



VRIJE
UNIVERSITEIT
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POSTERS

VUB PhD Day

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ABSTRACTS

Nurudeen Odeyemi

**Teacher Professional Development in Sustainable Entrepreneurship Education (SEE):
towards a conceptual framework**

Teachers lack the necessary competencies that will enable them to effectively deliver education for sustainable development (ESD) to learners. Proposed action by UNESCO integrates ESD into pre-service and in-service teacher education programs. Likewise, the United Nations Economic Commission for Europe (UNECE), centered efforts on developing educator competencies in ESD. Nonetheless, a systematic way of providing ESD-related professional development to all in-service teachers has not emerged (UNDESD). As a result, teacher professional development (TPD) in education for sustainable development (ESD) is deemed not to have advanced sufficiently (UNESCO, 2017; Leicht & Byun, 2018). To improve teacher competencies for ESD, this research through, a bibliometric method, combines contents from selected European educational projects and articles. The study presents a conceptual framework that synergizes training in entrepreneurship education (EE) and education for sustainable development (ESD). Presumably, integration of EE and ESD competencies, that is, sustainable entrepreneurship education (SEE), will provide a systematic way of advancing ESD delivery. To address the presumption, this paper questions: How can entrepreneurship education (EE) improve the professional development of secondary school teachers in ESD to promote sustainable entrepreneurship? This research scratches the surface for a new professional training in sustainable entrepreneurship education executed through a community of practice.

Israel Pérez Chávez

Structure-guided design of protein-based fluorescent biosensors for real-time in cell profiling of the glycolytic flux

Would it not be great to visualise the flux of different metabolites in real-time, in single cells, at subcellular resolution? I am particularly interested in glycolysis, a metabolic pathway that still lacks appropriate tools to monitor changes in its metabolites. In this project, I will develop selective and sensitive protein-based biosensors for the detection of glycolytic intermediates. They consist of a transcription factor that by nature binds a specific metabolite, and in which I will introduce a fluorescent protein. In brief, the binding of the metabolite to the transcription factor induces an allosteric effect on the binding interactions of the chromophore in the β -barrel, resulting in a ratiometric change in its excitation spectrum. By combining structure-guided design with mutant screening, I will develop biosensors which selectively and sensitively detect upper glycolytic intermediates such as glucose-6-phosphate, and lactate. Additionally, I will replace the β -barrel with a fluorogen-binding protein to create biosensors with various fluorescent colors. I will then test the functionality of all biosensors in human cells. Being unique, my sensors will revolutionize our current view on molecular metabolism and, could be used to measure the glycolytic flux in a wide range of pathologies including cancer, diabetes, and aging.

Fathima Mafaziya

A multistakeholder approach to understand mangrove forest management of the Eastern Province of Sri Lanka

Sri Lanka, with its rapid economic growth after three decades of civil war, exemplifies the problems related to coastal conservation faced by many countries in the Global South. This is especially the case in Sri Lanka's Eastern Province which has seen major infrastructure investments after the end of civil war in 2009 and 2004 tsunami. Here we present the results of three a multi-stakeholder engagement studies from August 2019 to October 2020, with a focus on coastal and mangrove management and resource use. Ethnobiological surveys were carried out in 83 households followed by an action research approach which explored changes in the coastal landscape from a community perspective. Sixteen key stakeholders from organizations directly involved in mangrove management were interviewed. Mangroves were used for fuelwood, construction, medicinal, chemical and alimentation purposes. All respondents and stakeholders emphasized the need to protect the coast for future generations. From a community perspective it was apparent that the degradation of coastal ecosystems also led to decreases in social cohesion among community members. It was recognized that there is a need to focus on re-establishing a sense of community besides focusing on the physical restoration or conservation of coastal ecosystems.

Manon Feys

Terminator taxi's? Possible implementations of autonomous self-driving vehicles

Self-driving or autonomous vehicles are not only expected to make traffic safer and more efficient, but also to alter mobility services we know today. For instance, autonomous passenger vehicles could operate as 'robo-taxis' or in car-sharing services. This way they provide highly flexible and on-demand personal transport. Alternatively, large buses that operate on fixed lines with fixed stops could be replaced by autonomous minibuses that bring you from your requested pick-up point to the nearest metro or train station. These are a few examples of how autonomous technology can provide safe, convenient and affordable transport that can reduce personal car dependency and enhance the access to public transport. The user uptake of autonomous and sustainable transport can have positive impacts on environment, public health, land use and transport equity in urban areas. Therefore, autonomous technology contributes to SDG 11 which aims to make cities and human settlements inclusive, safe, resilient and sustainable. My research focusses on the user acceptance of autonomous technology and their intention of future use. I would like to share what we learned from user-centred pilot tests with autonomous vehicles and what we took away from stakeholder consultations with representatives of the mobility sector.

