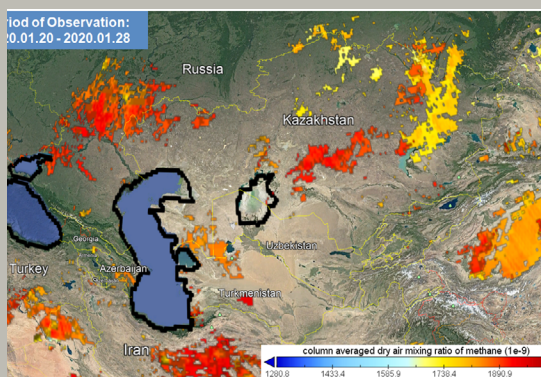
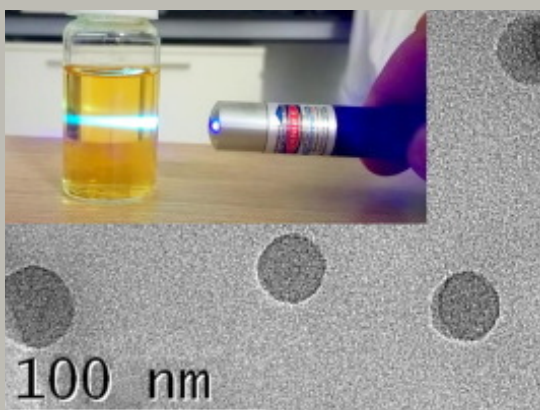




RESEARCH NEWSLETTER

OFFICE OF THE PROVOST - RESEARCH ADMINISTRATION
QUARTERLY EDITION

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School of Medicine

News

PREPAREDNESS FOR FUTURE PANDEMICS: WHERE BIOMEDICINE, PUBLIC HEALTH AND ECONOMY MEET



Dr. Luca Vangelista

Written by Dr. Luca Vangelista - Associate Professor & Director of the Master in Molecular Medicine at Nazarbayev University School of Medicine (NUSOM).

In these unique times in which humanity is under siege by a deadly respiratory virus, we are all experiencing the links between a pandemic, lifestyle and economy.

Being a molecular virologist Luca Vangelista felt obliged with the spontaneous duty to disseminate as much information as possible, especially in Kazakhstan. His involvement upon COVID-19 spans from adding several concepts related to coronavirus pathogenesis and medical intervention to various lectures for NUSOM programs such as the Doctor of Medicine (MD), Master in Public Health (MPH) and, most in depth, the Master in Molecular Medicine (MMM), to ex novo preparation of lectures focusing exclusively on coronavirus for three MMM courses. Other commitments included being a member of the NU COVID-19 Expert Committee and the Ministry of Health Advisory Board on COVID-19, give an information video message to the Italian community in Kazakhstan through the Italian Embassy's media, a video podcast for the NU community and a webinar for the 10 Year NU Anniversary.

Recently, Luca Vangelista wrote a Perspective together with Massimiliano Secchi, a collaborator in Milan (Italy), has been published in Frontiers in Molecular Biosciences (Q1 journal), (the article can be accessed [here](#)). The topic of this perspective article deals with the scientific advancements needed to devise biomedical interventions aimed to reach the most effective preparedness for future pandemics, i.e., the discovery of broadly neutralizing antibodies (bnAbs) and the development of a universal vaccine for human epidemic coronaviruses.

Bnabs have the unique capacity to neutralize most, and sometimes all, known strains of a virus and are thus extremely important molecules in this context. Currently, bnAbs are helping enormously in the fight against HIV-1, influenza and Ebola virus infections. Indeed, bnAbs can have a multiple use in therapy: they can be developed as antiviral drugs targeting the entry step in a virus lifecycle, but they can also be administered for passive immunization, often a life-saving intervention. Finally, bnAbs are extremely useful in the educated development of vaccines aimed at eliciting similar antibodies for a universal protection against most strains of a virus, including future strains yet to appear in the evolutionary scenario.

Where can these bnAbs be found? Rare individuals are capable to produce these potent antibodies and circulate them in their convalescent blood, they are survivors of lethal virus infections.

Why are these antibodies so smart and potent? Viruses have dedicated protein machineries for their targeting and entry into host cells: HIV-1 has Env (gp120-gp41 trimers), influenza virus has hemagglutinin (HA) trimers, Ebola virus has GP trimers and coronavirus has Spike trimers. These viral proteins can be very difficult to counteract because they are prone to mutations that often make immune system response ineffective. Env, HA, GP and the Spike are all covered with sugars that camouflage them as human proteins. Certain moieties are highly conserved in these proteins, regions dedicated to receptor recognition or essential for virus replication; these regions are most often very difficult to access for antibodies. The special and rare bnAbs are indeed capable to recognize these regions and, in doing so, they are capable to neutralize most strains of a virus, providing pan-protection.

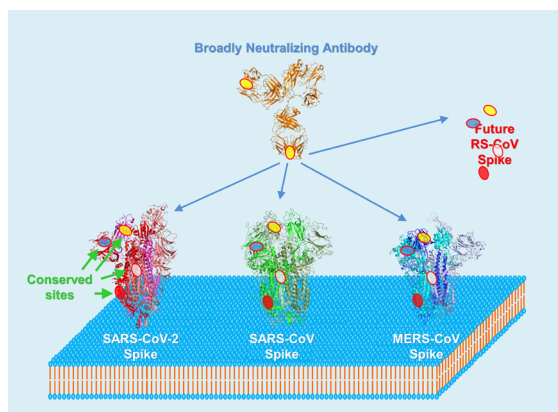


Figure legend: Trimeric Spikes of SARS-CoV-2, SARS-CoV and MERS-CoV are represented in different shades of red, green and blue, respectively. Hypothetical conserved sites (vulnerable regions) are depicted as oval spots. A broadly neutralizing antibody is illustrated to specifically target the same conserved region (yellow spot) in all human epidemic coronavirus Spikes, including future strains.

With SARS, MERS and now COVID-19, human epidemic coronaviruses became a major threat to humanity. Future hits are therefore highly likely to occur. In order to avoid health and financial crises similar to those caused by COVID-19, future preparedness in the form of ready passive (bnAbs) and active (universal vaccine) immunization strategies is imperative.

Despite daily announcements and a massive worldwide effort, no effective treatment exists for the SARS-CoV-2 infection and a vaccine might be available only in 2021. Yet, no certainty is warranted. Some antibodies are being discovered that can neutralize both SARS-CoV and SARS-CoV-2, however to date bnAbs capable to neutralize also MERS-CoV have not been reported. HIV-1, influenza and Ebola virus infections are being combated by bnAbs and the design of universal vaccines, the same road needs to be taken for coronavirus.

In this context, Luca Vangelista is also employing in silico methodology to design SARS-CoV-2 spike fragments and variants that could help in reaching the important aim - **future preparedness**.

THE IDENTIFICATION OF NOVEL DIABETES MELLITUS SUBTYPES: A STEP TOWARDS PRECISION MEDICINE

Provided by the research team that is comprised of Dr. Abduzhappar Gaipov, Dr. Byron Crape, Dr. Raushan Alibekova, Dr. Alpamys Issanov, Dr. Kainar Kadyrzhanuly, Dr. Kuralay Atageldiyeva, Dr. Anargul Kuntuganova, Tilektes Maulenkul, Binur Orazumbekova (RA) and the main PI, Dr. Antonio Sarria-Santamera MD, PhD.

Diabetes Mellitus (DM) is a chronic and lifelong metabolic disorder that may be accompanied with cardiovascular diseases, eye diseases (retinopathies, blindness), renal diseases and lower limb amputations, which in turn implicate tremendous human and health care costs. In 2019, the prevalence of DM increased to 463 million worldwide and is expected to rise to 642 million by 2040. Moreover, 1 in 12 of all-cause deaths across the globe may be attributable to DM.

