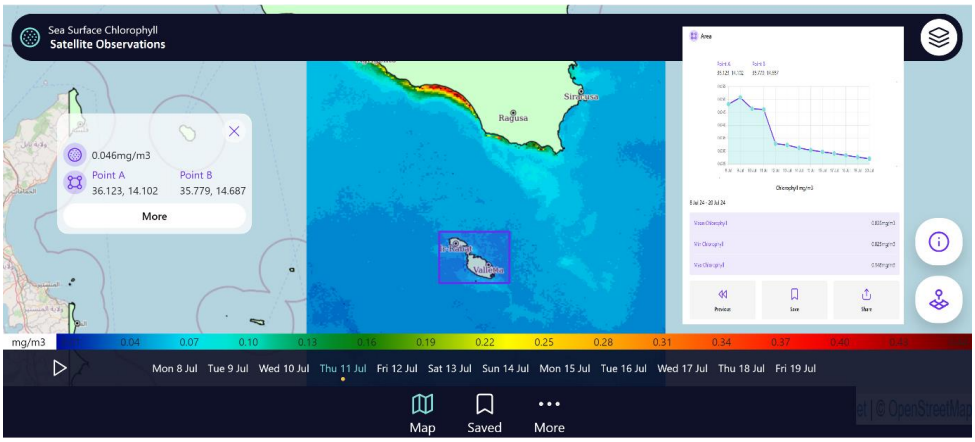
range of affordable smart mass media. The work done in this project can be followed on www.stream-srf.com.

MAIN EXPECTED OUTCOMES

STREAM enhances the level of access and application of space data with local users, including the citizen level, to facilitate its integration into daily endeavours by operators and responsible entities, for decision-making, higher efficiency, and performance at reduced risks, delivering tailor-made and added-value services needed at different scales, disciplines, and levels of society. The project provides an intermediate platform dedicated to data fields covering the sea areas around the Maltese Islands, and more broadly the Malta shelf area up to the southern Sicilian coast, channelling data easily and customised to user needs from different satellite data sources.

RESULTS

The project execution is led by the scientific coordination and technical inputs from the oceanography section at the Institute of Engineering and Transport of the Malta College of Arts, Science and Technology. It is implemented jointly with two Maltese SMEs (MST AudioVisual Ltd and THINK Design Ltd) and engaged specialised staff, and the scientific excellence of DELTARES engaged on subcontracting basis, bringing together into the project the expertise for system design, setup, and operation, as well as for the user interfaces and a branded service delivery on electronic hand-held devices.



The STREAM focus is on the dedicated services that aim to enhance and expand the local capability in the use of full resolution operational satellite data. Merged to numerical modelling data, the service streams raw data upon user-defined requests, and additionally delivers specialised derived products in the form of

indicators such as for heat wave alerting and water quality. The STREAM service is easy to use through a mobile-enabled interface that allows the user to make specific individual requests, selected and compiled on multi-functional input dashboards. Although intended as a proof of concept at this stage, the service targets different users, professional and non-professional, for research, education and awareness, monitoring and expert assessments, decision-making and planning, and to feed third party initiatives boosting private enterprise in many sectors. In particular, the prototype system delivered in this first project will favour fish farming, the monitoring of water quality in coastal sea areas, and of land-based sources of pollution in the sea. The area of interest is the Malta Shelf area covering the stretch of sea between Malta and Sicily, zooming on the sea around the Maltese Islands.

IMPACT

The project has addressed various technical challenges bringing components to work seamlessly together in a multi-functional process chain running from data sourcing to operational scripts that automate data harvesting, processing and elaboration, to storage on a dedicated server that handles and organises spatial data. The data workflow entails backend processes that channel data and respond to requests from a dedicated user interface that delivers peer services on a web and mobile application. With these requisites the STREAM digital platform follows a modular design, using state-of-the-art technologies, providing a versatile system architecture that is ready to take future evolutions. Hardware components consist of multiple redundant servers running VMware as the hypervisor, together with a centralised Network Attached Storage (NAS) interconnected over 10G connections to the core switch. A number of linux virtual machines are also used to house all the operational activity, together with providing SSL termination, firewalling and VPN connectivity. The GeoServer is the main software component through which end users access data on the platform. Data is stored as a combination of GeoTiff and NetCDF files, alongside a PostgreSQL database with PostGIS extensions for data preparation to front-end via mapping and tiling Application Programming Interfaces (APIs) for delivery to users through OpenLayers and KML integration. Other software components comprise the JAVA Spring framework which is used as the main interface between internal components of the platform and the database. This same framework is also used to expose a restricted set of REST APIs to the front-end application for metadata sharing. Python is the main language used to programme the automation, scheduling, processing and value addition on data.

Several innovations are implemented in STREAM: (i) while the focus is on EO data, other data fields such as from models are included to enable data inter-comparisons and forecasting; (ii) besides some web-based applications, the main service is made available on smartphones and tablets for easier accessibility to common users on the spot; (iii) visualisation will allow superposition of fields with user-friendly functionality; (iv) features include the viewing of time series at selected points, transects or areas of interest, together with the elaboration of simple statistics; (v) real-time data can be compared to climatological values; (vi) data selection and downloading will be available from the same service to provide one system for viewing, selecting and access to data. Moreover, the data fields will be restricted on the limited area of interest of the service, namely the Malta shelf area and Maltese Islands, thus allowing higher resolution data fields to be available at fast performance.

KEYWORDS

Satellite Observations, Operational Oceanography, Downstream Services; On-Demand Data, Marine Environmental Monitoring

Project STREAM financed by Xjenza Malta, for and on behalf of the Foundation for Science and Technology, through the Space Research Fund under grant agreement SRF-2022-4S1

The data we need for the marine R&I we want

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BACKGROUND

Marine data and information are essential ingredients not only for sea-based research, climate studies, the monitoring of the state of health of the sea and the management of its resources. Indeed the marine data value chain in the evolving information age targets new avenues, reaching out to industry and fuelling smart, innovative applications that can raise economic levels to new heights that we cannot yet fully grasp.

Marine data and information is generated to serve different targets. Marine observations (including space-based earth observations) and data from numerical models provide essential systematic information on the state variables of the sea and marine ecosystems, aiding a number of users and applications, namely:

- *the management of sea-based resources;*
- *commitments to EU Directives for the protection, management and sustainable development of the sea;*
- *environmental monitoring to safeguard the state of health of the sea, and to assess changes resulting from human and climatic impacts;*
- *marine safety, search & rescue, and surveillance;*
- *strategic planning including marine spatial planning, and the evaluation of conflicts for space and common resources;*
- *inputs to decision support systems in the marine and maritime sectors;*
- *operational assistance to responsible entities with remits in the marine sector;*
- *alerting and mitigation of extreme events and climate change;*
- *marine defence and security;*
- *safeguarding against marine risks including oil pollution;*
- *securing marine food resources and ecosystem services.*

OVERALL AIM

Under the patronage of the Parliamentary Secretariat for Youth, Research & Innovation, the Malta College of Arts, Science & Technology is leading the project 'Connecting marine data to serve society' (CONNECT) that aims to catalyse the design of a coordinated national system for the collection of essential data about the sea around the Maltese Islands. The CONNECT project brings stakeholders

together by creating a cluster for marine observations, and is precisely conceived to support the harvesting, management, access and sharing of the same marine data for multiple purposes and to diverse categories of users.

MAIN EXPECTED OUTCOMES

The project focus is to CONNECT key actors to share assets and resources through clustering initiatives related to marine data acquisition and applications, including data from space platforms. The ultimate aim is in CONNECTing data to support and service society. Data available from different sources, including data collected for research, management and monitoring activities, as well as data generated by third parties, can be shared and accessed as a public good, hence supporting the use and re-use of data to generate a multiplier effect through value addition by a wide range of users, leading to the generation of knowledge and supporting blue growth and economic activity.

RESULTS

The first main achievement of the project is the creation of a core stakeholder group that networks key national players who need, use or plan to use marine data for the activities and remits which are their responsibility. The group is intended to synergise existing efforts and to develop joint actions serving the needs of a wide spectrum of users engaged in public assignments, private enterprise, economic activities and human endeavours related to the sea. Clustering is renowned for coordination and networking among partners and relevant stakeholders, predominantly at the national scale while embracing regional contexts, with the aim of synergising efforts and strengthening delivery, excelling in outputs and optimising delivery, as well as facilitating the tapping of funding opportunities. Experience is unequivocally demonstrating that clustering can effectively contribute towards the enhancement of knowledge sharing, skills and education, and the exploitation of economic opportunities.

An important project milestone is the high-profile national conference on the Core Data Ecosystem for a Sustainable Blue Economy. The conference brings national stakeholders, responsible entities, members from the research community, operators and private enterprise together to meet and discuss the delivery of essential marine data to the nation, while brainstorming on a nationally coordinated system and framework to streamline marine observations in Malta for a multi-dimensional approach comprising monitoring, ecosystem services, research, industry and security. This includes satellite-derived data that is increasingly serving so many of our daily endeavours and services. It will also serve to highlight scenarios in the EU, and to build the national backbone for marine core

data management and related services for open access and free exploitation in applications to serve society.

IMPACT

The proportion of the stretch of sea around us that falls under Maltese jurisdiction compared to the land territory of the Maltese Islands, is an amount that far exceeds that of other countries in the EU. This brings with it duties and challenges such as for the protection of the marine ecosystem and the conservation of biodiversity, but it also yields a resource that we probably still do not know enough about and have not yet recognised enough. The challenges are there and we must overcome them, but these same challenges should be an incentive to turn them into advantages by creating added value with R&I that strengthens and boosts the economy, especially in those sectors linked to the sea.

In the marine sector at both global and regional scales, we are expecting big changes in the way we design products and deliver services. The demand on sea resources will continue to grow at a world level, but especially in the Mediterranean and in our country, this development linked to the sea - or as we know it better, the Blue Economy - must at the same time safeguard sustainability by ensuring the effective protection of the sea. For those who will be able to prepare well for this near future, and plan and complete the framework to ensure success, these challenges will open up new horizons of great advantages in the economic field.

The CONNECT project addresses the need for the country to be supported by marine core data collected in an organised and sustained manner. High-quality marine data is key to monitoring the state of health of the sea, and the conservation and management of its resources. Marine data is required by users to meet their operational (e.g., port activities, shipping and navigation, oil exploration, aquaculture & fisheries, oil pollution response, search and rescue), and strategic planning and management needs (e.g., marine spatial planning, and the evaluation of conflicts for space and common resources, securing marine food resources and ecosystem services, climate change, mitigation and adaptation), on top of the broader ambitious targets of the European Green Deal, and international agreements, such as the UN 2030 Agenda, and the Paris agreement on climate change.In a knowledge-based society, data provides the essential ingredients for our informed and calculated decisions, choices and actions. Indeed, the marine data value chain in the evolving information age targets new avenues, building on the capacity to integrate a wide range of data sources to transform data into knowledge and to connect, engage, and empower citizens, governments, and industries by providing them with the capacity to inform their decisions,

fuelling innovative applications that can raise economic levels to new heights that we perhaps cannot yet fully grasp. In the context of national marine policy within Malta's Smart Specialisation Strategy, the marine-based industry is a niche target, which our country is beginning to exploit. This project CONNECTs the enabling players and boosts those factors needed to achieve these targets.

KEYWORDS

Marine Core Data, Marine Observations, National System, Research & Innovation, Oceanography

CONNECT, a Project on Marine R&I financed by the Ministry for Education, Sport, Youth, Project and Innovation.

GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
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INDUSTRY COLLABORATION AND INNOVATION

MCAST

Response of prestressed concrete hollow-core slab subject to uniformly distributed loads

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BACKGROUND

Precast, prestressed, hollow-core, concrete slabs are structural elements with less self-weight, which thereby provide improved structural effectiveness at withstanding straining action and allowing for longer spans. The members are usually made in a long line bed and cut to the desired lengths. Because the depth of hollow-core slabs is so small, the prestressing strands are straight and the members are almost always used on simple spans. The individual members are usually connected together by grout keys and in some cases by structural concrete topping with mesh reinforcement. The longer the slab, the less the bending resistance and shear resistance for a given slab thickness. 'Thin' sections, say 200mm deep, provide substantial load capacities even at slabs up to 8 metres. This study investigates the behaviour of large span, prefabricated, prestressed, hollow-core slab when this is subject to uniformly distributed loading. The tests are carried out on thick slab, 760mm deep. The type of prestressed hollow-core slab under consideration is 760mm deep and is reinforced with prestressing strands in the longitudinal direction and with stirrup reinforcement in the transverse direction. The length of the prestressed slab is 18.28 metres (60 feet), producing a clear span of 17.68metres between supports. Both supports provide the vertical reactions and are unrestrained and free to move laterally, but subject to friction between the underside of the slab and the support.

OVERALL AIM

The aim of this research is to determine the response of prestressed concrete hollow-core slab subject to uniformly distributed load. The behaviour of the slab is analysed in terms of deflection of the prestressed concrete hollow-core slab when subject to uniformly distributed load. A series of tests is carried out with deflection readings recorded when the element under test is subjected to incremental loading and unloading.

MAIN EXPECTED OUTCOME/S

Structural elements (slabs) subject to static or dynamic loading produce deflections that should be within expected limits, as established by standards and codes. The

deflection values that are recorded at predetermined locations to the underside of the prestressed hollow-core at different positions will provide a clear indication of the slab deflections when this is subjected to vertical universal distributed load. Once the loads are imposed on the slab, it is expected that a certain deflection is recorded. The researcher will analyse the data of the deflection readings at regular intervals from when the slab is loaded.

IMPACT OF RESEARCH

Precast concrete is popular in structural engineering due to its many advantages. The quality control, speed of construction, and cost-effectiveness of precast elements make them an attractive option for many construction projects. The durability and flexibility of precast concrete also make it a reliable and versatile building material. However, precast concrete has several disadvantages, including transportation and installation challenges, potential environmental impact and unique maintenance requirements.

When considering the use of precast concrete in structural engineering, it is important to carefully evaluate the project's specific needs and weigh the pros and cons of this material. Precast concrete may be a good option for projects that require speed of construction, high-quality finishes and durability. Proper planning, design and quality control measures can help minimise the risks associated with this material and any other project materials and ensure a successful construction project.

Prestressed slabs are widely utilised in the construction industry. This research will determine the behaviour of prestressed slabs subject to uniformly distributed loads. By determining deflection of prestressed hollow-core concrete slabs subject to loading, an analysis can be carried out to determine bending and shear capacities. These can be compared with prescribed capacities as per manufacturers' data. Determination of any visible cracks on the underside of the prestressed slabs is another outcome from such test arrangements. The prestressed hollow-core will be loaded in accordance with prescribed capacities and hence any gaps between the manufacturers' data and the behaviour of the element under test are examined.