Hanne Bakelants

Compassionate Communities to ensure healthy lives and promote wellbeing for all at all ages

We are all, at different and various points in our life, confronted with experiences of serious illness, death, dying and loss, regardless of our age, gender, location, or socioeconomic background. Today, these experiences appear too often as taboo topics. Events and experiences such as death, dying and loss need to be re-conceptualized as the social experiences they essentially are, which require an integrated community approach: a “Compassionate Communities” approach. In Belgium, the Vrije Universiteit Brussel (VUB) has declared itself the first Compassionate University in Europe in November 2019. The ambition of the VUB aligns with the 2030 Agenda “Leaving No One Behind” for sustainable development. More specific, Compassionate Community development closely relates to ‘Good health and wellbeing for all at all ages’, target 3.8. Despite the growing movement to develop Compassionate Communities internationally, a systematic understanding of the transition process towards a Compassionate Community is still lacking. This heavily impedes the implementation, uptake and sustainability of this innovative model as the complexity and enormity might be daunting to many communities, researchers, development workers, healthcare professionals and policymakers. Therefore, the study will present an interdisciplinary research framework to guide the evaluation of Compassionate Communities in various contexts.

Amy Phillips

Use-related and socio-demographic variations in urban green space preferences

Green infrastructure and the ecosystem services it supplies heighten urban resilience to pressures related to demographic growth and environmental change. Much research has focused on assessing monetary valuation of ecosystem services. Cultural ecosystem services have been studied to a lesser extent, though they are essential for understanding the relationship between urban green and well-being. The interactions between supply, demand, and benefits of cultural ecosystem services for urban citizens are complex and depend on multiple factors, including the density and layout of built-up area, as well as the physical characteristics and accessibility of public green spaces. Adding to this complexity are the social practices and cultural context in which people use, experience, and value nature. It is critical for sustainable urban design that the value of urban green spaces is understood. Our research focuses on deepening the understanding of the relationships between ecosystem service supply and benefits and how this relationship is mediated by social inequalities, and use, perception, and valuation of urban green spaces. Online surveys were conducted in the Brussels Capital Region to determine how people use urban green spaces, how they experience these spaces, and whether these spaces fulfil their needs for urban green.

Ellis Michiels

Setting up a PDXO platform of pancreatic cancer with spatial -omics characterization

Pancreatic ductal adenocarcinoma (PDAC) is known for its aggressive biology and lethality. Due to a low success rate of current diagnostic and therapeutic approaches in clinic, there is an urgent need for preclinical research studies to investigate the underlying biology of this malignancy. This knowledge is indispensable to facilitate the development and validation of potential new therapeutic compounds. Superior to conventional biomedical research models, the focus of this study is on the development and use of a well-established patient-derived 3D model, mimicking the tumor as it is present in a human body. The development and characterization of patient-derived organoids (PDO) and patient-derived xenografts (PDX) of PDAC. The models are extensively analysed using advanced histological methods such as BaseScope®, 3D imaging and DNA hotspot sequencing.¹⁰ established PDAC-PDO and their corresponding parental tumors are already validated using immunostainings and DNA hotspot sequencing. The latter confirms presence of tumor cells in the organoids. In addition, this study is the first to show in situ detection of important driver mutations of pancreatic cancer, like KrasG12D, both in parental tumor and PDO. Thus far, 5 PDX have been generated that will undergo similar analysis. We have successfully started a pre-clinical screening platform for PDAC based on PDO and PDX. Altogether, spatial-omics analysis of both models can substantiate (1) resemblance to parental tissue and (2) spatial genomic characteristics associated with the type of model used. Ultimately, the screening platform can be used by pharmaceutical companies to facilitate oncological drug testing.