Why is novel clustering of diabetic patients important?

Due to heterogeneity of treatment response of patients, DM is much more complex than the classification into Type 1 and Type 2 and needs a personalized therapeutic approach and preventive measures. Recently, the study from Sweden having applied Artificial Intelligence identified the following 5 different subtypes of diabetes:



Dr. Antonio Sarria-Santamera

(1) severe autoimmune disease; (2) severe insulin-deficient diabetes; (3) severe-insulin resistant diabetes; (4) mild obesity-related diabetes; and (5) mild age-related diabetes. This study was later replicated in Japan, Germany, USA, China, UK, Sweden, Italy, Israel, Australia and Denmark. Therefore, our study is intending to validate the results of those studies in the Kazakhstan population utilizing large-scale administrative health data, as well as identify the trajectories of disease progression and estimate economic medical costs of DM in Kazakhstan.

Implications of the project

This project will contribute to the effective use of big health care data in healthcare in order to understand the burden of DM in Kazakhstan, address the tailored treatment and novel preventive measures of complications of diabetic patients. In addition, the project will largely contribute to obtaining a model to estimate future financial expenses on DM.

This project is led by the principal investigator Dr. Antonio Sarria-Santamera MD, PhD, who is Associate Professor at NUSOM.

SOME OF THE RECENT PUBLICATIONS IN NUSOM

Dr. Eugene Tulchinsky, Professor at NUSOM, is co-author to a recent publication in *Nature Cancer* (Q1 Journal). This paper describes the identification of a novel colorectal cancer (CRC)-promoting mechanism that depends on synergistic interactions between epithelial mesenchymal transition (EMT)-prone epithelial cells, the intestinal microbiota and the host immune system. Epithelial Zeb2 initiates loss of epithelial differentiation inducing barrier instability, bacterial infiltration and mucosal inflammation. In the absence of bacteria and subsequent inflammation, partial EMT is not sufficient to induce CRC development, but only upon synergistic interactions with microbial and myeloid immune components does aggressive invasive CRC develop. This mechanism and the provided model could enable the future validation of new microbiota-based therapeutic strategies for the treatment of invasive CRC.

Reference: Karolina Slowicka, Ioanna Petta, Gillian Blancke, Esther Hoste, Emilie Dumas, Mozes Sze, Hanna Vikkula, Enrico Radaelli, Jody J. Haigh, Sven Jonckheere, Joachim Taminiau, Niels Vandamme, Andy Wullaert, Eugene Tulchinsky, David Nittner, Pieter Van Vlierberghe, Gert De Hertogh, Pamela Baldin, Emre Etlioglu, Pratyaksha Wirapati, Louis Boon, Bart N. Lambrecht, Chris Callewaert, Sabine Tejpar, Steven Goossens, Geert Berx, Lars Vereecke & Geert van Loo. Zeb2 drives invasive and microbiota-dependent colon carcinoma. Nature Cancer 1, 620–634 (2020) doi:10.1038/s43018-020-0070-2.

Dr Zhaxybay Zhumadilov, who recently joined NUSOM, as a Professor is co-author of a recent publication in *Cardiovascular Research* (Q1 journal). This paper describes that gut microbes produce various metabolites, which mediate interactions with host physiology. Short-chain fatty acids (SCFAs), such as acetate, propionate and butyrate, are metabolites produced from otherwise indigestible polysaccharides (fibers) through bacterial fermentation in the intestine. Re-analyzed data from a recent randomized, double-blind, placebo-controlled trial investigating the effect of a synbiotic intervention on gut microbiome composition and cardiovascular risk markers in human subjects with metabolic syndrome and healthy controls. It appears that on average, the synbiotic intervention compared to placebo did not significantly change SCFA production potential, hsCRP or BP. However, in patients receiving the synbiotic intervention, an increase in SCFA production capacity correlated with a reduction in SBP, DBP and hsCRP, reaching significance (Spearman test, BH FDR < 0.1) for DBP. Therefore, we think SCFA production capacity may be a useful metric to assess the health of the host-microbiome interface in CVD patients.

Reference: Hendrik Bartolomaeus, Ellen G Avery, Theda UP Bartolomaeus, Samat Kozhakhmetov, Zhaxybay Zhumadilov, Dominik N Müller, Nicola Wilck, Almagul Kushugulova, Sofia K Forslund Blood pressure changes correlate with short-chain fatty acid production potential shifts under a synbiotic intervention Cardiovascular Research 116 (7), 1252-1253 (2020).

Recently **Dr. Abduzhappar Gaipov**, Assistant Professor in NUSOM, and collaborators published in *BMC Nephrology* (Q2 journal) a study entitled “Epidemiology of dialysis patients in Kazakhstan:

data from nationwide large-scale registry 2014-2018”, using administrative big healthcare data collected from the Unified National Electronic Health System (UNEHS). The UNEHS contains several disease registries and other nationwide electronic healthcare data developed by the Republican Center of Electronic Healthcare.

This is the first study in Kazakhstan and possibly in the entire central Asia region, to examine the prevalence, incidence and mortality rate of dialysis patients. The current study analyzed large-scale administrative healthcare data of dialysis patients over a five-year period between 2014 and 2018. The results showed an increase in the prevalence and incidence of dialysis patients, who accounted for a rising proportion of deaths within the general population. Meanwhile, the mortality rate within the dialysis population displayed a marked decrease of 43%, suggesting improvement in access to care and/or better healthcare practices. The study also described a lower survival rate for females compared to males, of older patients compared to young ones and patients of Russian ethnicity compared to other ethnicities.

Reference: Gaipov, A., Issanov, A., Kadyrzhanuly, K. et al. Epidemiology of dialysis-treated end-stage renal disease patients in Kazakhstan: data from nationwide large-scale registry. BMC Nephrol 21, 407, 2014–2018 (2020). <https://doi.org/10.1186/s12882-020-02047-6>

The number of older adults with depression has increased significantly in recent years. In relation to this important healthcare challenge, our Nursing Faculty team, **Dr. Joseph Almazan, Dr. Paolo Colet and Nancy Stitt**, recently published a review article entitled “Challenges of nurses and care management of depressed older adults: a narrative literature review” in the Scandinavian Journal of Caring Sciences (Q2 journal). They conducted a narrative review to provide a better understanding of the adaptive functioning of depressed older adults and the significance of interventions in reducing depression. They also investigated the nurses’ management of depressed older adult patients. It also presents a detailed investigation of the barriers preventing nurses from successfully implementing nursing care for older adults.

Reference: Albougami, A., Almazan, J., Stitt, N., Cruz, J., Colet, P., & Adolfo, C.. Challenges of nurses and care management of depressed older adults: a narrative literature review. Scandinavian Journal of Caring Sciences (2020). doi:10.1111/scs.12908.

SHARED BY DR. DIETER RIETHMACHER



Graduate School of Business News

Diagnosing COVID-19 Impacts on Entrepreneurship in Kazakhstan

IMMEDIATE IMPACT: JANUARY–JULY 2020

To combat the COVID-19 pandemic, the government of Kazakhstan has imposed a strict lockdown in its main cities starting on 30 March 2020. As a consequence, all business activities have been suspended with the exception of central government bodies, law enforcement agencies, health care organizations, the media, grocery stores, pharmacies and life-support organizations. The lockdown has led to an abrupt contraction of sales, breaks in supply chains, and cancellations of flights, as well as constraints on the free movement of citizens, all resulting in a significant contraction of business in various industries. In a survey conducted in March 2020 by the National Chamber of Entrepreneurs (NCE), 56% of respondents indicated a risk of reduced customer numbers and reduced revenue due to the spread of COVID-19. Some 33% of respondents indicated difficulties with access to raw materials and components. Amid a slowdown in internal trade, e-commerce has picked up. For the first quarter of this year alone, the volume of online purchases amounted to 89 billion tenge (about US\$212 million). In Almaty, the largest city in Kazakhstan, online sales quadrupled, and over 50,000 customers have been able to receive essential goods without violating the self-isolation regime during quarantine. From January to April 2020, the volume of non-cash transactions in the country increased more than 2.5 times. The COVID-19 pandemic has led most companies to revise their strategic development plans. The retail sector has been extensively developing online stores for product orders. In the finance sector, financial entities have shifted their focus to the accelerated creation and development of digital products. In the aviation sector, airlines have increased the share of freight carriage, thereby partially offsetting significant losses resulting from the lockdown and ensuing restrictions on passenger carriage.