KEYWORDS

Prestressed, Hollow-Core, Slabs, Testing, Deflection

The interaction of plasmas with the surface topography and chemical composition of copper leadframes used in semiconductor manufacturing.

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BACKGROUND

Semiconductor package manufacturing is a high-tech manufacturing field. The manufacturing process of semiconductors normally takes place in two distinct phases, each of which is carried out at a particular plant. The phase consisting of the processes required to produce the wafers, also are known as the "Front End" processes, is conducted in a wafer fabrication. The completed wafers are then shipped to a "Back End" semiconductor manufacturing plant. In the Back End plant the semiconductor wafer (shown in Figure 1a) is diced into individual dies which are then attached to a lead frame or substrate. This project will focus on lead frame-based semiconductor manufacturing processes.

Figure 1b shows a lead frame with dies attached, before the encapsulation process. The lead frame provides the connections for the die to the outside environment.

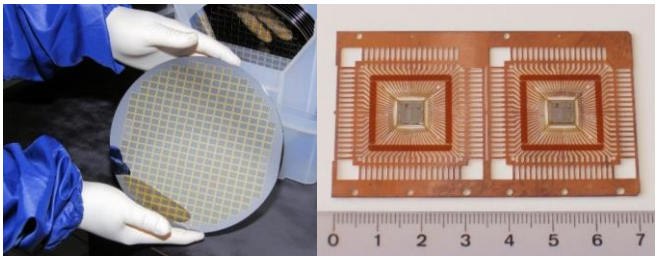

Figure 1: (a) Wafer with diffused dies seen as the rectangular shapes distributed across the wafer surface [1] (b) TQFP Lead frame with die attached in the middle of the lead frame structure [2].

The die pads are bonded to the lead frame through gold or copper wires. After the wire bonding process, the package is encapsulated by a polymeric protection shield, through the moulding process. It is crucial that the moulding compound binds tightly to the lead frame as delamination brings about package failure.

A key cause of delamination are impurities and oxides found on the lead frame or die surfaces. The reason for this being that oxides and impurities affect the bonding of the moulding compound to the lead frame itself. Such delamination can cause the decrease in the quality and reliability of the final devices, as well as a reduction in the yields of the manufacturing processes. It is for this purpose that plasma cleaning is conducted before the moulding process is carried out.

The plasma state is often referred to as the 4th state of matter. Matter in this state makes up 99% of the visible universe, including stars and interstellar space. When in this state, matter consists of electrically charged particles, namely electrons and positive ions. This level of ionization causes the movement and composition of the plasma to be influenced by magnetic and electric fields, as shown in figure 2a. When placed in contact with the lead frames, plasma can remove both organic contaminants and oxide layers. Figure 2b shows equipment used to conduct plasma cleaning in a semiconductor manufacturing plant.

Figure 2: (a) The formation of an Argon plasma [3] (b) Industrial semiconductor manufacturing plasma system [4].

OVERALL AIM

This project is focused on the study of the chemistry and physics of plasma cleaning processes to utilise them for manufacturing processes. The project aims to carry out:

- *An extensive literature review process. Through this process, published work conducted in this sector will be studied, focusing especially on areas such as the physics principles, equipment which needs to be used, the gases and recipes which can be improved upon to achieve better results.*
- *Finite Element Modelling. This modelling will utilise COMSOL Multiphysics to model the production of the plasmas and its physical and chemical interaction with the copper lead frames. A specialised plasma module is being procured as part of this project.*
- *Practical Experimental Work. Conclusions derived from the literature review and finite element work will be compared with results achieved from experimental work. Such experimental work will be conducted at STMicroelectronics utilising installed strip and batch plasmas.*

The overall aims of the project are to:

- *Optimise the plasma cleaning process for lead frame-based semiconductor manufacturing. This includes the setup, gasses, and parameters used to conduct the cleaning processes.*
- *Evaluate other areas and industries which can benefit from plasma cleaning. This may be in areas which are not related to semiconductor manufacturing.*

MAIN EXPECTED OUTCOME/S

The outcomes which will be presented at this stage will focus on the literature research aspect and any introductory work conducted using finite element modelling. Such work will study the efficacy of the use of the two main plasma cleaning processes as shown in figure 3.

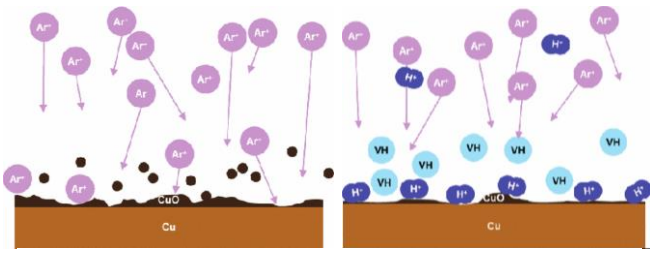

Figure 3: (a) Argon ion bombardment mechanism cleaning CuO topping the copper lead frame (b) Hydrogen ions combined with argon also reacting chemically with organic layers on the surface [5].

Various gases are used as the medium through which to produce the plasma. These depend on the mechanisms being used to conduct the cleaning.

By using inert heavy ions such as argon, a bombardment process can be created whereby the ar+ ions hit the material surface and dislodge contaminants through momentum transfer. One such use for this type of plasma is to remove oxide layers from the substrates. Another mechanism which is used is the harnessing of the chemical reactivity of certain radicals, such as hydrogen, to reduce oxide layers as shown in figure 3 (b). This mechanism is excellent to convert any carbon residues to volatile organic compounds, thereby removing such contaminants from the surface of the lead frame.

RESULTS

It is likely that the main results which will be achieved by the date of this EXPO will mostly be in the areas of the literature review and the Finite Element Modelling. Confidence in the underlying plasma physics needs to be established before experimental work can be conducted. Such experimental work uses expensive process equipment and materials and therefore the background needs to be well established.

IMPACT OF RESEARCH

Semiconductor manufacturing plants produce millions of devices every day. As an example the Malta ST plant produces more than 2.7 million semiconductor units every day. Therefore even minute improvements in the yield would lead to a substantial cost benefit. The plasma cleaning process improves the yield of subsequent processes as well as the reliability of the devices especially if used in grade zero applications.

The research results will be disseminated through published papers and also through online sources to be available to industry in general. The reason for this being that plasma cleaning has the possibility of being used to improve the yields and reliabilities of other industry sectors and not only semiconductor manufacturing.

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KEYWORDS

Plasma, Semiconductors, Lead Frames, Yield, Delamination

PlasmaSemiCon financed by the Ministry for Education, Sport, Youth, Research and Innovation

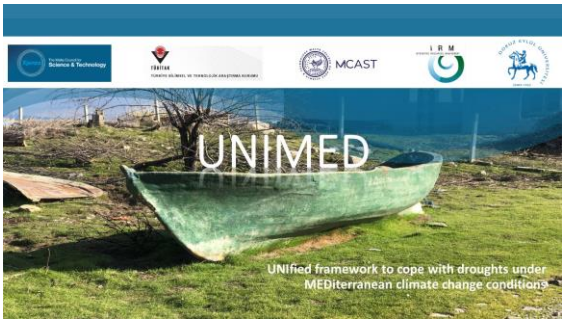
UNIfied framework to cope with droughts under MEDiterranean climate change conditions – UNIMED

Carmen Frendo

MCAST Institute of Business Management and Commerce

BACKGROUND

The Mediterranean region is facing a water challenge, with the situation of droughts in certain areas of the region becoming more frequent, affecting industry and society overall, but especially the agricultural sector. For instance, 30% of semi-arid Mediterranean drylands are now affected by desertification. The causes are not only environmental but also socio-economic as a consequence of the lack of water governance. Hence, following a Xjenza Malta-TÜBİTAK call for PRIMA funding opportunities, three partners decided to collaborate to develop a project that will contribute towards aiding the agricultural sector in the Mediterranean region to cope with droughts. The partners participating in this project are Integrated Resources Management Company Ltd. (IRMCo - Malta), Malta College of Arts, Science and Technology (MCAST) and Dokuz Eylül University Industrial Application and Research Centre (DEU - Turkey).



OVERALL AIM

UNIMED is aimed at the methodological development of a Survivability-of-Droughts Index in the context of the Water-Energy-Food-Ecosystem (WEFE) Nexus. This is a novel idea that derives from a quantification of four underlying indices: perception, vulnerability, adaptability, and recoverability. Each of these indices draws on a subset of relevant, yet mutually exclusive, economic, social and environmental indicators. In addition to the scrutiny of the proposed indicator subsets, the testing and validation of the methodology is achieved through stakeholder engagement activities. To this effect, three rounds of workshops have been organised, entitled 'Community of Practice' (CoP) events. The qualitative feedback collected during these events in turn created the opportunity to draw up sound policy recommendations.

MAIN EXPECTED OUTCOME/S

UNIMED's outcome is a unified, indicator-based framework to better assess, adapt and ultimately cope with agricultural droughts under Mediterranean climate change conditions. The framework will be made of indices which measure the vulnerability of the agricultural sector of a particular region and determine the degree of resilience of that region when it comes to recovering from a severe drought.

RESULTS

Preliminary findings using both primary and secondary data show that indices are being developed from quantitative data being collected, which are being grouped in:

1) The Perception index: represents how droughts are perceived (in terms of severity) among the agricultural community. It assesses farmers' degree of preparedness for droughts.

2) The Vulnerability index: measures the vulnerability of the agricultural sector to droughts.

3) The Adaptability index: measures the ability of farmers to cope with oncoming droughts.

4) The Recoverability index: measures the ability of the agricultural sector to recover from a severe drought.

IMPACT OF RESEARCH

UNIMED permits an evidence-based assessment of the urgent need to tackle the policy aspects required to safeguard the sustainability of the agricultural sector. Hence, the project contributes towards policymaking in agricultural drought management.

KEYWORDS

Draught, Agriculture, Survivability-Of-Droughts Index, Water Management

Project UNIMED funded by Xjenza Malta and the Scientific Technological Research Council of Turkey (TÜBİTAK) through the Xjenza Malta-TÜBITAK 2022 Joint Call for R&I projects. This initiative is part of the PRIMA Programme supported by the European Union under grant agreement number MCST-TUBITAK-2022-01.

SPARTACUS - Space and Aviation Repair Techniques Against Catastrophic Impacts

Leonardo Barilaro, Mark Spiteri

MCAST Department of Aviation

BACKGROUND

SPARTACUS is a collaborative research project between MCAST and the South East Technological University – SETU (Ireland) to investigate new repairing techniques for aerospace structures following high-velocity impacts.

OVERALL AIM

The project presents an exploratory study on the development of advanced repairing techniques for high-velocity impacts in the aerospace industry.

MAIN EXPECTED OUTCOME/S

In aviation, structural repairs are crucial for maintaining the integrity of aircraft structures. Improper repairs can pose safety risks, and the success of repairs depends on both design quality and workmanship. In aerospace, the increasing density of space debris necessitates the development of effective repair strategies for damaged spacecraft hulls and shields.

RESULTS

The successful implementation of these advanced repair techniques has the potential to extend aerospace research activities into a growing sector, strengthen collaborations with top-tier universities, and enhance the overall safety and reliability of aerospace structures.

IMPACT OF RESEARCH

The cold-welding technique shows promising results in restoring the structural integrity of damaged spacecraft hulls, while the 3D-printed shields offer enhanced ballistic protection.

KEYWORDS

Space Debris, Aerospace Technologies

Spartacus is part-financed by the Internalisation Partnershp Awards Scheme Plus (IPAS+) 2023 of Xjenza Malta.

The InnovationGUIDE project

Dr Ing. Ronald Cuschieri[1], Rozela Franco[2]

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BACKGROUND

InnovationGUIDE project is focused on identifying regional needs and connecting rural innovation ecosystems to foster entrepreneurship and economic development in the regions. The project has a total budget of €496,862.50 and a duration of 12 months from January 2024.

InnovationGUIDE will power the Pan-European Countries' rural areas by enabling innovators, including deep-tech and social innovation start-ups, to take better advantage of the single market. The project aims to integrate networks of individuals, organisations, and institutions in rural areas who are collaborating to drive innovation, entrepreneurship, and economic development. With interconnected ecosystems, start-ups in the InnovationGUIDE region become better equipped with relevant skills in the agriculture, fisheries, tourism, and bio-economy sectors in the consortium's member countries.

The project is funded by the European Innovation Council and SMEs Executive Agency (EISMEA) under the Horizon2020/ Horizon Europe - InnovationGUIDE HORIZON.3.2 - European innovation ecosystems.

The partners:

- *Türkiye Exporters Assembly (TIM) was established to guide Türkiye's foreign trade, which represents over 114,000 exporting companies under 27 sectors and 61 Exporters' Associations.*
- *Maastricht University (UM) is the most international university in the Netherlands, with nearly 22,000 students and 4,400 employees.*
- *The Fundación Empresa-Universidad Gallega (FEUGA, Spain) is a non-profit organisation specialised in the transfer of knowledge, innovation and technology, and experienced in EU projects that promote the participation of research groups.*
- *The Malta College of Arts, Science & Technology (MCAST) is Malta's leading vocational education and training institution, with an ethos based on applied research and innovation which is aligned with current national and European priorities.*
- *Social Entrepreneurs Association Malta (SEAM) is a network of entrepreneurs committed to bringing positive change through innovation and impact in the environmental, social, and cultural sectors.*

- *StartupCentrum Turkey brings startups together with all players in the ecosystem.*

OVERALL AIM

InnovationGUIDE will become a valuable resource for policymakers, researchers, and professionals interested in promoting sustainable and inclusive economic growth in rural areas. Such variety in the composition of the project consortium helps to bring together experience from different sectors, including academia, NGOs, and SMEs, thereby boosting collaboration between the private sector and research and innovation players. The project will also contribute to the preparation of long-term programmes and action plans and increase cooperation among innovation ecosystems, both within and outside EU. The outcome is also expected to identify the barriers that important actors in related sectors experience when they come to access innovation and contribute to rural development.