Roos Marina Johanna van Wees

Volcano erosion and geohazard mitigation

Volcanoes are extremely dynamic landforms: their eruptions have a significant impact on the earth and its inhabitants. Volcanoes grow by the accumulation of eruptive products and intrusions and degrade by a range of erosion processes, all of these being source of potential hazards. Studying and monitoring volcanoes is not only fascinating due to their variety in types, shapes, and eruptions, but also of importance due to the risks they impose on the inhabitants living on their flanks. In this study, we aim at documenting and quantifying the morphology of natural stratovolcanoes, better understanding the erosion patterns and modelling the volcano landscape overtime. Assessing the volcano morphology and its evolution through time is of importance as landslides, mudflows and flank collapses can result from the erosional processes and environmental factors at play on the volcano flanks. On the short term, understanding the key erosion processes, patterns and the areas that are prone to erosion could establish a foundation for volcanic hazard mapping and modelling. On the long term, modelling erosion of volcanic landscape will help to constrain the age and level of activity of volcanoes around the world.

Tianhui Ma

Biogeochemical cycle of Hg in water and sediment in the Scheldt estuary and the Belgian Coastal Zone (BCZ)

Mercury (Hg) is one of the primary health concerns in natural and urbanised environments. Coastal and estuarine zones are often sites of high Hg contamination due to the input from anthropogenic sources and the biogeochemistry of these systems. The Belgian Coastal Zone (BCZ) is a long-term, recurrent metallic pollution by atmospheric deposition, direct wastewater discharge from coastal industries and input of the Scheldt Estuary which is enriched in trace metals from the industrial site of Antwerp. In order to assess Hg contaminants in the Scheldt Estuary and the BCZ, a passive sampling technique: Diffusive Gradients in Thin-films (DGT) was used. It is a powerful tool to measure the bioavailable fraction of Hg in water and sediment porewater. Hg concentrations, distributions between different phases and fluxes between water and sediment systems are studied. Sediment can be seen as a sink for Hg and a source of Hg to surface water as well. A Belgica campaign was took place in March of 2020, the Hg concentrations changing with salinity in water along the estuary, while the exchange of Hg between solid and dissolved phases can affect the labile Hg concentration both in water and sediment.

Arnau Dillen

Brain-Computer Interfaces for real-life applications

The main objective of this research is to develop a proof-of-concept application of a robotic arm, controlled with a brain-computer interface (BCI). Therefore, we will develop a BCI pipeline that is able to decode the user intent from brain signals and translate this into commands for the robotics arm. This will require integrating several software and hardware components, some of which will need to develop ourselves. One of the objectives is the development of a standardized data gathering procedure towards establishing a dataset for training machine learning models. Using this data, deep learning models will be trained and evaluated for their suitability for real-time decoding. The best models will be integrated in the full BCI pipeline of our proof-of-concept application. Finally, prototypes will be evaluated according to human efficiency and user experience when using BCI to control the robotic arm. This work should contribute towards multiple sustainable development goals, the main field being healthcare and well-being. The envisioned application should allow persons suffering from a paralyzing condition to interact more with their environment, therefore improving their autonomy. Additionally, BCI can help reduce physical strain for workers and improve interaction with industrial robots.

Oussama Atoui

Experimental and numerical investigations on flight trajectory of blast-driven ball bearing embedded in rear detonated spherical explosives using the background oriented Schlieren technique

In today's society, the threat of terrorism is ever present. The number of terrorist attacks have increased during these last years, targeting civilians in many places but especially in high density public areas like airports, concert arenas, security check-points and public transport stations. These attacks are causing damage to both persons and infrastructures. Nail bombs, containing nails, screws, bolts and steel ball bearings SBB are very destructive. The main purpose in the present work is the establishment of reliable experimental set-ups and numerical Finite Element models with the aim to investigate the flight trajectory of SBB attached to a spherical explosive and detonated either in Free Air Blast or at the entrance of an Explosive driven shock tube using the Background Oriented Schlieren visualization technique and a projectile tracking software. The experimental work demonstrated that SBBs maintain a horizontal-like inflight trajectory in free air and were barely influenced by the multiple reflections of blast waves inside the tube. It also revealed that the dispersion of impacts into the target is governed by many parameters such as charge masses, projectile diameters, projectile velocities and loading conditions. On one hand, the BOS visualization technique was able to successfully capture the main characteristics of the flying projectiles flow fields. On the other hand, Finite Elements (FE) simulations using the commercial software LS-DYNA were able to reproduce the experimental data reasonably well.



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