Population (2019) (WEF)	GDP growth (2019, annual % change) (IMF)	GDP per capita (2019, PPP, international \$) (IMF)	World Bank Ease of Doing Business Rating (2019)	World Bank Starting a Business Rating (2019)	WEF Global Competitiveness Rank (2019)	WEF Income Group Average (2020)
18.5 million	4.5%	27.44 thousand	79.6/100 Rank: 25/190	94.4/100 Rank: 22/190	55/141	Upper-middle

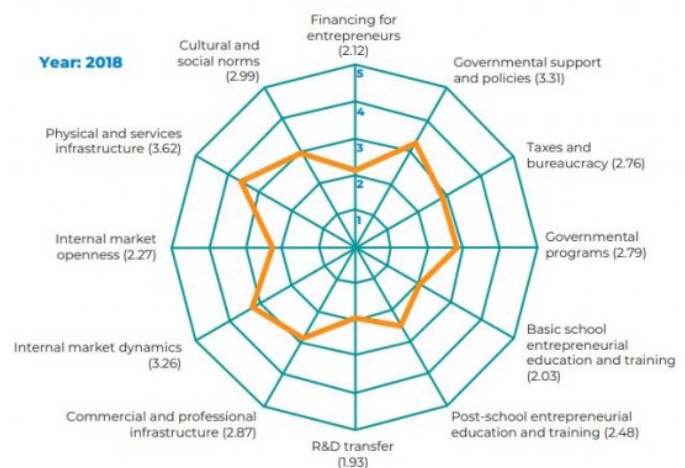
IMMEDIATE POLICY INTERVENTIONS: JANUARY–JULY 2020

The Global Financial Crisis of 2008–2009 serves as a point of reference. In response, the government of Kazakhstan approved an action plan worth US\$10 billion to regulate and supervise the financial market with the aim of stabilizing the economy. These funds were thus aimed at the stabilization of the financial sector first and foremost, but also at development of the housing sector, support for SMEs, the development of the agricultural sector, and the implementation of innovative industrial and infrastructure projects. In contrast, to address the pandemic crisis, the State Commission has taken steps to primarily support national business. In the face of falling demand and a decrease in the market value of assets and collateral, fund guarantees have been extended to loans issued under the National Bank's working capital lending program. To expand lending to the economy, measures have been taken to weaken prudential standards and reduce pressure on liquidity.

This has allowed a release of about 600 billion tenge to the banking sector, which will be directed to the country's economy. Special attention has been focused on small businesses within the framework of the Business Roadmap program. Tax incentive measures have provided all SMEs with a deferment plan for all taxes and social payments. In the most vulnerable sectors of the economy, the property tax rate has been reduced until at least the end of 2020. For agricultural producers on agricultural lands, the land tax rate has been reduced to zero until the end of 2020. The VAT rate has been reduced from 12% to 8% for the sale and import of socially significant food products up to 1 October 2020. From 1 April to 1 October 2020, zero rates on taxes and social payments from the wage fund have been set for the most affected sectors of the economy. In general, benefits offered cover 29 types of SME activity.

Pre-COVID-19 Expert Ratings: Entrepreneurial Framework Conditions

Kazakhstan's most recent National Expert Survey (NES) data comes from 2018. Its EFC scores reflect a country with unique strengths and weaknesses, particularly compared to its peer group of middle-income countries. On about half of the EFCs, Kazakhstan mirrors its middle-income peers, while exceeding them on the three government-related EFCs. Kazakhstan underperforms on financing for entrepreneurs and post-school entrepreneurial education and training. The Kazakhstan government's support for entrepreneurship is well above its middle-income peer's average of 2.3, and its taxes and bureaucracy score (2.8) is 0.5 points above the average. This may be due to the country's recent investment in diversifying its economy which is highly dependent on commodities. However, its financing for entrepreneurs condition should be evaluated, scoring only 2.1 in 2018, down from 2.8 in 2017.



EFCs scale: 0 = very inadequate insufficient status, 10 = very adequate sufficient status. Rank out of 54 recorded in brackets. See Executive Summary for full EFC description.

FUTURE ECONOMIC/POLICY OUTLOOK

The economic growth of Kazakhstan for 2020 is forecast at -0.9%. In 2019, the Ministry of National Economy predicted that economic growth for 2020 would be 4.1%. According to International Monetary Fund (IMF) forecasts, the unemployment rate in Kazakhstan will be 7.8% in 2020. The government, together with the National Bank and business associations, has already developed a Comprehensive Plan which includes tax incentives, credit expansion, measures to develop infrastructure, support for domestic production, support for entrepreneurship, and measures to preserve employment. Specific measures are directed at the manufacturing sector, mining, metallurgical and agro-industrial complexes, the construction industry, civil aviation, logistics and tourism, SMEs and the services sector, employment, education, and health care. This anti-crisis package of measures has already been approved and is being implemented. Depending on how things go, additional measures can be taken. Therefore, the IMF predicts a restoration of economic activity in Kazakhstan in 2021, with projected growth in GDP of 4.1%.

Team leader: DR SUBRAMANIAN VENKAT

Team members: DR SHUMAILA YOUSAFZAI, DR YERKEN TURGANBAYEV, DR BAKYT OSPANOVA, NURLAN KULBATYROV, CHINGIZ TOREZ, MADINA NURGUZHINA

Full report is available at <https://www.gemconsortium.org/file/open?fileId=50521>



Institute of Smart Systems
and Artificial Intelligence

ISSAI CELEBRATES ITS 1ST ANNIVERSARY PRESENTS THE KAZAKH SPEECH CORPUS TO MARK THE OCCASION



The Institute of Smart Systems and Artificial Intelligence (ISSAI) of Nazarbayev University celebrated its first anniversary on the 14th of September, 2020. ISSAI was launched one year ago, with the mission to apply AI technologies to advance the national development objectives of the country.

On the occasion of the anniversary, ISSAI announces its milestone project: the Kazakh Speech Corpus and Automated Kazakh Speech Recognition system.

The project was launched to support the use of Kazakh online and for interaction with computers, such as digital assistants, and in smart home applications.

The ISSAI team has created the world's largest digital dataset of Kazakh speech, using a web-based technology to record and annotate over 300 hours of spoken Kazakh, collected from more than 2000 native speakers. The dataset was then used to develop Automated Kazakh Speech Recognition system. These technologies are used in virtual assistants, such as Siri and Alexa, and voice- or text-enabled applications, and will be of great benefit to people with special needs.

“Previously, the lack of an authoritative database has been an obstacle to the use of Kazakh in the digital world. In order to improve this situation, ISSAI is publishing the Kazakh language dataset as an open-source project, available to all researchers and digital entrepreneurs, in order to maximize its positive impact to the Kazakh economy and society” – says ISSAI director, professor Atakan Varol.

The dataset is available at <https://issai.nu.edu.kz/kz-speech-corpus/> and the public can personally test the performance of the Automated Kazakh Speech Recognition system.