MAIN EXPECTED OUTCOME/S

These are the main expected outcomes:

1. *The establishment of interconnected innovation ecosystems across the EU, particularly in less represented areas.*
2. *Synergies between rural areas created by enhancing innovation chains through a supportive stakeholder environment for innovation and entrepreneurship.*
3. *Specific regional and international focus groups and workshops designed to enhance cooperation between the private sector, academia, public authorities, civil society, and entrepreneurs.*
4. *The development of more inclusive, gender-equal innovation environments to increase diversity in innovation and entrepreneurship, particularly within rural areas.*
5. *The development of interregional, personalised, and gender-diverse inclusive coaching, training, and capacity development actions focused on entrepreneurship and capacity building for rural business development and to improve the skills and knowledge present in rural communities.*
6. *Research collaborations between deep tech startups, universities, and research institutions.*

RESULTS

These are the results achieved from the project to date (the project will be completed in December 2024):

1. *Submission of the project handbook detailing activities and partner responsibilities.*
2. *Submission of communication and dissemination plan, along with preliminary exploitation definition.*
3. *Submission of risk, data, and innovation management plan adhering to FAIR principles.*
4. *Identification of Gender-Responsive Policies through a report addressing gender-related needs, challenges, and priorities in rural innovation.*
5. *Pathways identification in case studies from eight countries: South Korea, Denmark, Sweden, Switzerland, Iceland, Australia, Italy, and Germany, focusing on "innovation leaders" and "strong innovators."*
6. *Stakeholder and Context Mapping with Thematic Networks Visual Map Annex, showcasing identified stakeholders, their connections, and interactive visual maps of innovation hubs in agriculture, fisheries, bioeconomy, and sustainable tourism.*
7. *Completion of regional stakeholder workshops in Turkey, Malta, Spain, and the Netherlands.*

IMPACT OF RESEARCH

The impacts are:

Scientific: Regional interconnected knowledge about common needs, challenges and solutions to foster innovation among the partners' rural regions, shared according to FAIR principles to guarantee public access to project results.

Economic: Investor attraction for deep tech and social start-ups to commercialise and scale up their companies.

Industry: Skills development, training and infrastructure promotion services in the rural ecosystems of the involved regions.

Industry & Economy: Commercialisation and talent attraction to the rural communities to improve rural job creation and economic development.

Industry: Development and technology uptake in the primary sectors of agriculture and bio-economy.

Societal; Economic & Environment: Long-term programmes and action plans to increase cooperation and accelerate the creation and deployment of innovation and challenge-solving services in rural areas. Furthermore, contributions to innovation implementation in rural areas, by fostering talent attraction and social networking. New regulatory frameworks providing for rural innovation are also expected to contributeto EU policy priorities and global challenges especially in a sustainable economy and environment.

KEYWORDS

Rural Innovation, Framework Development, Entrepreneurship, Collaboration, Four-Sectors, Agriculture, Fisheries, Sustainable Tourism, Bioeconomy.

Innovation GUIDE

InnovationGUIDE has received funding from the European Union under Grant Agreement 101134854. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Funded by the European Union

SMARTPOL - The Environmental Aspect

Juan Jose Bonello[1], Thomas Gatt[2], SMARTPOL Consortium[3]

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[3]Beneficiaris: MCAST, AquaBioTech Group, Yildiz Technical University, Cape Town University, Interactive Software, Sirena Marine.

BACKGROUND

Marine and coastal environments face a multitude of threats that can have detrimental effects on the surrounding ecosystems and biodiversity. Some of the key threats include pollution from various sources such as plastic waste, oil spills, and chemical runoff, which can harm marine life and disrupt the balance of the ecosystem. Addressing these threats requires coordinated efforts to promote sustainable practices, conservation measures, and effective management strategies to protect these vital ecosystems.

Needless to say that monitoring the marine areas is crucial for understanding and preserving marine ecosystems, ensuring maritime safety, and promoting sustainable resource management. However, this is typically time-consuming and laborious, and the results might take days until they are available for decision makers. Thus, SMARTPOL (Autonomous & dynamic marine pollution monitoring system for Inland Waters) provides an innovative and practical way in which monitoring and detection of pollutants is done in real time to adequately assess mitigation measure, as well as to identify the source of challenges.

One of the potential deliverables of SMARTPOL is the attempt to find a link between the in-situ data collected and microplastics. Microplastics are widely dispersed in the marine environment and are present in the water column, on beaches, and on the seabed. The multitude of implications that are associated with microplastics can range from ecological harm, to social and economic concerns.

Studying microplastics presents several challenges due to their small size, widespread distribution, and diverse sources. Coupled with that, microplastics can undergo physical and chemical changes over time, further complicating their study. Additionally, there are currently several methods employed to study for microplastics, all of which have with benefits and limitations. This makes the study of these particles a complex and multidisciplinary field.

OVERALL AIM

SMARTPOL aims to present a novel and practical pollution detection, monitoring and analysis system in real time.
The system will mainly consist of a Shore Control Centre (SCC) and an unmanned surface vessel (USV), both equipped with multi-sensor technology and AI based solutions. The USV will be equipped with pollution detection sensors for data collection. The data will be collected from the sensors and the results will be transmitted to the SCC. SMARTPOL will validate the data collected by the USV by monitoring pollutants in specific areas of Turkey, Malta and South Africa through sensors identified for pollutant monitoring.

MAIN EXPECTED OUTCOME/S

Studies of microplastics within the local scenario are limited, so any findings will be beneficial for the several reasons enumerated above. However, trying to find a link or correlation with parameters that can be collected in-situ will have several benefits since currently, monitoring is predominantly done manually and at times, results take days to be collated and made available to decision makers. Real-time monitoring would ensure that the necessary actions are taken and mitigation measures are considered if need be. Nevertheless, the traditional approach of manual monitoring will still be taken as a form of ground truthing. Ground truthing will be important because it can help confirm or refute the accuracy of the data collected by the USV.

IMPACT OF RESEARCH

The system that will be applied within SMARTPOL (SCC and USV) can be applied in several contexts and for several purposes, such as monitoring bathing waters, which are required to be regularly monitored during the bathing season to safeguard public health and protect the aquatic environment in coastal and inland areas from pollution (Directive 2006/7/EC); safeguarding Marine Protected Areas, of which Malta has 18 sites through the Natura 2000 network which aim to conserve important habitats and species, in accordance with a number of directives (such as Directive 92/43/EEC; Directive 2009/147/EC; Directive 2008/56/EC).
SMARTPOL aims at detecting and responding to potential threats such as oil spills and maritime security risks in real time. This will allow for a quick response to reduce potential environmental harm. This project will provide a better understanding to preserve marine ecosystems, ensuring maritime safety, and promoting sustainable resource management.
Studying microplastics and investigating potential links between microplastics and other environmental parameters is highly relevant due to the growing concern over the impact of plastic pollution on ecosystems and human health.

Understanding the distribution, abundance, and sources of microplastics in the environment is essential for assessing their potential risks and developing effective mitigation strategies. By studying the interactions between microplastics and other environmental parameters such as water quality, one will be able to gain crucial insights into the pathways and impacts of microplastics in ecosystems.
Whilst microplastics do not fall directly within the scope of Directive EUR 2019/904, they are considered specifically in descriptor 10 of the Marine Strategy Framework Directive [10.1.3 "Trends in the amount, distribution, and where possible, composition of micro-particles (in particular micro-plastics)"], and implicitly in the indicator related with impacts of litter on marine life. Additionally, the European Union expert group on marine litter (TSG-ML) recommends the development and calibration of monitoring methods, and the immediate initiation of European wider scale monitoring to commence straight away.
Identifying potential correlations between microplastics and environmental parameters can help inform policies, regulations, and conservation efforts aimed at reducing plastic pollution and protecting marine and coastal environments.

KEYWORDS
Marine Pollution, Unmanned Surface Vehicle, Multi-Sensor Technology, Autonomous Network System, Microplastics

Project SMARTPOL is funded by the MarTERA partners – Xjenza Malta, and supported by the European Commission under grant agreement MRT-2021-057A.

Exploring the Intersection of Decentralised Finance (DeFi) and Artificial Intelligence (AI).

Franco Farrugia

MCAST Institute of Information and Communication Technology

BACKGROUND

This research aims to investigate the synergies between DeFi and AI, assessing how AI technologies can enhance the efficiency, security, and accessibility of decentralised financial systems. By analysing data trends, algorithmic trading strategies, and smart contract optimisation, we seek to uncover innovative solutions to key challenges in DeFi

OVERALL AIM

To assess how Artificial Intelligence (AI) technologies can enhance the efficiency, security, and accessibility of decentralised financial systems. The project objectives are to investigate synergies between these two fields. The main goal is to examine the potential synergies between DeFi and AI. This includes investigating how AI technologies can enhance and supplement the capabilities of decentralised financial systems, resulting in improved performance and functionality.

MAIN EXPECTED OUTCOME/S

As a researcher on a project at the intersection of Decentralised Finance (DeFi) and Artificial Intelligence (AI), I am playing a multifaceted and essential role in ensuring the project's success. I am utilising my expertise in research methodologies, data analysis, and literature review to lay the project's foundation. This involves conducting thorough literature reviews on DeFi and AI, identifying key research gaps, and developing methodologies to address these questions.

RESULTS

Investigations on how AI technologies can enhance and supplement the capabilities of decentralised financial systems, resulting in improved performance and functionality.

IMPACT OF RESEARCH

By exploring how AI technologies can enhance the efficiency, security, and accessibility of decentralised financial systems, the proposed research contributes to these global priorities by identifying innovative solutions that have the potential to benefit people and economies around the world.

KEYWORDS

Decentralized Finance, Artificial Intelligence.

Project Defi & AI financed by the Ministry for Education, Sport, Youth, Research and Innovation

GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION

MCAST

Valorisation of seagrass beach wrack to produce novel 3D printing materials

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[1]*MCAST Applied Research and Innovation Centre*
[2]*MCAST Institute of Applied Sciences*
[3]*Invent 3D, Malta*

BACKGROUND

The 3D printing sector is increasingly shifting towards sustainable practices, with a growing use of biodegradable polymers and recycled materials. However, these sustainable alternatives often face limitations such as higher production costs, limited availability, and performance issues. Sea2Tech's innovative approach seeks to overcome these challenges by providing a novel material solution produced from a renewable source that can degrade completely in natural environments, thereby reducing long-term ecological and health impacts.

OVERALL AIM

The Sea2Tech project seeks to innovate within the 3D printing industry by developing fully compostable materials derived from seagrass beach wrack, a renewable marine waste biomass. This project addresses the significant environmental issues associated with the prevalent use of petroleum-based materials in additive manufacturing. These conventional materials contribute to pollution and waste due to their production and disposal processes, posing challenges to sustainability.

MAIN EXPECTED OUTCOME/S

Sea2Tech focuses on harnessing the properties of seagrass beach wrack, an underutilised renewable marine biomass usually removed from beaches to enhance tourism and discarded as waste. This biomass holds potential to be valorised as sustainable resource. By converting this lignocellulosic biomass into 3D printing filaments, the project aims to produce materials that are environmentally friendly, cost-effective and capable of performing better than current market options

RESULTS

Collaborating with local industrial partner Invent 3D Ltd., Sea2Tech not only aims to advance sustainable 3D printing technologies, thereby contributing to the fostering of smart manufacturing, but also to contributes to the broader goals of climate change mitigation by diverting organic material from landfills, thus decreasing greenhouse gas emissions. This project is particularly crucial for a small island state like Malta, where efficient waste management and resource

sustainability are vital, because it also promotes the development of a recycling industry and the circular economy.

IMPACT OF RESEARCH

The Sea2Tech project aligns with several strategic priorities at national, European Union, and global levels by focusing on the development of bio-based renewable materials from seagrass beach wrack, an unexploited and sustainable resource. This initiative reflects a commitment to advancing research and innovation within the framework of environmental sustainability and economic growth, targeting several key areas.

KEYWORDS

Sustainable 3D Printing, Novel Bio-Based Materials, Renewable Resources For Smart Manufacturing, Waste Valorisation, Circular Economy

Sea2Tech financed by the Ministry for Education, Sport, Youth, Research and Innovation

CAPES - Continuous Assessment of Pollutants and Environment via Satellites

Daren Scerri, Frankie Inguanez

MCAST Institute of Information and Communication Technology

BACKGROUND

The purpose of this team is to undertake research of local and regional interest in terms of the environmental and climate impact of pollutants and environmental events. The primary medium of research undertaken within this project is medium-to-high resolution multispectral satellite or drone imagery data, including both commercial providers and the European Space Agency (ESA) suite of satellites, which are made up of the Meteorological Programme, the Copernicus Programme, and the Earth Observation Envelope Programme. Over the past few years, several collaborations with various entities have been established, such as with Environmental with the Resource Authority (ERA), Malta Resource Authority (MRA) and Planning Authority (PA), and with whom several research projects are taking place. These collaborations enabled the various authorities to explore the benefits of machine learning techniques applied to satellite data so as to address their respective obligations. The team has researched the latest state-of-the-art techniques and how they were applied in different geographical regions, whilst also experimenting with how to customise said technologies to address the local geographical scenario and specific needs.

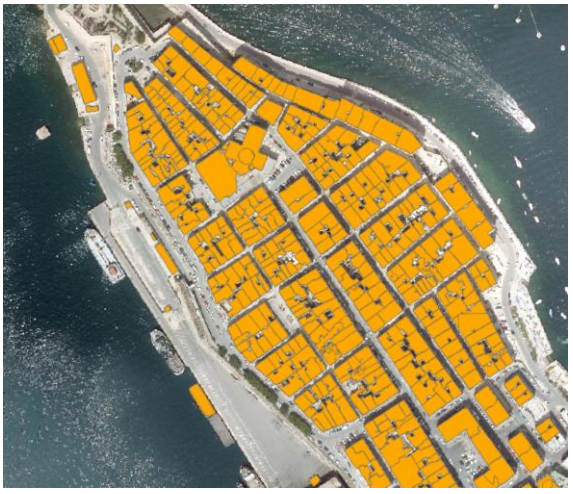
OVERALL AIM

Most recently, we assisted the PA with developing an intelligent building segmentation algorithm, taking into consideration the diverse local building fabric. Given the size of the country and the quite unique mix of village cores with newer developments and high-rise buildings frequently very close to each other, no existing dataset was found to be suitable to train an AI model on with good results in the Maltese context. Hence, the aim of this study is to explore how to advance the current generic state-of-the art AI models and inferencing performance for automated building boundaries segmentation, through an innovative methodology and algorithms to address the above challenges.

MAIN EXPECTED OUTCOME/S

The expected outcome of this developing collaboration with the Planning Authority (PA) is to develop, in an incremental manner, an innovative algorithm and AI model to segment building boundaries. The development of a robust AI model for property delineation also entails the development of new datasets of diverse urban fabrics using an innovative combination of commercial, high-resolution satellite

data, drone orthophoto data and Digital Surface Model (DSM) / Digital Terrain Model (DTM) height data.