AI-based Voice Technologies Team:

Yerbolat Khassanov, Postdoctoral Scholar
Saida Mussakhoyeva, Data Scientist
Mukhamet Nurpeiissov, Data Scientist
Almas Mirzakhmetov, Computer Engineer
Alen Adiyev, Junior Researcher
Aigerim Boranbayeva, Kazakh Language Specialist
Dastan Abilev, Multimedia Designer
Yerbol Absalyamov, Technical Project Coordinator
Gibrat Kurmanov, Administrative Manager
Kuralay Baimenova, Senior PR Manager

Follow ISSAI on Social Media

For more information, please visit the [ISSAI website](https://issai.nu.edu.kz/)



Graduate School of Education News

SCHOOL EDUCATION RESEARCH GROUP (SERG) RESEARCH UPDATE

Message from Research Chair,
Professor Naureen Durrani

The School Education Research Group (SERG) focus on researching the challenges of quality, equity and inclusion in education system delivery in Kazakhstan, in the post-Soviet space and globally.

SERG members have started the new academic year on a very strong footing, winning 11 grants in total including 2 international/external grants, 5 Collaborative Research Projects (CRP) and 4 Faculty Competitive Development Research Grant Projects (FCDRGP). We have contributed to an important book on education reforms in Central Asia. SERG members continue to play their intellectual role in supporting national and global education communities through participation in public events.



In this research update, I share:

- *new grants secured;*
- *news of a large multi-country international project that we launched recently;*
- *emerging findings of an ongoing study on the challenges of motherhood and academia in the time of COVID-19;*
- *new publications;*
- *public events and knowledge exchange.*

NEW GRANTS

International/ External

Strengthening Teacher Education

NU has been contracted to work with HAMK University from Finland as a Local Expert team. GSE, Dean Aida Sagintayeva is the project Deputy Team Leader, supported by Duishon Shamatov, Alima Ibrasheva, Mir Afzal Tajik, Elaine Sharplin, Kairat Kurakbayev, Laura Karabassova, Kathy Malone, Daniel Hernandez, Duncan Priestley, Yeldos Nurlanov, Zhanyl Zhontayeva and Gulmira Qanay along with other local and international experts.

Funder: World Bank Project

Education, gender and family relationships in the time of COVID 19: teachers', students' and parents' perspectives in Kazakhstan

Team: Naureen Durrani (PI), Janet Helmer (co-Lead), Filiz Polat (Co-I) and Gulmira Qanay (Co-I)
Funder: Partnerships for Equity and Inclusion (PEI) which in turn is funded by UK Research and Innovation (UKRI)/ Engineering and Physical Sciences Research Council (EPSRC). The PEI is led by the University of Leeds and includes 21 partners including NU, 6 British universities and several partners across Africa and Asia.

Collaborative Research Programme 2021-2023

Creating culturally relevant Social Science research ethics in Central Asia: Mediating local and global influences

Team: Elaine Sharplin (PI); NU co-investigators: Lynne Parmenter (GSE), Neil Collins (SSH); external co-investigators: Aygul Zhakupova (KSU), with a team of 18 researchers from six universities across three countries of Central Asia (Kazakhstan, Kyrgyzstan and Uzbekistan). Other NU researchers include: Aziz Burkhanov (GSP), Yeldos Nurlanov, Zakir Jumakalov, Alima Ibrasheva, Adil Ashirbekov, Aigul Rakisheva. International collaborators are: Galina Gorborkova, Makhinur Mamatova, Mehriqiul Ablezova (AUCA - Bishkek), Myrza Karimov (UCA - Bishkek) Abror Juraev (Bukhara State University), Bakhrom Mirkasimov (Westminster International University of Tashkent), Ainagul Ismaniglova and Gulmira Rakisheva (KSU)

Graduate students' challenges with academic reading and writing in English medium universities in Kazakhstan

Team: Mir Afzal Tajik (PI), NU Co-Investigators: Duishon Shamatov, Syed Abdul Manan (GSE) and Uli Schamiloglu (SSH); external Co-Investigators include Maganat Shegebayev (KIMEP) and Talgat Zhussipbek (SDU).

Equitable access to education in the time of COVID 19 in Kazakhstan: Experiences, outcomes, challenges and Possibilities

Team: Naureen Durrani (PI); NU Co-investigators: Filiz Polat (GSE), Janet Helmer, Gulmira Qanay and Saltanat Akhmetova (SSH); external co-investigator includes Svetlana Shakirova, (National Kazakh Women Teacher Training University).

Policy enactment of mainstreaming gender equality in higher education and civil service in Kazakhstan

Team: Zumrad Kataeva (PI); NU Co-investigators include Naureen Durrani and Saltanat Janenova (GSP); external co-investigators include Svetlana Shakirova (National Kazakh Women Teacher Training University) and Nazym Shedenova (Al-Farabi Kazakh National University).

Building capacity for teaching and research in STEM teacher education in Kazakhstan: A research-practice partnership

Team: Bridget Goodman (PI), Kathy Malone (co-I) and Laura Karabassova (post-doc).

Faculty Development Competitive Research Grant Programme 2021-2023

Development of a Kazakhstani Teaching Observation Protocol for reformed teaching practices (KTOP)

Team: Janet Helmer (PI) and co-investigators are Kathy Malone, Filiz Polat, Bridget Goodman, Matthew Courtney, Enrico Marsili (SEDS) and Kulzhan Besembayeva (Eurasian National University).

Women university graduates' in science, technology, engineering, and mathematics (STEM) transition from university to first jobs in Kazakhstan

Team: Ainur Almukhambetova (PI) and Aliya Kuzhabekova (co-investigator).

The nature, purposes and functions of educational research: A study of policymakers', educators' and researchers' conceptualization in Kazakhstan

Team: Laura Karabassova (PI) and Zakir Jumakalov (co-investigator).

Tensions between policy aspirations and enactment: Institutional and ecological concerns about English medium instruction in Kazakhstani schools

Team: Syed Abdul Manan (PI), Co-Investigators: Mir Afzal Tajik and Anas Hajar.

RESEARCH SPOTLIGHT

THE POLITICAL ECONOMY OF EDUCATION RESEARCH (PEER) NETWORK

We are pleased with the launch of our international multi-country project, *The Political Economy of Education Research Network (PEER Network)*, funded by the Arts and Humanities Research Council, UK through Global Challenges Research Fund Network Plus Grant and led by the Universities of Ulster, Nazarbayev, Cape Town and Sussex.

PEER NETWORK Research Team



Dr Kelsey Shanks
Joint-PI, Ulster University



Prof Naureen Durrani, NUGSE
Leader, Central Asian Hub



Azeem Badroodien, Leader,
African Hub, University of
Cape Town



Professor Mario Novelli,
Joint-PI, University of Sussex



Dr Hélène Thibault, SSH, NU,
Co-PI, Central Asian Hub



Dr Yunus Omar, co-PI, African
Hub, University of Cape Town

Education is usually considered ‘a good thing’, but we know that in certain circumstances education may actually be ‘part of the problem’ as well as ‘part of the solution’. We therefore need to better understand the underlying political, economic and social reasons why some forms of education may make conflict worse. This is known as Political Economy Analysis (PEA) and is highly relevant to the provision of education. The PEER Network is a three-year initiative led by four universities (Ulster, Cape Town, Nazarbayev and Sussex) aimed at improving the quality of PEA in partnership with academics, policymakers and practitioners in two world regions: Central Asia and sub-Saharan Africa. The PEER Network aims to develop a critical and locally grounded approach to Political Economy Analysis (PEA) of Education that will help national, regional and global level policymakers and practitioners make socially just decisions about investments in education that benefit children in contexts of conflict and crisis.

By the end of the project, we aim to have made an impact by:

- Establishing two regional hubs of PEA expertise across countries in Central Asia and Sub-Saharan Africa
- Bringing together policymakers, practitioners and academics to develop PEA tools, knowledge and expertise
- Commissioning at least 20 research studies worth £800,000 to create locally owned knowledge bases
- Making all the tools and resources freely available online to students, researchers and practitioners
- Supporting a new generation to undertake political economy analysis of education systems in their own contexts
- Influencing change in global practice in PEA for the benefit of children and young people in conflict-affected countries

Lecture Series
Thursday's at 1pm – 2.15pm, October 8th -December 10th, 2020
Online on ZOOM

The University of Sussex, Nazarbayev University, University of Ulster and University of Cape Town in conjunction with *United Kingdom Forum on International Education and Training (UKFIET)*, are organising a global, online lecture series exploring the theme of '*the Political Economy of Education in Times of Conflict, Crises and Pandemics*'.

This series will be led and hosted by the *Centre for International Education (CIE) University of Sussex* between October and December 2020 and will be openly accessible, free and online and aimed at scholars and students of international development and education, and all those who seek to better understand the complex situations facing education systems around the world in a period of increasing instability, where education systems are challenged by war, environmental crisis, financial austerity and pandemics that threaten the futures of a generation of young people. The lecture series will be recorded and uploaded onto a designated webpage and contribute to an open source bank of materials and resources on the Political Economy of Education that will be produced by the PEER Network team during the lifespan of the project.

The Political Economy of Education in Times of Conflict, Crises and Pandemics

Whilst the current COVID19 pandemic has brought home to many citizens in the Global North the fragility of their existence, their education systems lack of resilience, and exacerbated and revealed widespread learning inequalities; in the Global South this is but one more crisis in a long list that have punctuated daily lives and educational journeys. This lecture series seeks to challenge its speakers and participants to go beyond narrow understandings of education and its relationship to economy and society and to critically explore the complex ways that education systems are linked to war, peace, ecological crises, financial crises and pandemics – not merely as victims but also as drivers and catalysts. In doing so we seek to highlight that education systems and actors have agency, capable of producing conflict ridden and crises prone systems as well as succumbing to these factors, and that policy and practice matters in the pursuit of more socially just and equitable educational systems that can contribute to a fairer and better world. We also seek to highlight how education systems are affected by particular crises and what policy options they might have to redress this. In that sense the series also seeks to recognise that education policy and practice is about power and its projection into the education system by competing social forces. For that reason we seek to draw upon a wide range of contexts and examples to highlight these contestations and their effects on issues of education and social justice/injustice in times of conflict and crises.

Calendar of Events

1. **Thursday 8th October, 1-2.15pm (BST).** Introduction to Lecture Series and Overview (Mario Novelli, CIE, University of Sussex, UK)
2. **Thursday 15th October, 1-2.15pm (BST).** The Politics of COVID 19 and Education (Prachi Srivastava, Western University , Canada)
3. **Thursday 22nd October, 1-2.15pm (BST).** The Political Economy of Education Privatization in Times of Crises (Antoni Verger & Clara Fontdevila, Universitat Autònoma de Barcelona, Spain)
4. **Thursday 29th October, 1-2.15pm (GMT).** Evidence & Education Policy Making in the Global South during Covid19: Pundits, Social Movements and Policy Makers in an age of unpredictability (Yusuf Sayed, University of Sussex, UK)
5. **Thursday 5th November, 1-2.15pm (GMT).** The Construction and Survival of an Intellectual Community during Structural Adjustment in Africa (Nimi Hoffman, University of Sussex, UK)

6. **Thursday 12th November, 1-2.15pm (GMT).** Towards a Political Economy of Education and Conflict in South Africa' (Azeem Badroodien and Yunus Omar, University of Cape Town, South Africa)
7. **Thursday 19th November, 1-2.15pm (GMT).** Academics For Peace & The Political Economy of Repression in Turkey's Higher Education Sector (Birgul Kutan, University of Sussex, UK & Mehmet Ugur, University of Greenwich, UK).
8. **Thursday 26th November, 1-2.15pm (GMT).** The Politics and Policy of Education in Iraq (Kelsey Shanks, University of Ulster, UK).
9. **Thursday 3rd December, 1-2.15pm (GMT).** Gender, Education, Conflict & Crises (Naureen Durrani & Hélène Thibault Nazarbayev University, Kazakhstan)
10. **Thursday 10th December, 1-2.15pm (GMT).** Rethinking Peace Education: A Cultural Political Economy Approach (Sean Higgins, University of Sussex, UK)

Please register for each lecture on the following [link](#), and you will be sent a ZOOM link prior to each event

RESEARCH STORY FROM THE FIELD

Beyond work/life balance during quarantine

Using an innovative arts-based approach to address issues of equity and inclusion in higher education



Dr Anna CohenMiller

In this ongoing international study, Dr. Anna CohenMiller with GSE PhD student, Zhanna Izenkova, are using an innovative approach, an adaptation of an arts-based participatory action method, called photovoice, to understand the “reality” of mothers in higher education during quarantine. In the method, participants take on the role of participant and researcher, documenting their lives through photos and providing description their data.



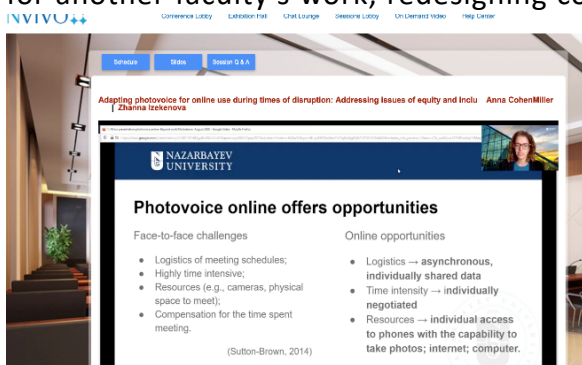
Zhanna Izenkova

Adapting such an approach for online purposes is unique and important for researching with marginalized populations. Recently, the methodological innovation was highlighted at the world NVivo Virtual Conference:

When COVID-19 hit, globally the ways in which education works changed. Children moved to learning online and those in higher education were faced with making rapid shifts in their teaching and work-lives. For mothers in higher education, they were often confronted with not online working full-time at home for their job but also taking on a full-time job in guiding/schooling their children.

With mothers typically taking on the roles of childrearing and the household, the addition of teaching children full time, or guiding them in online learning adds an additional full-time job to an overly full plate. For some mothers, the expectations during quarantine also extends to taking care of extended family and an expanded job description (e.g., covering for another faculty's work, redesigning courses for online learning, leading online learning trainings).

To date, participants include approximately 70 women from Asia, Europe, Oceania, and the United States. Most frequently they have 2-3 children each and are often the primary breadwinner, caretaker, either in a home with other family members or living alone with their children.



Many of the mothers also explained that their children have special needs. The following two photos and descriptions provide an insight to the ways mothers in higher education are finding solutions for the short-term to address current needs for their research and teaching, and for their children's learning online. The descriptions detail the academic rank of each person, explain why they took the photo and what it represents about their reality working in higher education and at home guiding children in online learning.



Associate Professor, S., has two children, breastfeeding the toddler. She explains the following about her work life: **"I am the primary breadwinner and we have no family where we live.** My husband is an immigrant and I am the child of immigrants so our network in the US are friends mostly. We don't live near them bc of academia. We are very alone."

Describing the availability of office space at home, she writes: "This is my office at 7 am on Saturday. But it is not really an office. It is the corner of the playroom and a surplus guest

room."

What becomes clear is the mismatch between her being able to do her work and her daughter being able to do her work: "It is the only desk in the house with the main computer so I share it with my 7 year old. **When she is working online I cannot work. When I am teaching or having meetings she cannot do school...**This is the most empty silent contemplative time of the week for this room. Otherwise it is chaos."