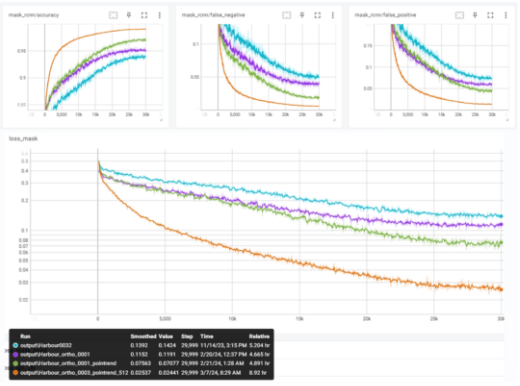


RESULTS

The industry standard ArcGIS Pro Deep Learning tools and standard Mask-RCNN algorithm, have both exhibited limitations in precision metrics (60-70%) and the ability to customise algorithms to the local context. Due to these issues and other limitations in pre-processing, tuning and post-processing both during training and inferencing, we developed a more low-level solution based on Detectron2 framework (Facebook AI Research's next generation library that provides state-of-the-art detection and segmentation algorithms), with PointRend and custom postprocessing. Our algorithmic solution provided a more precise segmentation performance. The best results were then achieved by further development of our algorithm to handle additional channels to the standard imagery data and include DSM-DTM data within the trained model, leading to a three-dimensional understanding of terrain, leading to a much-improved precision of 87%.

IMPACT OF RESEARCH

The project started with the creation of datasets targeting specific regions of similar building fabric such as Valletta and Floriana in the Grand Harbour area, as opposed to areas such as St. Paul's Bay and Munxar. Research then focused on experimentation with the above-mentioned algorithm for the identification of the optimal parameters needed to address the identified objective. Upon completion of the model training and inferencing, it was established



Graph	Algorithm	Tile size	Stride	Raster	No of tiles
BLUE	Detectron 2 Resnet50	256x256	128	MAXAR	10480
PURPLE	Detectron 2 Resnet50	256x256	128	Orthophoto 2018	10480
GREEN	Detectron 2 Pointrend Resnet50	256x256	128	Orthophoto 2018	10480
ORANGE	Detectron 2 Pointrend Resnet50	512x512	256	Orthophoto 2018	3198

that the undertaken research facilitates the manual process of property delineation yet cannot completely replace the human activity. Thus, the impact of this project led to the understanding that AI can be utilised to quickly identify changes in the local build-up composition which a human evaluator can review, thus reducing the chance of error/oversight and accelerating the process. It is noted that the AI produced building delineations exported as shapefiles can be imported in any popular GIS package and can be used to assist the Planning Authority in the laborious exercise of updating the Malta and Gozo basemap, which is critical for planning purposes, is used by various stakeholders, and is also made available to the public via services like the map server.

KEYWORDS

AI, GIS, Planning, Satellite, Building Delineation

Data Exploration, Computation, and Optimization for Discovery and Experimentation (DECODE)

Frankie Inguanez, Alan Gatt

MCAST Institute of Information & Communication Technology

BACKGROUND

The Data Exploration, Computation, and Optimisation for Discovery and Experimentation (DECODE) research group is an academic team whose research focuses on data-related research using machine learning and data mining techniques. The team applies this knowledge in various domains such as news, sports, and marketing.

Data Exploration: The team is skilled in retrieving, cleaning, and exploring data to identify hidden patterns for more efficient interpretation and use.

Computation: The creation of models that identify hidden patterns and replicate human behaviour is one of the core skills that the team constantly researches and focuses on.

Optimisation for Discovery and Experimentation: The team focuses their research on hyperparameter optimisation, model selection, and experimental design to help researchers and practitioners make the most of their work.

One of the goals of this team is to create content that supports young learners in their understanding of machine learning through practical applications, workshops, and interactive educational content.

The team strives to collaborate with members of the industry to assist in research endeavours whilst also bringing real-world case studies to the academic community. Such collaboration leads to larger, possibly funded, projects as well as academic and industry skills alignment. The team is committed to making its research more accessible and thus the work by various members of the team has been published in academic journals and conferences, with software released under open-source licenses.

OVERALL AIM

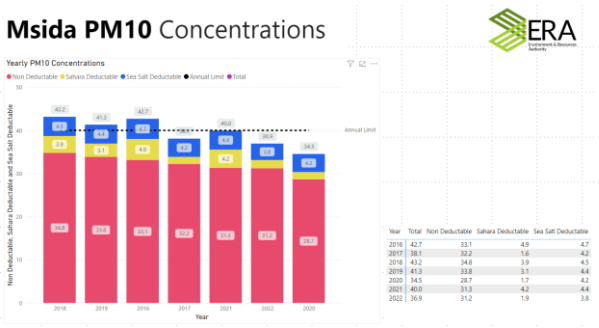
DECODE research group's main goal is to use machine learning and data analysis in applied areas including news, sports, and games amongst others. The aim of applied machine learning is to find hidden patterns in data and create computer models that can simulate human behaviour, and even improve upon this. Another intention of DECODE is to guide learners into machine learning applications and offer opportunities to work closely with industry partners on real-world projects. DECODE's findings will also be published in academic journals, and the resulting software will be available for free to make research accessible to everyone.

MAIN EXPECTED OUTCOME/S

Better Data Understanding: Developing techniques for retrieving, cleaning, and interpreting data, leading to better insights.
Application of ML Models: Development of various machine learning models applied to various areas.
Additional Education: Creation of educational content and workshops for learners to apply machine learning.
Industry Collaboration: Collaboration with industry members, to access and work on real-world cases and potential funding opportunities.
Knowledge Dissemination: Publication of research in academic journals and conferences, alongside open-source software, promoting accessibility and skill alignment.

RESULTS

After successfully completing the DataVisuals project we have jointly submitted an MCST FUSION REP project titled "Supporting Early ChiLdhood Education in Blue Skills with Generative Artificial Intelligence (SELBI)" which has been accepted. The project focuses on researching the use of generative artificial intelligence in support of early years educators for the creation of educational content on Blue Skills.*
A number of industry collaborations are advancing, and research has started. Firstly, with the Environment & Resource Authority (ERA) the team is jointly designing an interactive dashboard to showcase the air quality reporting that the authority curates. This makes their reporting more accessible and understandable to the public. A collaboration with PickStreet is leading to the provision of real-world football match and player data for inclusion in educational programmes and events while also serving research purposes. A new collaboration with HID Global is leading to the formulation of a bespoke Power BI course.



IMPACT OF RESEARCH

The team is researching various machine-learning techniques which can lead to academic publications. The outcome of said studies will also benefit Undergraduate research undertakings in various ways Programming and machine learning-related modules will be an additional benefit since the researchers can enhance course content with research-related material and relevant content.

Through industry collaboration, the team is lending their expertise to assist the decision-making processes and recruitment of specific companies. Several research projects have been initiated which were directly shaped by industry needs, the results of which were communicated and supported by the companies in question.

As per RIS3 Malta's National Strategy 2021-2027, Emerging Technologies is one of the national priorities, while Artificial Intelligence is one of the niche areas. Through this teamwork, the individuals can advance their research skills and grow their portfolio, which aids in positioning them to undertake national or European-funded projects that address said priority.

KEYWORDS

Machine Learning, Artificial Intelligence, Data Mining, Data Optimisation

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Monitoring Sea Pollution with Autoencoder AI Models

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[3]Beneficiaris: MCAST, AquaBioTech Group, Yildiz Technical University, Cape Town University, Interactive Software, Sirena Marine.

BACKGROUND

The Smartpol project aims to address the growing environmental challenge of sea pollution by leveraging drone technology and artificial intelligence. Using drone-captured images of sea conditions, an autoencoder model is developed to detect pollution by identifying anomalies in the water. This approach offers a scalable solution for monitoring marine ecosystems and identifying areas affected by pollution, such as oil spills or plastic waste.

OVERALL AIM

The primary aim of Smartpol is to develop a robust, AI-driven system for detecting sea pollution using drone footage, satellite images and other data collected from boats. The project seeks to accurately identify and classify anomalies in sea conditions, which could indicate the presence of pollutants like oil or plastic.

MAIN EXPECTED OUTCOME/S

- *Development of a reliable autoencoder model to detect anomalies in sea images.*
- *A dataset of normal and polluted sea conditions for model training and testing.*
- *An effective threshold for distinguishing between clean and polluted areas.*
- *Visualised results showing polluted areas in drone-captured images.*

RESULTS

Although at this point the results are preliminary, the autoencoder model achieved high accuracy in detecting anomalies in sea images, with a clear distinction between normal and polluted conditions. The model's performance was validated through MSE metrics, showing reliable anomaly detection. Visualisations highlight the identified anomalies, suggesting the potential for real-time pollution monitoring.

IMPACT OF RESEARCH

This project contributes to environmental sustainability by providing a scalable method for early detection of sea pollution. It enables faster identification of polluted areas, helping to mitigate environmental damage and supporting conservation efforts by monitoring marine ecosystems in real-time.

KEYWORDS

Sea Pollution, Anomaly Detection, Autoencoder, Drone Imagery, AI.

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Coastal Opportunities for Climate Change Adaptation through Sustainable Tourism, Cetacean Research, and Integrated Marine Ecosystem Management

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BACKGROUND

Coastal communities worldwide are becoming increasingly vulnerable to the adverse effects of climate change, which manifest through extreme weather events, sea level rise, and habitat degradation. These impacts not only threaten human populations but also disrupt the delicate balance of marine ecosystems. Research on the sustainable use of resources for climate change mitigation and adaptation highlights the crucial role that healthy marine ecosystems play in addressing these global environmental challenges. Protecting these ecosystems is necessary for both biodiversity conservation and the wellbeing of coastal communities.

Effective solutions include leveraging the economic potential of ecotourism, which can provide both financial support and public awareness, alongside the active participation of citizen science initiatives that enhance data collection and monitoring efforts. Moreover, the protective framework provided by Special Areas of Conservation (SACs) is vital in safeguarding biodiversity. Cetaceans, such as the bottlenose dolphin (Tursiops truncatus), serve as key indicators of ecosystem health and resilience due to their sensitivity to environmental changes.

In Malta, however, the bottlenose dolphin population is currently subject to limited conservation measures, and there exists a gap in our understanding of their ecological dynamics and distribution patterns, particularly in the coastal waters along the north eastern side of the Maltese archipelago. This shortfall undermines the bottlenose dolphins' ability to maintain ecosystem balance, underscoring the need for more comprehensive research. Enhanced knowledge of this population is essential for developing effective conservation strategies to ensure their long-term survival and the health of the marine environment.

OVERALL AIM

This research aims to conduct a comprehensive assessment of the distribution and habitat use of bottlenose dolphins within the coastal Special Area of Conservation

(SAC) MT0000105 Żona fil-Baħar bejn Il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet, encompassing a large and heterogeneous area on the north eastern side of the archipelago. The study will focus on mapping the spatial distribution of bottlenose dolphins across this designated area, evaluating their patterns of habitat use, and identifying key environmental factors that influence their habitat preferences. Additionally, the research will investigate the impact of climatic factors on habitat selection.

MAIN EXPECTED OUTCOME/S

The main expected outcome is the development of a habitat suitability map highlighting the distribution and habitat preferences of bottlenose dolphins within the selected SAC. This map will identify the main environmental factors, such as water depth and prey availability that affect dolphin habitat selection and provide insights into how climatic pressures, including anomalies in sea surface temperature, influence their distribution.

RESULTS

To date, 15 opportunistic surveys have been carried out during eco-tourism boat tours, resulting in 20 sightings of bottlenose dolphins within the selected area of research. Additionally, the citizen science campaign proved effective in increasing the number of sightings in an effort-limited study. Preliminary findings suggest that bottlenose dolphins are widely distributed across the area, with a preference for shallow waters, ranging between 25 and 50 meters. This pattern indicates a clear inclination for coastal habitats, which increases their vulnerability to human activities and climatic pressures.

IMPACT OF RESEARCH

Through the generation of fundamental data on the distribution patterns and climatic responses of bottlenose dolphins, this study will provide essential baseline information on a population that has been under-researched in the selected area. Addressing these knowledge gaps will lead to a more comprehensive understanding of the local dolphin population, facilitating the implementation of effective conservation measures and the maintenance of ecological equilibrium within the marine environment. This knowledge will also support policymakers in crafting policies that better address the impacts of climate change on marine ecosystems.

The research will have broader implications for marine conservation by integrating eco-tourism and citizen science, demonstrating how these approaches can support data collection and promote sustainable tourism practices that align economic benefits with conservation goals. This integration will serve as a model for effective

collaboration between research entities and local businesses engaged in sustainable activities, paving the way for a future where resources and knowledge are shared for greater conservation efficiency.

Furthermore, by incorporating Nature-Based Solutions (NBS), such as Marine Protected Areas (MPAs), the study will contribute to the development of climate-resilient coastal ecosystems. NBS play a crucial role in preserving habitats that act as natural buffers against environmental stressors like sea-level rise, ocean acidification, and extreme weather events. The research will show how these solutions can be integrated into broader conservation efforts to enhance environmental resilience, mitigate climate change effects, and promote sustainable blue economies.

Additionally, the study will raise public awareness about marine conservation and the ecological role of cetaceans. By fostering greater public understanding and engagement, the project aims to garner stronger support for conservation initiatives, which is essential for bolstering the resilience of marine ecosystems and ensuring the sustainability of coastal communities in the face of climate change.

Overall, this research will advance scientific knowledge on bottlenose dolphins and practical marine conservation approaches, drive progress in safeguarding marine biodiversity, maintain ecosystem integrity, and establish sustainable partnerships for marine research while increasing both local and international public awareness.

KEYWORDS

Climate Resilience, Bottlenose Dolphin, Eco-Tourism, Coastal Management

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MCAST RESEARCH & INNOVATION EXPO 24

RESHAPING EDUCATION

MCAST

Communication as Education: Testing the impacts and validity of a connective learning intervention that puts communication at its heart to better address the learning needs of the students

Dr Ian Attard

MCAST Institute for the Creative Arts

BACKGROUND

Achievement in learning has been attributed to many factors by scholars. As Whalstrom (2010) states '… to teach means to build educational relations.' Through this study, it will be argued that communication is an essential factor of learning and can have a presence that builds effective educational relations and experiences between curriculum and learners. In my personal experience as a senior lecturer in a vocational education institution in Malta, I have entered into many pedagogic relationships with learners with a range of different and encouraging learning abilities. Some learning abilities are extrinsic and obvious to pin-point, such as motivation, enthusiasm, and prior knowledge, but other abilities are harder to shed light on as they are personal, intrinsic and difficult to explore without presence of effective communication in a learning setting.

OVERALL AIM

The purpose of the study is primarily to communicate a concept of learning achievement and to describe how it becomes problematic when it is presented in learning settings that lack opportunities for learners to communicate and think critically about learning. This study aims to find out how effective communication in education is key to impacting students' ability to think critically about learning achievement and learning validity, through arguments about the lack of relationship between knowledge and a student's intrinsic factors.

MAIN EXPECTED OUTCOME/S

A wide range of personal learning efficacies are considered in this study, giving it the momentum needed to establish it as an on-going explorative journey. This particular study explores the impacts of effective communication on the individual learner within a learning setting and on their sense of achievement. Key arguments will be made in the context of how one can address the fundamental pedagogical problem that teachers always face, which is that of the discontinuity between the culture of a curriculum and the culture of the students.

IMPACT OF RESEARCH

The study puts communication at its heart to better address the learning needs of the students. The study explores the essential role of communication in educational settings, particularly within the context of vocational education in Malta. Therefore, this research can significantly influence educational curriculum design and delivery in Maltese schools in several key ways.

Firstly, by placing an emphasis on communication-centric pedagogy. The study underscores the importance of integrating effective communication into the learning process. It suggests that open and meaningful communication between teachers and students can help bridge the gap between curriculum content and students' personal learning experiences. By emphasising communication, educators can better understand students' intrinsic motivations, learning styles, and critical thinking abilities. This approach encourages a more personalised and responsive educational experience, enhancing student engagement and achievement.

This study also impacts curricular design and delivery by highlighting the need to recognise and cater to the diverse learning abilities of a multicultural and mixed-ability classroom. By promoting effective communication, teachers can identify and support both extrinsic and intrinsic learning factors. This insight can lead to the development of curricula that are more inclusive and adaptive to the varied needs of students, ensuring that all learners have the opportunity to succeed. For instance, curricula could incorporate more interactive and creative media-based activities that would allow students to express their understanding and engage with the material in a way that resonates with them personally.

Another key impact factor is the expected finding that communication-led teaching methodologies can enhance critical thinking and reflective learning. One of the key findings of the study is the link between effective communication and the development of students' critical thinking skills. By creating an environment where students feel comfortable communicating their thoughts and questions, educators can encourage deeper reflection and critical analysis of the subject matter. This approach can be integrated into the curriculum through the inclusion of media collaborative media projects that require students to articulate their ideas and challenge their understanding using communication tools that they are conversant with.

This study, furthermore, addresses the common pedagogical challenge of bridging the cultural gap between the curriculum and students' backgrounds. By incorporating communication-focused strategies, educators can create a more culturally responsive curriculum that respects and integrates the diverse cultural

contexts of students. This can involve including culturally relevant examples and materials, as well as encouraging students to share their own cultural perspectives in class through media practice and discussion.

Moreover, to effectively implement these communication-centred strategies, teacher training programs may need to be updated. Professional development courses could focus on enhancing teachers' communication skills, particularly in terms of active listening, empathy, media production training and culturally responsive teaching methods. By equipping teachers with these skills, schools can create a more supportive and effective learning environment.

KEYWORDS

Communication-Centric, Creative Media, Critical Pedagogy, Literacy, Curriculum

Constructing Knowledge with AI: Reflective Practices and Transformative Strategies for Educators in the Digital Age

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BACKGROUND

In an era where artificial intelligence (AI) is reshaping the educational landscape, this study ventures into the heart of innovative pedagogy through a comprehensive exploration of the transformative potential of AI tools from an educators lived experience. Specifically, it examines the roles of ChatGPT, Grammarly, and PowerPoint Designer (Microsoft 365) in revolutionising teaching, lesson preparation, and educational research. Anchored in Constructivist learning theory, the study emphasises the process of knowledge construction facilitated by AI-enhanced educational practices using the Technological Pedagogical Content Knowledge framework (TPACK) as an educational model. This advocates for a learner-centred approach that prioritises active engagement and personal experience. By intertwining reflective practice with a Constructivist framework, the paper not only delineates the author's personal learning journey but also incorporates perspectives from the broader educator community. Using autoethnography as a methodological tool, the study offers a rich narrative of the author's encounters with AI in education, highlighting the nuanced interplay between technology and pedagogy. This study aims to contribute to the ongoing discourse on AI in education, offering insights and practical implications for educators seeking to integrate AI into their pedagogical practices.

OVERALL AIM

The study seeks to demonstrate how AI tools can foster a deeper learner engagement, and support the development of personalised learning experiences. Additionally, the study aims to provide insights and practical implications for educators on integrating AI into their pedagogical practices and teaching role, ultimately advocating for a learner-centred, Constructivist approach to education.

MAIN EXPECTED OUTCOME/S

Through this exploration, the study aspires to inspire educators to embrace AI as a catalyst for innovation and transformation in the educational landscape.

RESULTS

By showcasing the effectiveness of AI tools through storytelling, the study aims to streamline pedagogical processes and foster more innovative practices in education. The results may showcase how AI can be used to create personalised

and interactive learning experiences for students as well as educators using the tools. Additionally, the study's integration of AI into reflective practice can provide educators with deeper insights into their teaching methods, promoting continuous professional development and improved teaching strategies. By incorporating diverse perspectives from the educator community through autoethnography, the research contributes to a richer understanding of AI's implications in education, potentially informing future research and policy-making. Ultimately, this study aspires to inspire educators to embrace AI as a catalyst for innovation, influencing curriculum development and educational policies to better integrate AI technologies, thus shaping a more dynamic and effective educational landscape.

IMPACT OF RESEARCH

This study can significantly impact various fields, including the TPACK model, autoethnography, AI discourse, and the broader educational landscape. By integrating AI tools like ChatGPT, Grammarly, and PowerPoint Designer into the TPACK framework, the research can enhance our understanding of how technological, pedagogical, and content knowledge intersect, leading to more effective and innovative teaching practices. By utilising autoethnography, the study can enrich methodological practices by demonstrating how personal and communal experiences with AI can provide deeper insights into educational phenomena. Furthermore, the research contributes to the ongoing AI discourse by providing empirical evidence and practical examples of AI's transformative potential in education, thus informing and shaping future discussions and developments in AI applications. Lastly, the study's findings can influence the educational field by promoting the adoption of AI-enhanced pedagogies to educators, fostering more engaging and personalised learning experiences, and guiding policy and curriculum development to incorporate AI technologies effectively. This holistic impact underscores the study's potential to drive innovation and improvement across multiple dimensions of educational theory and practice.

KEYWORDS

Artificial Intelligence; TPACK; Autoethnography; Education; Educator

Becoming Herself. Women Teachers in the Making. A Foucauldian Analysis

Tania Borg

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BACKGROUND

With the increase in challenges in the field of education, teachers need to care for themselves as well as caring for and teaching others. Through a narrative approach, this study explored the learning trajectories of three women teachers: their learning experiences in constructing themselves as women and as educators, the power struggles these women teachers have been involved in, and the different educational technologies they adopted in forming themselves as women and as educators. Three women teachers who experienced teaching in post-secondary and/or tertiary institutions responded to open ended interviews that allowed them to narrate their life history. Findings showed a strong value system at home, they were all involved in voluntary work, all had strong role models or mentors in their life, but at a point 'othered' themselves from those around them in becoming free subjects, which indicate how processes of becoming oneself as a teacher are influenced by their gendered, class, and religious positioning. The importance of having strong role models and mentors in their life, the willingness to contribute to the communities in which they live, and the articulation of a philosophy of teaching, all refer to their unique values. This enables them to care for themselves. This thesis presents a series of innovative Technologies of the self (Foucault 1988) adding on to those suggested by Tamboukou (2003) as Technologies of the female self, which helped women teachers' self-development as gendered and knowledgeable caring subjects.

OVERALL AIM

With the increase in challenges in the field of education, teachers need to care for themselves as well as caring for and teaching others. A caring profession is a self-reflective process, requiring the preliminary condition of caring for the self, in turn requiring knowing thyself (Greek Classics). This study suggests ways of caring for the Female self.

MAIN EXPECTED OUTCOME/S

Through in depth questioning and collection of life histories with a narrative approach, this study explores the learning trajectories of three women teachers:

- *their learning experiences in constructing themselves as women and as educators,*
- *the power struggles these women teachers have been involved in, and*

- *the different educational technologies they adopted in forming themselves as women and as educators.*

RESULTS

Some results include the importance of having strong role models and mentors in a woman's life, the willingness to contribute to the communities in which the teachers live at, and the articulation of a philosophy of teaching, all refer to the teachers' unique teaching values. This is a work in progress, life-endeavour, self-transforming research project from a female perspective.

IMPACT OF RESEARCH

"Research conducted for the purpose of contributing towards the science of teaching by the systematic collection, interpretation and evaluation of data ... is called scientific research with a researcher conducting this research. The results obtained from a small group through scientific studies are socialised, and new information is revealed with respect to diagnosis, treatment and reliability of applications". (Çaparlar, 2016). As a researcher in education, my task is to identify local and national teaching and learning problems, systematically collect, interpret, evaluate and present/socialise results and suggestions in higher education teaching to its stakeholders.

This research aids in helping governments atglobal, EU, national, local levels, and CEOs in governing a better financed society, as discussed by Foucault between 1977-1984. Considering that a substantial amount of teachers have breakdowns and leave the educational sector, teachers' wellbeing, first and foremost as citizens and seconly as educational providers, is essential for the country. Education is one of society's three pillars.

A healthy teacher results in a healthy student, a healthy family, a healthy society; if students are society's product, teachers are its backbone. Investment in education is part and parcel of a healthy economy, and a healthy social environment. With Malta's emphasis on financially supporting students between ten to fifteen years, right up to Undergraduate level, the State should now check, audit, revise and redirect its spending in education. During the last twenty years, since joining the EU, Malta has taken a Leftist shift towards a Central Left-leaning policy, yet fresh Maltese graduates are leaving the Islands and going to mainland Europe, Asia and the Americas, creating a brain drain in Maltese society. This is despite the strong investment by the Maltese government in modern technologies and enticement of foreign industries through tax rebates. In the Western world, globally and locally, the old Maltese technologies; the (natural, urban, social, historical, religious, cultural) environment is being overseen if not wanting to sound too drastic, lost. EU funding is helping Maltese project writers applying for

European Union funds, however the speed of modernisation is missing the targets of several opportunities to redirect EU- and nationally fundedapplications. The Maltese environmental movements are doing a lot of work, yet at times are not timely in their protest applications against Maltese sustainable 'development'. Maltese industries lack specialists who will stay on for at least six years, yet contradictorily, Undergraduate students are not finding work in their field of study and hence are leaving the Islands for better opportunities.

Global politics and recent EU elections results show a shift towards a Centre-Left , in turn reflecting a shift, I dare say, from the social to an individualised society, whereas our global responsibilities enshrined in"The Sustainable Development Goals (SDGs), also known as the Global Goals, and adopted by the United Nations in 2015 lie in a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The 17 SDGs are integrated:they recognise that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability."

(https://www.undp.org/sustainable-development-goals cited 9th July 2024 11:28)

This research has so far shown that in building state-ofthe-art global tangible-societies including campuses is not necessarily resulting in happier, purer, wiser lives, and gives suggestions.

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KEYWORDS

Feminist Philosophy, Foucauldian Studies, Self-Transformation, Self-Reflection, Women Teachers.

Exploration and Education for Urban Mobility Leaders

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BACKGROUND

The EXCEL Winter School, initiated under the umbrella of EIT Urban Mobility RIS projects, was designed to address critical challenges in urban mobility through innovative educational approaches. Malta, with its unique geographic and administrative structure, provided an ideal setting for this initiative. MCAST took a leading role in this project, leveraging its expertise in vocational education and its extensive network within the local ecosystem, which includes companies, policymakers, and educational institutions.

The impetus for the EXCEL Winter School arose from the need to prepare a new generation of professionals who are not only knowledgeable about the latest trends in urban mobility, but also equipped with practical skills and innovative thinking to tackle real-world challenges. Urban mobility is a pressing issue worldwide, and Malta is no exception. The country's dense urban areas, reliance on traditional transport methods, and growing environmental concerns necessitate a fresh, comprehensive approach to mobility solutions.

In collaboration with Cleantech Bulgaria and Project Aegle Foundation (PAF), MCAST developed a curriculum that combines theoretical knowledge with hands-on experience. This initiative aligned with MCAST's commitment to fostering resilience, agility, and employability among its students. The winter school aimed to create a dynamic learning environment where participants could engage with experts, develop prototypes, and explore new business models.

The project also benefitted from the support of various local stakeholders, including the Gozo Regional Development Authority (GRDA), Transport Malta, Malta Public Transport, and the Ministry for Gozo and Planning. Their involvement ensured that the program was grounded in real-world applications and provided valuable insights into the local context.

Overall, the EXCEL Winter School exemplifies MCAST's dedication to addressing contemporary issues through education, innovation, and collaboration, aiming to make a significant impact on urban mobility in Malta and beyond.

OVERALL AIM

The EXCEL Winter School aimed to equip participants with the knowledge and skills necessary to address contemporary urban mobility challenges. By fostering innovative thinking, practical problem-solving abilities, and interdisciplinary collaboration, the programme sought to develop future leaders in urban mobility.

The ultimate goal was and still is to create sustainable, efficient, and inclusive transportation solutions that can be implemented locally and globally, enhancing the quality of life in urban environments.

MAIN EXPECTED OUTCOME/S

The primary expected outcomes of the EXCEL Winter School include the development of innovative urban mobility solutions and the creation of early-stage business models. Participants gained enhanced skills in entrepreneurship, innovation, and system thinking, preparing them for careers in the urban mobility sector. Additionally, the programme aimed to foster a network of highly talented and connected individuals who can collaborate on future projects, thereby contributing to the advancement of sustainable urban transportation systems.

RESULTS

The EXCEL Winter School has yielded several notable results, demonstrating its impact and success. Firstly, we successfully engaged participants from various countries, fostering a diverse and dynamic learning environment. This diversity enriched discussions and facilitated the exchange of different perspectives on urban mobility challenges and solutions.