S. explains of her photo how it represents a major issue in the academic life, even though she tries to focus on the positive side:

It represents how my research and career have been derailed by the trappings of children and domesticity. I love my family. But if I were a man and the primary breadwinner things would be different. I am so privileged in other ways. I make a great salary and have a great job. So I try not to complain. **I lack space metaphorical and literally to do what I need to do at work.**



Whereas, for Assistant clinical professor, A., who has four children, with one breastfeeding and not sleeping well since the pandemic, she converted "a small closet into an office space in order to work from home. It demonstrates the **adaptability and resiliency** during stressful situation and also the **inadequacy and inability to sustain this solution long term.**"

She explains that while there is much adaptability and resiliency at this time, that such solutions are not sustainable: **"We need to account for (the) fact that even with spousal support, working from home with children at home is inadequate and not able to sustain.** As breadwinner I am thankful that I can work from home without break in pay, but administration at my institution does not account for extra work of moving to online learning and the strain it has on mother's with kids (esp small children)."

She explains the major demands of blurring of work and home with online learning: **“Online learning has also blurred the boundaries of career and family.** Students and colleagues call/text at all times and all days. Children have pulled me away from work activities for me to fix food or solve issue or get help on their homework. I crave the separation back and be to manage that balance I once had.”

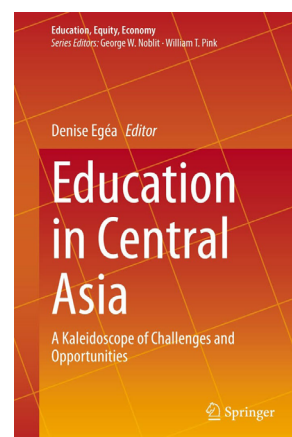
The participant concludes with what steps could be taken in higher education to address such issues: **“To improve life, we need more support (whether staff help or more money) than we are currently provided.** I also had to take over another faculty members duties while she is on leave. So currently I have double the work and none of normal support. **Writing and research has been moved to back burner since pandemic due to these factors.”**

Broadly, preliminary results of this study demonstrate that mothers in higher education are facing unsustainable pressures and expectations of working full time at home while also guiding children through online learning. While they are findings ways to “manage” through this unprecedented time, institutions of higher education are on the brink of systematically disadvantaging mothers. The emerging findings indicate the need for institutional-wide systematic changes to ensure access and success for everyone, including mothers.

PUBLICATIONS

Peer-reviewed Book Chapters

- Cerone, A., Fazli, S., Malone K.L. & Pietarinen A. V. (2020). Interdisciplinary Aspects of Cognition. In: Camara J., Steffen M. (eds) Software Engineering and Formal Methods. SEFM 2019. Lecture Notes in Computer Science, vol 12226. Springer, Cham. https://doi.org/10.1007/978-3-030-57506-9_9
- Halai, N. & Durrani, N. (2020). School Education System in Pakistan: Expansion, Access and Equity. In: P. Sarangapani & R. Pappu (Eds.) Handbook of Education Systems in South Asia. Global Education Systems. Springer, Singapore. https://doi.org/10.1007/978-981-13-3309-5_17-1
- Karabassova L. (2020) .Understanding Trilingual Education Reform in Kazakhstan: Why Is It Stalled?. In: Egéa D. (eds) Education in Central Asia. Education, Equity, Economy, vol 8. Springer, Cham. https://doi.org/10.1007/978-3-030-50127-3_3



Peer-reviewed Journal Papers

- Shamatov D. & Bahry S. (2020). Variation in Educational Quality in Kyrgyzstan by District and Language of Instruction: An Analysis of 2017 National Scholarship Test Results. In: Egéa D. (eds) Education in Central Asia. Education, Equity, Economy, vol 8. Springer, Cham. https://doi.org/10.1007/978-3-030-50127-3_2
- Almukhambetova A. & Hernández-Torrano, D. (2020) On Being Gifted at University: Academic, Social, Emotional, and Institutional Adjustment in Kazakhstan. Journal of Advanced Academics. [doi:10.1177/1932202X20951825](https://doi.org/10.1177/1932202X20951825)
- Tajik, M.A. & Wali, A. (2020). Principal's strategies for increasing students' participation in school management: A case of a community-based school in a rural, mountainous region in Pakistan. International Journal of Improving Schools. Sage. doi.org/10.1177/1365480220923413
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- Zhexenova, Z., Amirova, A., Abdikarimova, M., Kudaibergenov, K., Baimakhan, N., Tleubayev, B., Asselborn, T., Johal, W., Dillenbourg, P., CohenMiller, A., & Sandygulova, A. (2020). A comparison of social robot to tablet and teacher in a new script learning context. Frontiers in Robotics and AI, Section Robot Assisted Education, Human-Robot Interaction. <https://www.frontiersin.org/articles/10.3389/frobt.2020.00099/abstract>

KNOWLEDGE EXCHANGE & PUBLIC ENGAGEMENT

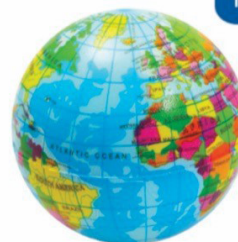


CRN Presents

Thursday
5:30 to 7:00PM
September 17, 2020

Pakistan Time

CRN is pleased to organize a Panel Discussion on
**"Reshaping the future of education:
Lessons learnt from Covid-19"**



Dr. Farid Panjwani

(Prof. & Dean, AKU-IED, P; Former Director, Centre for the Study of Education in Muslim Contexts, UCL, UK)
Topic: Why it is important to ask big questions now?



Dr. Naureen Durrani

(Prof. & Research Chair, Nazarbayev University; Former faculty, Sussex University, UK)
Topic: Educational inequalities & implications for policy and practice



Dr. Sarfarozi Niyozov

(Prof. University of Toronto, Former Dean AKU-IED, P)
Topic: Covid-19: Reshaping Teachers' Role & Pedagogies



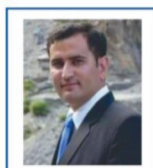
Dr. Nishat Riaz

(Director Education, British Council, Pakistan)
Topic: Covid-19: Reshaping the role of global education development agencies



Dr. Mir Afzal Tajik

(Faculty, Nazarbayev University)
Moderator



Issa Khan
(CRN Coordinator)

Via Zoom

SERG member, Dr Mir Afzal Tajik moderated a public webinar organized by COVID-19 Regional Network (CRN), Pakistan. Panelists included Prof Naureen Durrani (SERG, NUGSE), Dr Farid Panjwani (AKU-IED, Pakistan), Dr Sarfarozi Niyozov (University of Toronto) and Dr Nishat Riaz (British Council Pakistan). Audience across the globe participated in this interactive session to discuss the challenges of equitable education in the time of COVID 19 and how to reimagine the philosophy, purposes and delivery of education systems for the promotion of socially just society. Recording of the event is available via this [link](#).



Resource Person:



Anna CohenMiller, PhD
Assistant Professor, Graduate School of Education
Nazarbayev University
Kazakhstan

Title: Body-Mapping: Encouraging Equity and Inclusion in Higher Education

Date: October 8, 2020

Time: 5:00-6:00 p.m. (Philippine time)

Dr. Anna CohenMiller presented an invited webinar about the use of innovative research methods to address issues of equity and inclusion in higher education. In the webinar, she shared about the use of body-mapping and presented data from the course she taught on Innovative Research Methods at GSE and the article under review with alumni, Aigul Rakisheva and Nurlygul Smat. Over 500 people registered for the event from across multiple countries (e.g., Philippines, Kazakhstan, UK). The question and answer period included Dr. CohenMiller addressing highly topical directions for arts-based research participants' brought up including rigor and adaptations for virtual application such as during COVID-19

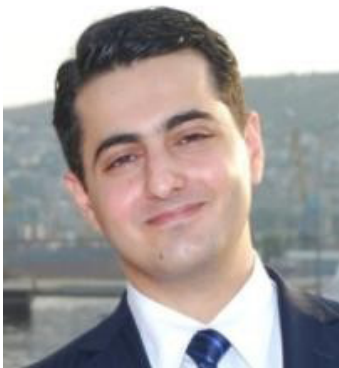
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School of Mining and Geosciences