One of the key achievements was the development of innovative solutions to real-world urban mobility challenges presented during the programme. Through a series of workshops and collaborative sessions, participants created early-stage prototypes and business models. These solutions were designed to address specific mobility issues faced by cities, showcasing the participants' ability to apply theoretical knowledge to practical problems.

Preliminary feedback from participants highlighted significant improvements in their skills related to entrepreneurship, innovation, and systems thinking. Many reported feeling more confident in their ability to tackle complex urban mobility issues and develop viable solutions. This was further evidenced by the quality of their final presentations and the innovative ideas they proposed.

Moreover, the engagement with local authorities and industry stakeholders, such as Transport Malta, GRDA, and Sofia Municipality, provided valuable insights and support. These collaborations not only enhanced the curriculum but also ensured that the solutions developed were relevant and practical.

Additionally, the winter school fostered a sense of community among participants. They formed lasting connections, creating a network of like-minded individuals passionate about sustainable urban mobility. This network is expected to facilitate future collaborations and initiatives, contributing to the long-term impact of the program.

IMPACT OF RESEARCH

Society:

The EXCEL Winter School has a profound impact on society by addressing the pressing need for sustainable urban mobility solutions. By equipping students with the necessary skills and knowledge, the program ensures that future urban mobility professionals can tackle complex transportation challenges. The diverse and inclusive learning environment promotes social equity, as it encourages participation from students of various backgrounds, thereby fostering a culture of innovation and inclusivity. This approach not only helps in creating well-rounded professionals but also in building a community that values and practices sustainable and inclusive mobility solutions.

Moreover, the involvement of multiple stakeholders, including local government authorities and transport organizations, ensures that the solutions developed are practical and tailored to real-world needs. This collaboration enhances the relevance and applicability of the students' work, ultimately benefiting society by improving the quality of urban life. The focus on teamwork and communication skills further prepares students to effectively engage with various societal stakeholders, ensuring that they can advocate for and implement sustainable mobility solutions in their future careers.

Environment:

Environmental sustainability is at the core of the EXCEL Winter School. The project emphasizes the development of eco-friendly transportation solutions aimed at reducing carbon emissions and improving air quality in urban areas. By engaging students in hands-on projects that address real-life environmental challenges, the program fosters a deep understanding of the environmental impacts of urban mobility.

Students are encouraged to think critically about the sustainability of current transportation systems and to innovate new solutions that can lead to significant environmental benefits. The focus on sustainable urban mobility ensures that the future workforce is prepared to lead the transition towards greener cities. The practical experience gained through the program empowers students to implement and advocate for environmentally sustainable practices in their professional lives, thereby contributing to global efforts to combat climate change and environmental degradation.

Curriculum:

The EXCEL Winter School significantly enriches the educational landscape by introducing innovative and interdisciplinary teaching methods. The curriculum is designed to bridge the gap between theoretical knowledge and practical

application, ensuring that students are well-prepared for the dynamic field of urban mobility. The programme incorporates challenge-based learning, where students tackle real-world problems, fostering critical thinking, problem-solving, and creativity.

The involvement of industry experts, mentors, and stakeholders in the educational process provides students with valuable insights and real-world perspectives, enhancing their learning experience. This approach not only prepares students for the immediate challenges in urban mobility but also equips them with transferable skills that are valuable in various professional contexts.

Additionally, the programme's focus on entrepreneurship and innovation encourages students to develop new business models and project ideas, potentially leading to the creation of start-ups and new ventures in the mobility sector. By fostering a spirit of innovation and providing the tools and knowledge needed to succeed, the EXCEL Winter School contributes to the development of a highly skilled and entrepreneurial workforce.

KEYWORDS

Entrepreneurship, Innovation, Sustainable Urban Mobility, Industry Involvement, Engagement With Local Authorities, Challenge-Led Learning

The EXCEL Winter School was funded through EIT Urban Mobility, an initiative of the European Institute of Innovation and Technology (EIT), a body of the European Union

Enhancing Student Performance Through the Revamp of the Research-Related Unit and Dissertation Processes: A Case Study

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BACKGROUND

The paper presents a case study examining how changes to the research methods unit impacted student performance in dissertations at the Malta College of Arts, Science and Technology's Institute for Creative Arts. The study specifically focuses on the Creative Media Production degree course and analyses the effects of transforming a Research Processes and Techniques unit from a three-month course into a year-long program during students' second year.

The research tracked three cohorts of media students from 2021-2023, with class sizes ranging from 15-21 students per year. The study's methodology combined qualitative analysis of lecture notes and student feedback with quantitative assessment of dissertation performance metrics. The researchers also conducted in-depth analyses of dissertation samples across all three cohorts to ensure consistency and identify common challenges.

A key innovation was encouraging students to begin developing their Statement of Intent (SOI) earlier and meet with supervisors during the summer months before their final year. The SOI document outlines the student's research title, questions, methods, literature review, and project timeline. This extended timeline aimed to give students more of an opportunity to develop and refine their research ideas.

The findings demonstrate that students who established clear research directions early and maintained consistent engagement throughout the year-long course generally achieved better outcomes in their final dissertations. The study also highlights the critical importance of effective supervisor-student relationships and the value of providing structured guidance through comprehensive manuals and documentation of the dissertation process.

OVERALL AIM

The primary aim of this study was to evaluate the impact of restructuring the Research Processes and Techniques unit from a three-month course into a year-long program for second-year Creative Media Production students at Malta's Institute for Creative Arts. The researchers sought to understand whether giving students more time to develop their research ideas and understanding of key concepts would lead to improved dissertation outcomes.

The study specifically examined how this curriculum change affected students' ability to:

- *Develop clearer research ideas earlier in the process*
- *Create more comprehensive Statements of Intent (SOI)*
- *Better understand research methodologies and academic writing requirements*
- *Produce higher-quality dissertations and associated media projects*

By analysing three consecutive student cohorts (2021-2023), the researchers aimed to identify whether there was a correlation between early clarity of research direction and final dissertation performance. They also sought to understand the role of effective supervision and structured guidance in student success.

A secondary aim was to use these findings to improve future dissertation processes by:

- *Identifying best practices for student-supervisor relationships*
- *Developing more comprehensive guidance materials*
- *Understanding common challenges faced by students*
- *Establishing clearer frameworks for assessment and support*

The ultimate goal was to create an evidence base for curriculum design that would better prepare students for their final year dissertation projects while maintaining high academic standards in both written work and creative media productions.

MAIN EXPECTED OUTCOME/S

The researchers anticipated several significant outcomes from extending the Research Processes and Techniques unit to a full year. At the core, they expected to see improved student performance through higher quality dissertations and creative projects, better integration between written research and practical media components, a more thorough understanding of research methodologies, and stronger academic writing skills. The extended timeline was expected to facilitate better research development, with students identifying and refining their research topics earlier, producing more comprehensive Statements of Intent (SOI), completing stronger literature reviews during summer months, and having more time to develop their research ideas and methodologies.

The changes were also expected to enhance the supervision process, leading to more effective student-supervisor relationships, earlier engagement between parties, better-structured guidance throughout the dissertation journey, and a clearer understanding of roles and expectations for both students and supervisors. At an institutional level, the researchers anticipated improvements through the development of a more comprehensive dissertation manual, better frameworks for assessment, clearer guidelines for all parties, and a more standardised approach to dissertation supervision.

Finally, the extended timeline was expected to result in better time management, with workload more evenly distributed throughout the academic year, reduced last-minute pressure on students, more time for revision and refinement of work, and better planning and execution of creative projects. Overall, these outcomes were anticipated to lead to an improvement in the quality of student work and a more structured, supportive academic environment for dissertation development.

RESULTS

The findings demonstrated several positive outcomes from extending the Research Processes and Techniques unit to a full year. The data from three cohorts (2021-2023) showed a clear correlation between early clarity of research direction and final dissertation performance. Students who identified clear research topics early and maintained consistent engagement generally achieved higher grades in both their dissertations and creative projects.

Specifically, students who scored over 70 in the Research Methods unit consistently performed even better in their dissertations and projects. The 2022 and 2023 cohorts showed improved performance overall, with more students scoring in the higher mark brackets (70-79 and 80-89) compared to the 2021 cohort. There was also a notable reduction in students scoring below 60 in their final dissertations.

The research highlighted the crucial role of effective supervision in student success. Students who received consistent guidance and support from well-matched supervisors typically showed marked improvement from their second-year performance to their final dissertation grades. This was particularly evident in cases where students faced personal challenges or had weaker academic skills but received appropriate support.

However, the study also identified some persistent challenges, including student absenteeism and time management issues. A small number of students still struggled or failed, particularly those who frequently missed classes or failed to maintain regular contact with supervisors. The results emphasised the importance of consistent engagement and the value of early supervisor-student relationships in achieving successful outcomes.

IMPACT OF RESEARCH

The study provides valuable insights into educational practice at a specific institute, the Institute for the Creative Arts, and offers practical value in demonstrating the benefits of extended research preparation time. It highlights the importance of early supervisor-student relationships, provides evidence for curriculum design decisions in creative media education, and offers insights into dissertation support structures.

This research represents a valuable contribution to educational practice and curriculum development, particularly for creative arts institutions and programs with similar structures. Its primary value lies in its practical applications rather than its scientific advancement of the field.

KEYWORDS

Dissertation, Curriculum Development, Research Methods, SOI

Investigating Early Childhood Educators' Agency in Curriculum-Making

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BACKGROUND

Located in the context of Maltese educational reform, this study addresses educators' perspectives on the policy shift towards an emergent and holistic approach to curriculum-making in Early Childhood Education (ECE). The National Curriculum Framework for All (NCF) (MEDE, 2012) for ECE ostensibly bestows educators with the autonomy to develop a bespoke curriculum that is responsive to children's interests, needs, and enquiries. However, the extent to which such aspirations are being enacted in practice is questionable, particularly given that educators have been required to make significant shifts from deeply entrenched, centrally-imposed and prescriptive practices which are the enduring legacy of colonialism.

In order to understand the challenges and affordances for curriculum change, the study drew upon Priestley et al.'s (2012; 2015) Ecological Model of Teacher Agency. This theoretical framing draws attention to the multiple and interrelated contextual factors that enable or constrain educators' capacity for agency and openness to change in curriculum decision-making. Such an approach posits that educational reform requires us to think beyond notions of curriculum' implementation' or 'delivery', and to acknowledge the 'multi-layered social practices, including infrastructure, pedagogy and assessment, through which education is structured, enacted and evaluated' (Priestley, 2019, p.8). It follows that educators are constantly required to navigate a dynamic network of interconnected systems in their mediation of curriculum.

OVERALL AIM

The study employed a qualitative and Interpretivist methodology to explore how Maltese early childhood educators understand their agency in curriculum practice. Following institutional ethical approval, semi-structured interviews were conducted with nine educators to investigate the following research questions:

1. How do educators understand their agency in (making) an emergent curriculum?

2. How can early childhood educators, through their knowledge and practice, become agents of change within their learning communities to sustain quality education for all?

MAIN EXPECTED OUTCOME/S

The study objectives are to:

1. *Evaluate how early years educators in Malta perceive their agency in embracing curriculum reform and pedagogical change.*
2. *Explore characteristics of agentic educators transitioning to an emergent curriculum and becoming agents of change within their learning communities.*
3. *Investigate contextual affordances that facilitate or hinder curriculum reform.*
4. *A phenomenological, interpretative approach was used to allow the participants to express themselves and curriculum-making experiences. Data was analysed through reflexive thematic analysis (Braun & Clarke, 2019), using hand coding to identify themes.*

RESULTS

The research findings underscore the critical role of the early years educators' agency in facilitating curriculum reform in Malta. The data reveals that when educators are afforded ample opportunities to develop a deep understanding of the core principles and values that underlie effective curriculum practice, their capacity for agency in curriculum-making is significantly enhanced. This enriched understanding empowers educators to approach their planning and practice with a heightened degree of flexibility, enabling them to adapt dynamically to the evolving interests of the children in their care, and experiment with innovative curricular approaches. It also serves to inspire educators to take initiative, grow in their profession, and become agents of change within their learning communities. By assuming an autonomous role in curriculum-making, early years educators are better positioned to meet the ever-changing and increasingly complex needs of the children entrusted in their care. Conversely, the findings also show that a lack of adequate training and support can lead to reliance, indifference, a sense of powerlessness, and adherence to prescriptive practices.

IMPACT OF RESEARCH

Within the Maltese context, these findings have multiple implications for curriculum change:

1. *Authentic involvement of early childhood educators as key stakeholders in curriculum-making.*

While the recognition of early childhood educators as key stakeholders is crucial, mere acknowledgment is insufficient. Their contributions have to be valued not only in rhetoric but also in decision-making processes which prioritise their expertise, concerns, experiences and unique perspectives. This leads to a more

inclusive and collaborative approach to curriculum reform, where educators are seen as partners in shaping the local educational landscape, as outlined in the National Curriculum Framework (NCF) (MEDE, 2012).

2. *Targeted Professional Development Opportunities to Enhance Understanding of Agency and Influence on Curriculum Reform.*

The findings indicate the need for targeted professional development opportunities that enable educators to deepen their understanding of their agency in curriculum reform. The prevalence of participants expressing the necessity to adhere to decisions made by authorities suggests a potential lack of knowledge and skills required to navigate the complexity of curriculum reform. Thus, such investment in educator development can enhance personal aptitudes and contribute to the creation of a more knowledgeable and empowered teaching force that can drive sustainable curriculum change, as aspired in one of the initiatives in the National Education Strategy 2024-2030 (MEYR, 2024).

3. *Empowering Educators for Responsive Curriculum Practices*

Empowering educators to deepen their understanding of their agency and influence on curriculum reform as explained above, can support them in reflecting on and improving their daily practices to respond to the interests of the children. This needs to be supported on the school level as leaders need to provide educators with the flexibility to exercise greater agency within their classrooms. Furthermore, this empowerment can be extended beyond individual classrooms to foster collective reflection and agency among educators who base their curriculum on their specific context and learning communities. Thus, the valuable expertise of early childhood educators and their ability to shape the curriculum in meaningful ways is further enhanced.

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Keywords
Early Childhood Educators, Curriculum-Making, Curriculum Reform, Ecological Model Of Teacher Agency; Malta

How AI is Shaping Media Education

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BACKGROUND

The development of AI and AI-enabled applications is changing the way many industries function. One can say that AI is now used in almost every aspect of our existence. It has the benefit of speed and efficiency making it cheaper to use than recruiting employees.

The increase in the development of AI and its proliferation in the artistic scene has raised concerns about the usefulness of what is being taught to our students in the Media courses at MCAST ICA.