NU SCHOOL OF MINING AND GEOSCIENCES APPLIES REMOTE SENSING EARTH OBSERVATION TECHNOLOGIES FOR RISK MANAGEMENT IN THE PETROLEUM INDUSTRY



Dr. Emil Bayramov
Assistant Professor in Geospatial and Remote Sensing Technologies for Petroleum and Gas & Mining

The School of Mining and Geosciences establishes new scientific research directions using Geospatial and Earth Observation Technologies in collaboration with Technical University of Berlin, Dresden University of Technology, American University Washington DC and Italian Space Agency (ASI). We have identified opportunities in optimization, risk management, and cost reduction in petroleum and mining industries in the Caspian region. International collaborations in the application of space observation technologies have



Prof. Dr. Randy Hazlet
Acting Dean/Professor in Petroleum Engineering

enabled a multidisciplinary approach for geographic information management and spatial analytics and spawned a series of Q1 publications. For example, we have published on the monitoring of oil spills and natural seepage slicks in the Caspian Sea for risk management, environmental monitoring and emergency response (see Figure 1). We also have worked on detection and mapping of methane emission hotspots associated with hydrocarbon assets (see Figure 2). Additionally, we are using remote satellite measurements of ground deformation at oil and gas fields (see Figure 3) and along pipelines (see Figure 4). Furthermore, NU has integrated remote sensing and geospatial applications into our academic teaching that focus on critical needs and challenges in Kazakhstan.

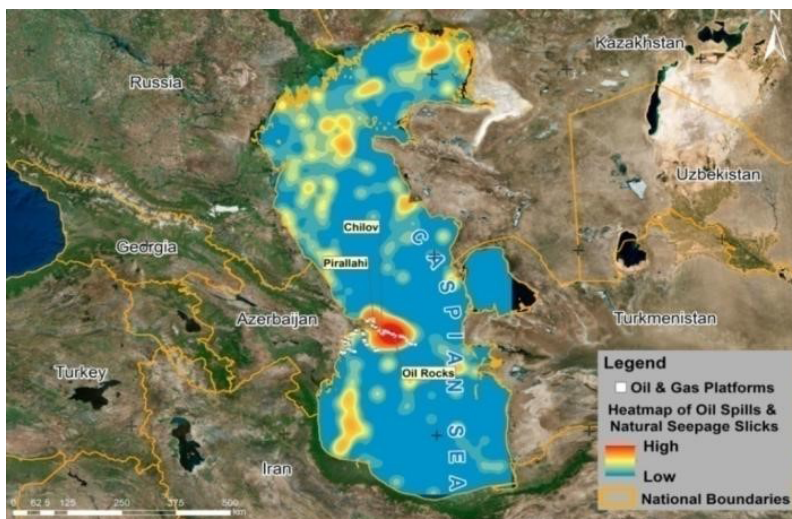


Fig. 1. Mapping of oil pollution and natural seepage slicks in the Caspian Sea for environmental awareness and crisis management [1].

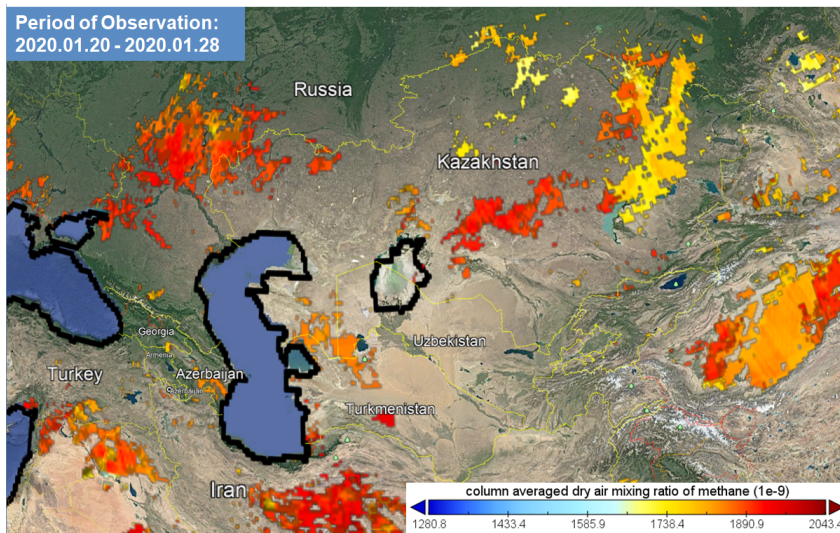


Fig. 2 Remote methane detection for risk management and environmental awareness for the petroleum industry.

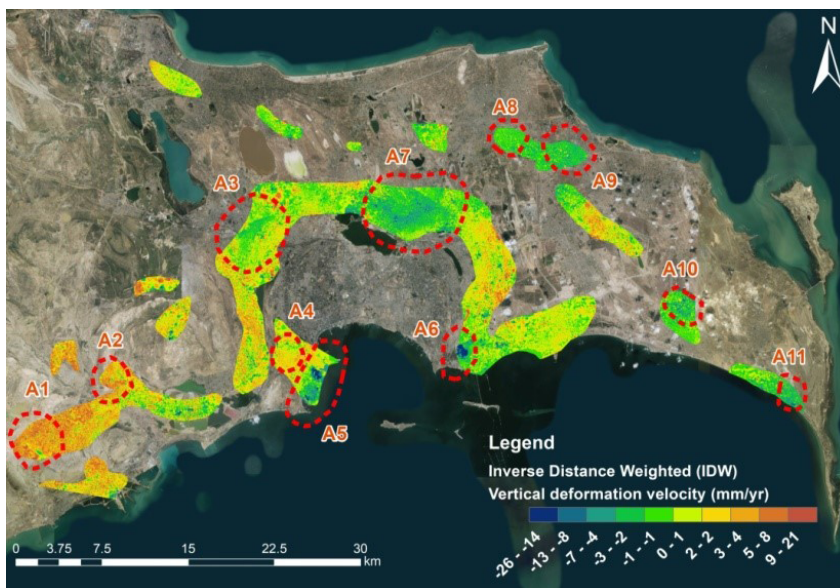


Fig. 3 Satellite measurement of ground deformation risks for the management of oil and gas fields in the Absheron Peninsula of Azerbaijan [2].

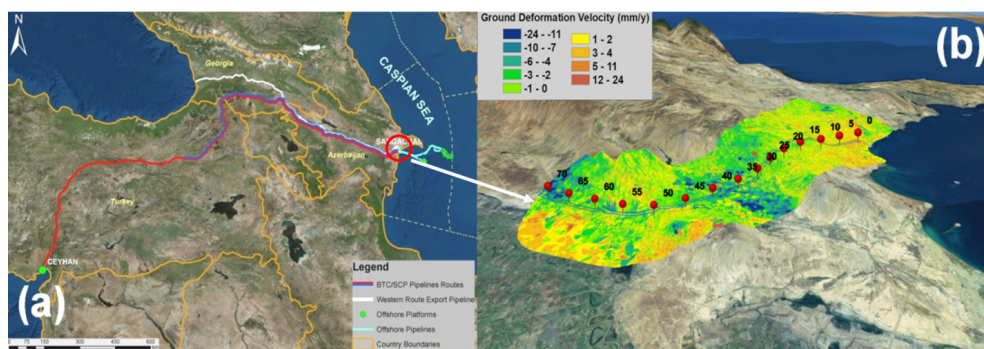


Fig. 4 Petroleum pipeline risk management [3]. (a) Map of the 1768km long Baku-Tbilisi-Ceyhan pipeline system; (b) Satellite measurement of ground deformation velocity measured in millimeters per year along this seismically active area.