The Media programs at level 3 and 4 begin covering the basics of camera, lighting, and editing techniques. These form the foundations and are developed and fine-tuned across the course of studies until students graduating at level 6 have explored a wide range of uses of the technology and techniques across various scenarios. Students are also guided to find their niche interests and abilities to enable them to enter into the working world with immediate ability to contribute to the scene.

The latest iterations of AI models demonstrate that in a short time it will be able to create footage, images, or sounds with no camera, actors or models, or set ever involved in the process, to such a level that real and artificially generated content will become indistinguishable to humans. AI is already able to correct most mistakes made during recording or shooting. With these realities, what should future media-educational models look like?

AI is a tool which, and like it or not, is a part of our reality. Should we be teaching students how to use AI in the same way that they are trained in the use of cameras, lights and other equipment, or should we be focusing on other skills that AI does not have?

OVERALL AIM

This research aims to analyse the courses in Media being provided at MCAST ICA and existing and upcoming AI tools in the media industry. Through a deep breakdown of learning outcomes currently being delivered, and a comparison with what AI can and cannot do, more relevant Media courses will be proposed. The aim is to create a beneficial learning journey for our student in their chosen art form: the moving image.

MAIN EXPECTED OUTCOME/S

With a better understanding of AI tools, their capabilities, uses, and outcomes, and how they are being or will be used in the industry, a better understanding of what needs to be imparted to media students will be achieved. This will build a stronger foundation for the restructuring of the courses offered, as well as a rethinking of what units are taught and the learning outcomes of each.

RESULTS

The research is still at too early a stage to indicate any specific results.

IMPACT OF RESEARCH

The main impact of the research will be on the curriculum. Through deep analysis of and experimentation with AI tools available and being produced, interviews with industry players, and focus groups with both educators and learners, a holistic understanding of the situation will be achieved.

Students trust that as a vocational institution, MCAST will provide them with education and training for a specific industry. At the Department of Media, we are always at a disadvantage as technology is advancing at a rate we cannot keep up with. Our units therefore, while covering training in the latest equipment and software, focus on transferable skills which students may then apply to whatever editing suite, cameras and rigs, or lighting set-up they will face when entering the workplace.

The main goal of the research is to ascertain that the skills currently being taught are still required, and if not, what skills our students should be trained in to become professional filmmakers, editors, and moving image creators once they leave our classrooms. We aim to determine what skills are needed to use the AI tools being developed as efficiently as possible.

AI is making creation so accessible that the difference between professional content and amateur will diminish. Yet, as the digital democratisation of photography has shown, although everyone can take photos, there are those who succeed in communicating more effectively through the medium. This research will try to ensure that students graduating from our courses become the individuals who, regardless of how much AI affects the film and moving image industry, will be the ones creating products that set them ahead of the everyday amateur creators.

Producing graduates who enter the local film industry with the right aptitudes, skills and thinking processes to make use of the tools and software available will directly raise the level of what our local industry produces. This, in turn, will encourage societal change towards viewing the arts, specifically media, as a viable career, area of research and investment.

KEYWORDS
AI, Moving Image, Media Courses, AI Tools, Future Industries

Investigating the 'My personal journey' programme for Foundation Certificate students at MCAST from the students' own perspective.

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BACKGROUND

"The concept of pastoral care to effectively meet the personal, social and academic needs of students is a complex yet under-researched matter in higher education" (Seary, & Willans, 2020). This research focuses on analysing how Foundation Certificate students at MCAST perceive the Pastoral Care programme, the name of which has been changed to 'My personal journey' in academic year 2023-2024. This is vital since the way pastoral care is communicated plays a critical role in engaging young people, especially in environments where stigmas and taboos can be pivotal in influencing behaviour (Walker, 2022). Furthermore, research indicates that supportive learning environments, coupled with caring trainers, can facilitate extremely positive interactions amongst students, which effectively lead to high student retention and satisfaction (Seary, & Willans, 2020).

OVERALL AIM

The objective of this research was to focus on students' opinions and feelings about 'My personal journey', how useful they find the programme, which qualities they appreciate the most in their lecturer, and whether there is anything that they would improve. Sampling methods included questionnaires and interviews with Foundation Certificate students having 'My personal journey' as part of their course. The data generated from across the different Institutes was analysed so that the efficacy of the programme from the student point of view was examined and recommendations about how better to tailor the programme according to the students' needs were derived.

MAIN EXPECTED OUTCOME/S

Data was collected via questionnaires from students enrolled in the programme (n = 217), as well as interviews with students who decided to drop out of the 'My personal journey' programme but still continued attending their other lectures (n = 8).

RESULTS

Results were analysed via thematic analysis and primarily, shed light on the critical importance of lecturers' aptitude and predisposition to 'care' about their students, rather than just being their instructors. Timetabling issues have been found to severely hinder retention, while responses also suggest the introduction of new,

pertinent topics in the programme, necessitating teacher training in specific subjects.

IMPACT OF RESEARCH

In an educational setting, pastoral care refers to a holistic approach aimed at creating an environment that promotes the well-being, engagement, and academic achievement of learners. (Ojewunmi, 2019). It involves providing support and guidance to students, addressing their social, emotional, and personal needs, and fostering a sense of belonging and community within the school (Cross & Lester, 2014). It involves creating a supportive and inclusive environment where students feel safe, valued, and supported. Effective pastoral care helps students develop resilience, self-confidence, and positive relationships, which are essential for their overall development and academic success. (Murphy & Holste, 2016). The transition from secondary school to post-secondary education is a significant and challenging experience for students, both physically and mentally. It involves a major shift in responsibilities, increased independence, the loss of familiar social networks, the need to establish new social connections, and the added stress of managing academic and socioeconomic pressures associated with post-secondary education (Hopmeyer & Medovov, 2017; Mental Health Commission of Canada, 2017 in Nwogu, 2023). For this reason, in 'My personal journey', students coming from secondary schools are supported in "developing their self-awareness and self-esteem through the practice of self-empowerment. Learners are encouraged to think about, reflect on and communicate to others their thoughts and ideas on various subjects, particularly on own life history, the nature of their individuality and who they wish to become, both orally and in writing. There is a focus on reflection, evaluation and communication" (Unit Descriptor, Pastoral Care, p.2).

It can be said that through this research, the efficacy of the programme in nurturing tomorrow's citizens has been assessed. In the questionnaire, participants rated the unit and its relevance to everyday life at 7.12 out of 10, with positive comments such as: "I learned a lot", "The lesson is interesting and i [sic] enjoy coming i love it", "One of the most pleasing lecture [sic] of the entire semester !!", "It's the best lesson" "It's an amazing unit and should be kept throughout the school years, im [sic] sure it helps many realize certain things and express their opinion in a positive and supportive environment", "helps me improve myself" and "It's very good and fun", from the vast majority. The participants themselves identified topics they would like to be engaged in during the sessions, which further render the unit more relevant to today's society. Amongst such suggestions were topics on financial literacy, mental wellbeing and self-improvement, including topics tackling depression, anxiety and related problems, anger management, self-

confidence tips and character development tips, handling stress and self-harm, diversity, eating disorders, drugs and how to recover from addictions, personal, social and life skills, mindfulness and wellbeing, self-awareness, special needs and autism spectrum, relationships and how to keep commitments, dealing with and understanding traumas, problem-solving and "the importance of good ethics and values, justice, sincerity, truth. That it is ok not to accept things that you feel are not ok".

KEYWORDS

Pastoral Care, Student Wellbeing, Student Engagement, My Personal Journey, Student Satisfaction, Supportive Learning Environments, Student Retention, Post-Secondary Education

Exploring the Efficacy of Expressive Arts in the Educational Environment focusing on Group Therapeutic Practices

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BACKGROUND

EXA, theatre tools, EXIT (exa in liminal spaces), clown, movement within community.

OVERALL AIM

Within the contemporary educational landscape, the psychosocial distresses faced by Generation Z demand innovative and interconnected approaches. The local mental health framework for such issues remains predominantly medical. While medical treatments are pivotal in delivering quality mental health services, they often fall short without the support of therapeutic interventions. Internationally, there is compelling evidence supporting the effectiveness of innovative non-medical strategies such as EXA within mental health services. For instance, in 1994 arts-based prescriptions, started to be offered in the UK as part of the NHS's holistic framework (Bungay & Clift, 2010). Such programmes mostly targeted pupils experiencing mental health problems and social isolation. The latter are typical profiles of numerous MCAST students seeking support services at the Well Being Hub and in most of our Institutes. The purpose of such schemes is not to replace conventional therapies but rather to act as an adjunct, helping people in their recovery through creativity and increased social engagement.

MAIN EXPECTED OUTCOME/S

Repression of emotions leads to the disarmament of the body's defence systems, thus heightening susceptibility to illness, thus Expressive Arts (EXA) was proposed as a tool for this research (Practice as Research) and as a potent modality that transcends the traditional notion of artistic education as merely enhancing artistic

knowledge. EXA as a process, shifts an internal exploration through low-skill high-sensitivity measures making it ideal to encompass students who are following courses which are not necessarily related to artistic subjects. The study focused on a community comprised of 8 full-time MCAST students from diverse cohorts as participants. Students partook in the experience without any financial burden. The exploration and selected community served as the primary data collection method.

RESULTS

Some of the key findings expressed the necessity for regularity in such offerings and the need for more communal frameworks; as well as the benefits of facilitating in a circular framework. From an educator's perspective there also emerged the need for supervision on an ongoing basis for those with teaching role on an ongoing basis. Through this research, the potential of EXA served as a transformative non-medical therapeutic intervention.

IMPACT OF RESEARCH

Focus on soft skills, healing and communal processes.

KEYWORDS

Well-Being, Stress, Expressive Arts (EXA), Modalities, Clown, Movement, Psychosocial Distress, Community, Polyvagal Theory, Self-Regulation, Response Mechanisms.

Building Citizenship Skills through SDG Framework Development

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BACKGROUND

As part of the Erasmus+ Tools for T project, establishing a framework involved the inclusion of promising features and opportunities, while improving educational resources. In this study, knowledge was generated around the practical world citizen. Both desk and field research were carried out. Then, based on the data of the research, a conclusion was written. From the conclusion a framework was designed which formed the basis for additional research to be undertaken. To further triangulate the results and to ensure quality, the findings were sent for peer review through the use of anonymous questionnaires.

This framework was based on the data and conclusions from the study. Four contextual principles were targeted:

- *Personal*
- *Profession*
- *Society*
- *World citizen*

These principles were the basis for the development of a framework, which was linked to emerging citizenship themes.

Through Tools for T, we wanted to contribute to the development of our students and teachers, in order to be able to use modern techniques even better, to renew and strengthen education. This was achieved by making learning more attractive through the use of V-Learning activities.

OVERALL AIM

The aim of conducting this research was to identify the skills of a practical world citizen, and also to identify the attributes needed to acquire these skills. It was assumed that the creation of a framework in alignment with the 17 SDGs would allow us to know which topics need to be addressed and matched toboth educational materials and V-Learning modules.

MAIN EXPECTED OUTCOME/S

The expected outcomes at the end of this research included developing a framework bearing different social themes, which linked up, respectively, with the four contextual principles of personal, professional, social, and world citizenship.

In turn, all these connections would be linked to the 17 SDGs with the purpose of facilitating resource development and compilation for educators.

RESULTS

The researchers conducted a two-pronged investigation, consisting of a comprehensive review of the existing literature regarding the integration of citizenship skills within students' education, together with an empirical analysis of stakeholders' perceptions concerning the integration of such skills within the educational framework. The synthesis of past studies on the subject evaluated the merits and demerits of the various strategies available to embed citizenship skills within courses, ranging from the design of stand-alone units dealing with the subject to the infusion of such skills within each unit in the delivery of the lectures, collaborative work performed during the lesson, as well as the design of the assessments.

In addition to such a literature review, findings from the one-to-one interviews with lecturers have underscored the challenges they face in implementing these skills within their unit, despite their efforts and commitments to integrate these skills given their importance in today's dynamic market. The disseminated results confirm lecturers' steadfast belief in the importance of citizenship skills to meet the needs of the 21st-century employer, however, there are also challenges vis-à-vis how best to embed them in their teaching methods and assessment protocols. To triangulate the process, the views of Vocational Education and Training students were collected and they have affirmed the importance of integrating citizenship skills in every academic unit, rather than having a stand-alone subject. Nevertheless, students have also attributed the acquisition of citizenship skills elsewhere, beyond the classroom, such as to their participation in apprenticeship programmes, which equipped them with the practical know-how for a successful transition into the workforce.

IMPACT OF RESEARCH

The project directly contributes to the key priorities of EU policy while being consistent with needs that the project partners experience on a daily basis in practice. To carry out the project on an EU level requires providing support for the objectives of a shared social and sustainable vision to create a strong, competitive, innovative, and sustainable Europe.

The role of citizenship education and embracing the SDGs are both of vital importance. As Tools for T touches upon common European shared values and a common social and economic identity, it is important to address these issues broadly across member states. By creating awareness of citizenship skills among EU countries, European citizens' commitment to fostering inclusivity and

promoting environmental sustainability can be ensured. The project binds geographical regions with similar needs, by involving partners with specific expertise.

KEYWORDS

SDG; Tools For T; Erasmus+; Transversal Skills; Citizenship Skills;

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Advancing Water Education through Immersive Virtual Reality: The WATERLINE project

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BACKGROUND

The WATERLINE project seeks to establish a European Digital Water Higher Education Institution (HEI) Alliance, leveraging the quadruple helix model to foster innovation, research, and education in the water sector. By integrating institutional, regional and European resources, WATERLINE aims to build a sustainable ecosystem for digital water-related learning. A key component of this initiative is the development of cutting-edge educational technologies, including MCAST's Virtual Reality (VR) water rig, which exemplifies interdisciplinary collaboration in EdTech development between researchers working in the water domain and IT researchers and developers.

OVERALL AIM

This presentation presents the conceptualisation, design, and development process of MCAST's VR water rig, exploring its role in enhancing research and innovation (R&I) capabilities within higher education.

MAIN EXPECTED OUTCOME/S

The VR rig emulates the water distribution test rig present at the Institute of Applied Sciences (IAS). The VR rig serves as an immersive learning tool, simulating real-world water management scenarios to foster deeper understanding and skill acquisition in water-engineering disciplines. Through this case study, we analyse the interdisciplinary coordination between engineers, educators, ICT developers and researchers in developing the VR system, highlighting how it enhances water-related curricula.

RESULTS

The hands-on interactive session during the research EXPO will provide an opportunity for participants to explore the VR rig, engage with its functionalities, and discuss the pedagogical, technical, and collaborative challenges encountered during its development. This session will also emphasise the broader WATERLINE

initiative's objectives, particularly in enhancing Master's-level water programs and building a European knowledge network.

IMPACT OF RESEARCH

The implications for future EdTech innovations in water education, R&I capacity building, and quadruple helix collaboration will be critically examined.

KEYWORDS

Edtech Innovation, Interdisciplinary, Skills, Water Education

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autonomouS application for informaTion mapping scrApbook during the disseRtation journey (STAR)

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BACKGROUND

As undergraduates embark on the arduous journey of completing their final year dissertations, they are required to demonstrate a profound understanding of concepts and knowledge in their field of study. With the ever-expanding corpus of human research, linking all relevant knowledge to a specific problem has become increasingly challenging. Recent studies have shown that using information maps—comprising literature review mapping, videos, diagrams, and other sources—can significantly benefit the learning process. However, creating and maintaining these maps remains a daunting task for new researchers, often consuming valuable time and requiring consistent effort to stay up-to-date. The STAR project aims to harness the power of artificial intelligence as an education technology. The project focuses on developing a sophisticated AI system specifically tailored for educational use. This system is designed to utilise a large language model (LLM) trained on data curated by lecturers, allowing it to adapt to the unique learning styles of students.

OVERALL AIM

The STAR project aims to design and test an AI application that automatically generates a scrapbook of research topic information. This application, which can be moderated by a supervisor and categorized based on well-known learning style models, aims to enhance the student's dissertation journey.

MAIN EXPECTED OUTCOME/S

The STAR project is expected to produce the following main outcomes:

1. *Training an AI model on various published materials.*
2. *Initial qualitative insights on the relevance and acceptability of the automatically generated information from users.*
3. *Foster increased knowledge and capacity among the research team, promoting further collaboration and expanding research within the AI in education sphere.*

4. *Advancement in the understanding and application of AI in education, contributing to broader academic and technological knowledge.*

IMPACT OF RESEARCH

For students, particularly those conducting research dissertations, the AI application represents a tangible tool that autonomously populates a list of relevant sources for a particular hypothesis or dissertation topic. This can significantly reduce the time spent searching for sources, allowing students to focus on developing their discussions with supervisors and peers. Additionally, the application can help students and supervisors explore alternative sources and methods of representation, facilitating a better understanding of information mapping.

An autonomous application could also identify alternative sources, such as webinars, that cater to students with specific access difficulties, providing a broader range of valuable resources. If successful, the application could be further implemented to manage and monitor dissertation timelines, sending reminders and generating meeting requests based on the recommended schedule. It could even function as a logbook to streamline the dissertation process.

For dissertation supervisors, the application offers the potential to improve the supervision process by tracking and analysing the sources that students interact with. This data could provide additional insights, helping supervisors to enhance the quality of supervised dissertations.

From a computer and data science perspective, this autonomous application pushes the boundaries of AI. By classifying high-quality sources, the project will provide valuable insights into how generative AI can effectively support educational processes. The analysis of these methods will contribute to the broader field of AI, demonstrating its capability to autonomously generate useful, relevant information for academic purposes.

KEYWORDS

AI In Education, Personalized Learning, Large Language Models, Educational Technology, Learning Styles

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Shifting the Focus from 'AI for Education' to 'Education for AI': MCAST's Contribution through the ZENITH Framework at EDULEARN24

Judita Tomaskinova

MCAST Applied Research and Innovation Centre

BACKGROUND

As artificial intelligence (AI) continues to transform industries, education is also undergoing a significant shift. The traditional focus on using AI to enhance educational processes is giving way to a new priority: preparing educators and learners for a future where AI is integral to everyday life and work. This emerging focus was a central theme at the 16th annual EDULEARN24 International Conference, held in Palma de Mallorca, where global experts discussed AI's evolving role in education.

A key takeaway from the conference was the recognition of gaps in AI adoption within educational institutions. Factors such as the complexity of AI technology, varying user needs, disparities in resources, and insufficient educator training have hindered its widespread implementation. Additionally, there is a lack of comprehensive ethical training for AI in education, with an overemphasis on technology often overshadowing the vital role of educators in providing personalised learning experiences. While AI has the potential to enhance educational outcomes, it is essential to preserve the human element, ensuring that learners receive individualised support and guidance. The need for ethical AI deployment and maintaining personalised learning experiences have thus become key priorities for future educational frameworks.

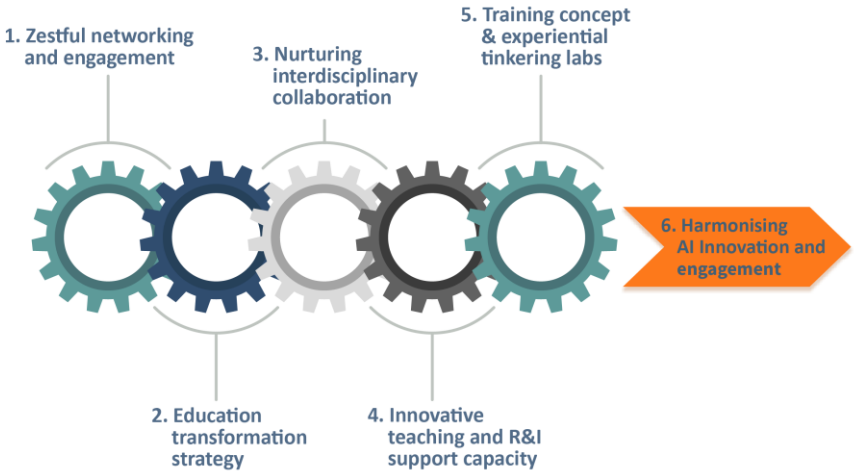
OVERALL AIM

The aim of MCAST's Applied Research and Innovation Centre (ARIC), in collaboration with European institutions such as the University of Twente, ADAPT Centre/Dublin City University, Learning Hub Friesland, and Mendel University in Brno, was to address these challenges by introducing the 'ZENITH' framework at EDULEARN24. The ZENITH framework seeks to empower educators by equipping them with both the technical and soft skills necessary for integrating AI into their classrooms. It advocates for a shift from "AI for Education" to "Education for AI," ensuring that educators actively shape how AI is implemented in education, while fostering continuous professional development, interdisciplinary collaboration, and ethical awareness.

MAIN EXPECTED OUTCOME/S

The ZENITH framework aims to increase educators' AI readiness by equipping them with both technical and soft skills, enabling them to effectively integrate AI into educational settings. The primary expected outcomes include:

- *Increasing educators' AI readiness: Preparing educators with the necessary AI knowledge and practical skills to adapt to and implement AI in their classrooms.*
- *Interdisciplinary collaboration: Establishing partnerships between educators, technologists, and industry professionals to foster innovation.*
- *Ethical AI deployment: Ensuring that AI is used in education in an ethical manner, while maintaining personalised, human-centred learning experiences.*
- *Sustainable technological integration: Promoting the long-term and effective adoption of AI within educational institutions.*
- *Continuous professional development: Creating a structured approach for ongoing learning, enabling educators to adapt to evolving AI tools and teaching methods.*



RESULTS

The implementation of the ZENITH framework is expected to contribute to meaningful progress in addressing the gaps in AI adoption within education. The framework offers a structured, six-pillar approach that promotes educator empowerment, interdisciplinary collaboration, and continuous professional development and support. At its core, ZENITH recognises that educators are the

cornerstone of successful AI integration in educational settings. It focuses on equipping educators with both technical and soft skills necessary to navigate the complexities of AI technologies, ensuring they actively participate in shaping AI's role in education. Through this structured approach, ZENITH is designed to foster an inclusive, adaptable learning environment that encourages educators to confidently adopt AI tools, engage in collaborative learning, and advance their professional skills in an AI-driven landscape.

The expected results from the implementation of the ZENITH framework include:

- *Zestful networking and engagement: The creation of sustainable communities where educators, technologists, and students exchange ideas and drive collaborative innovation. This will foster professional learning communities (PLCs) that nurture continuous professional development and deepen understanding of AI integration into educational practices.*
- *Education transformation strategy: The development of a strategic roadmap to guide educational institutions through the transition to AI-enhanced learning environments. This strategy, based on Constructivist principles and design thinking, will empower educators to embrace AI in ways that foster critical thinking, creativity, and problem-solving among learners.*
- *Interdisciplinary collaboration: Stronger partnerships between educators, AI experts, and industry professionals, resulting in innovative and holistic AI-based solutions. This collaboration will lead to more interactive and inclusive learning environments, advancing the practical application of AI in education.*
- *Innovative teaching and R&I support capacity: Enhanced organisational structures and human resources within R&I support offices will lead to better guidance for educators and more successful AI-related projects. Professional development programs for R&I staff will improve their capacity to assist in securing funding and managing AI initiatives.*
- *Training concept & experiential tinkering labs: Hands-on experiential tinkering labs will provide educators with practical experience using AI tools, boosting their confidence and ability to implement AI in teaching. These labs, alongside continuous professional development, will ensure ongoing improvement and adaptability.*
- *Harmonising AI innovation and engagement: The framework will facilitate the seamless integration of AI into educational practices, creating personalised and engaging learning experiences. AI will enhance teaching*

methods without overshadowing the human aspect, leading to improved learner engagement and outcomes.

IMPACT OF RESEARCH

The ZENITH framework represents a potential pathway towards integrating AI more effectively into education. Its holistic approach aims to ensure that educators are not merely passive adopters of AI technologies but active participants in shaping how these tools are applied to foster critical thinking, creativity, and problem-solving in the classroom. By focusing on ethics, collaboration, and continuous professional development, the framework aspires to empower educators to better navigate the evolving AI landscape. While ZENITH is a theoretical framework at this stage, it is built on a proactive, bottom-up transformation approach driven by the collaboration team. This approach fosters change from the grassroots level, emphasizing the role of educators in influencing AI integration. The framework provides a foundation for future research and practice that could contribute to sustainable educational development and better prepare institutions to meet the challenges and opportunities of an AI-driven future.

KEYWORDS

AI, AI Readiness, Educational Transformation, Innovation In Education, Educator Readiness

Exploring Non-Industry Apprenticeship Programmes and Their Digital Administration at Malta College of Arts, Science, and Technology (MCAST)

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[2]*MCAST Institute of Community Services*

BACKGROUND

The Malta College of Arts, Science, and Technology (MCAST) follows a dual education model, integrating both academic learning and practical training. This system ensures that students receive traditional classroom education alongside professional training within an industry context [1]. However, the apprenticeship programmes at MCAST are non-industry driven. This means that the design, administration, and logistics of these programmes are entirely managed by the educational institution, specifically by the Apprenticeship and Work-Based Learning department.

In contrast, an industry-driven apprenticeship model involves employers in the development and assessment of training programmes. Such an approach gives businesses more control, ensuring the apprenticeships are relevant to the industry and meet specific employer needs [2]. This employer-led system encourages companies to actively participate and invest in the training process [3]. When businesses are given a leading role, they take ownership of the programme's development, ensuring alignment with workforce demands [4].

This study, as part of the EU4DUAL project, explores MCAST's perspective on the advantages and challenges of running non-industry-driven apprenticeship programmes. It also investigates whether the shift to digitalisation is facilitating or complicating the administrative processes involved. The findings will provide insights into how digital transformation impacts the management of these programmes at MCAST and the potential benefits or drawbacks of maintaining a non-industry-led approach.

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OVERALL AIM

This study aims to evaluate MCAST's perspective on the advantages and disadvantages of running non-industry-driven apprenticeship programmes. Additionally, it explores the impact of the recent shift from manual data entry to a digital management information system (MIS) on the administrative processes and how this transition has affected the employers participating in these apprenticeship programmes.

MAIN EXPECTED OUTCOME/S

The anticipated outcomes of this research are, first, that MCAST will largely view industry-driven apprenticeship programmes as more efficient across various areas. Second, it is expected that participants will believe that maintaining the current non-industry-driven approach would continue to present challenges in digitalizing administrative tasks. Addressing these hurdles would require fully meeting the current needs of the College's apprenticeship programmes and the department managing them.

RESULTS

The results of this study revealed unanimous agreement among participants on the drawbacks of MCAST's current non-industry-driven apprenticeship model. None of the participants identified any positive aspects of this approach, instead highlighting several challenges they faced while navigating it. In contrast, participants believed that an industry-driven model would offer numerous benefits, with no mention of potential negative consequences.

Regarding the transition to digital administration, participants reported several difficulties with the existing system. They agreed that the current digital platform was not designed to meet the specific needs of MCAST's apprenticeship programmes or the department managing them. The participants felt that the one-size-fits-all system was inadequate and that a new, customised digital solution tailored to the College's apprenticeship programmes would better serve their needs.

IMPACT OF RESEARCH

The research presented on non-industry-driven apprenticeship programmes and the digitalisation of their administration at MCAST could have significant implications for both industry and curriculum development. The findings suggest that the current non-industry-driven approach places considerable pressure on educational institutions like MCAST to manage apprenticeship programmes independently, without substantial input from employers. This model may limit the alignment between the skills developed through these programmes and the immediate needs of the industry. For the industry, the transition to an industry-driven approach could be highly beneficial, as it would allow companies to take an active role in shaping apprenticeship programmes, ensuring that the skills of apprentices align with evolving market demands. An industry-driven approach could lead to more effective workforce development, helping to close the skills gap in various sectors. Employers would have greater confidence in the competencies of graduates, knowing that they had been involved in the design and evaluation of the programmes.

From a curriculum perspective, the study indicates that transitioning to an industry-driven model would necessitate a more collaborative approach to curriculum design. Educational institutions would need to work closely with industry stakeholders to develop programmes that balance theoretical knowledge with practical skills. This would likely result in curricula that are more responsive to technological advancements and industry needs, improving graduates' employability and readiness for the workforce. Additionally, the findings highlight the challenges faced in the digitalisation of administrative processes. While digital systems are intended to streamline operations, the study reveals that the current system used at MCAST is not adequately tailored to the specific needs of their apprenticeship programmes, leading to inefficiencies. For both industry and educational institutions, the development of a more customised digital management system could improve the administration of apprenticeship programmes, enhancing communication between employers and educational providers and reducing the administrative burden.

In conclusion, the research suggests that adopting an industry-driven approach and improving digitalisation efforts could enhance both the effectiveness of apprenticeship programmes and the curriculum's relevance, ultimately benefiting students, educational institutions, and industry partners alike.

KEYWORDS

Dual Education, Work-Based Learning, Apprenticeship, Industry Driven, Digital Transition

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