- [1] Bayramov, E., Kada, M. & Buchroithner, M. (2018) Monitoring oil spill hotspots, contamination probability modelling and assessment of coastal impacts in the Caspian Sea using SENTINEL-1, LANDSAT-8, RADARSAT, ENVISAT and ERS satellite sensors, *Journal of Operational Oceanography*, 11:1, 27-43 (DOI: 10.1080/1755876X.2018.1438343) (Best Publication Award by Denny Medal from IMarEST: Institute of Marine Engineering, Science & Technology)
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VIRTUAL/AUGMENTED REALITY TECHNOLOGY IN MINING APPLICATIONS – SCHOOL OF MINING AND GEOSCIENCES STRATEGIC POSITIONING



Dr Fidelis T Suorineni, Professor of Mining Engineering

Background

In 2001, Laurentian University officially opened a state-of-the-art Virtual Reality Laboratory (VRL) as part of its newly created Centre for Integrated Monitoring Technology (CIMTEC). The objective for the acquisition of this technology was to enable CIMTEC meet the needs of the mineral exploration and mining industries, and to offer a team mode interpretation environment for earth modelling applications. The VR facility enabled the Mining Innovation, Rehabilitation and Applied Research Corporation (MIRARCO) to undertake research and development programs that bring the five dimensions of the mining space into one environment: (x, y, z), time (t) and money (\$) together to create a 5D Mining. Indeed, the VR technology is capable of definition dimensions beyond 5D as explained in Kaiser, Vasak, Suorineni and Thibodeau (2005).

The author, Professor FT Suorineni was engaged in the use of virtual reality technology for mining applications at MIRARCO in Laurentian following the establishment of CIMTEC and the VR laboratory. MIRARCO was the first to adopt the virtual reality technology for mining applications, following its success stories in the military, oil and gas and the automation industries. The VR technology has since been adopted by various academic institutions including the University of New South Wales (UNSW Sydney) and Mining Companies including Rio Tinto and Vale.

School of Mining and Geosciences VR Headsets



Figure 1. School of Mining and Geosciences 20 Oculus Headsets

The School of Mining and Geosciences procured and took delivery of 20 Oculus Go headsets (Figure 1) in May 2020. The headsets are intended to be used for teaching, research, and recruitment purposes.

The US National Academy of Engineers listed Virtual and Augmented Technology as one of the Grand Challenges of the 21st Century. The benefits of virtual and Augmented Reality Technology are listed in Kaiser, Vasak, Suorineni and Thibodeau (2005) and includes:

1. Facilitating the use of visual perception, a capability that only humans master
2. Enhancing ability to integrate complex and or large volumes of data from different sources
3. Providing increased understanding of complex datasets and simplifying critical decision making
4. Encouraging interdisciplinary team collaboration and brainstorming
5. Reducing time in data understanding and interpretation
6. Connecting geographically remote experts through linked VR centres for problem solving at much reduced cost and with great time savings, and
7. Providing a great strategic planning, negotiating and public relations tool based on the principle of “seeing is believing.”

Suorineni (2015, 2019) argue that the power of the VR technology is in its use for the solution of complex problems rather than in gaming as perceived by many. Mining problems are complex and requires interdisciplinary collaboration, thereby making the VR technology ideal for mining purposes.

VR for Recruitment Purposes

In the past, mining was a physical manpower job meant for only men. It was also perceived as anti-technology and dirty. It is well known in the mining industry that mining companies never want to be first users of new technologies but second. Today, there is a paradigm shift in the mining industry. Mining is now data and technology driven. This paradigm shift requires that mining schools and institutions re-organize their program structures and contents to reflect the current and future needs of the mining industries to be relevant and sustainable. Suorineni (2019) notes that an additional benefit of the paradigm shift is to attract the Generation Z to the mining industry in order to reverse the current low enrolments in schools that is resulting the closure of most mining schools. Generation Z is technology savvy and with their familiarity with gaming with virtual reality tools can be attracted to the mining profession. Hence the VR technology is a potentially attractive recruiting too into mining engineering programs.

VR for Teaching

The effectiveness of the use of virtual reality technology for teaching compared to the traditional methods such as the use instructor led PowerPoint has been investigated by several researchers including Bennett, Stothard and Kehoe and Schofield, Lester and Wilson (2005). Most of the studies on the use VR technology for teaching conclude that this approach drastically improves students' ability to understand and retain knowledge far better than any of the traditional pedagogical teaching methods. It is concluded that Virtual environments (Figure 2) improve learning performance by exploiting the powerful human capabilities for spatial cognition. Ata and Tibbett (2018) note that VR provides the opportunity to enhance the learning experience by representing complex systems in a 3D visualisation and freeing up cognitive capacity for learning.



Figure 2. Demonstrative use of SMG Oculus Headsets for teaching, research, and recruitment

In the COVID-19 era, laboratory experiments usually performed face to face physically are compromised and engineering courses often supported by such experiments have been sacrificed and academics are struggling for alternatives. Preferred replacements for physical face to face laboratory experiments are Virtual reality interactive laboratory experiments as discussed in Schofield, Lester, and Wilson (2004). [Eon Reality](#) is championing this cause, among others.

VR for Research

As stated earlier, the power of Virtual and Augmented Reality is in their ability to solve complex problems and to promote systems thinking as opposed to factor-based thinking that is counter effective in systems performance optimization. In this context, the author and colleagues at MIRARCO in Laurentian University took advantage of the VR technology to think deep into the phenomenon of rockburst and seismicity resulting in the development new understanding of this complex phenomenon (Figure 3) that often affect the safety and productivity rockburst-prone mines.

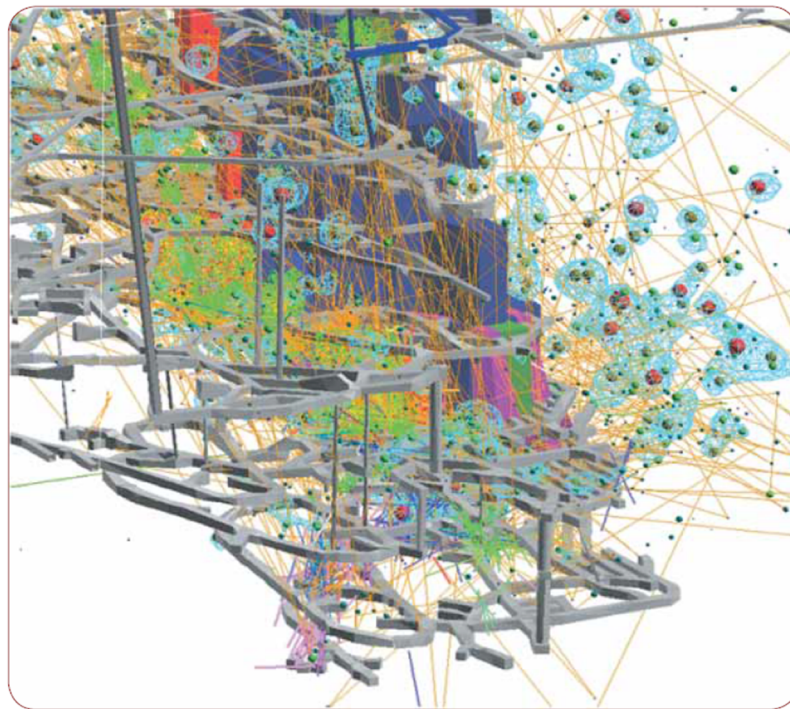


Figure 3. Output of VR application for rockbursts and seismicity research: Figure shows mine geometry, rockbursts as spheres and timelinks sequence in which the rockbursts occurred (from Vasak and Suorineni 2011)

Block caving mining is the most complicated but cheapest underground mining system, given the right type of orebody. One of the key issues hindering the technical understanding of caving geomechanics is the fact that one cannot enter the cave. VR technology was therefore used to gain indirect access to the cave to explore and better understand what happens inside the cave in service during active production and its propagation (Figure 4). The output from this study was presented at the 13th Congress of the International Society for Rock Mechanics in Montreal, Canada.

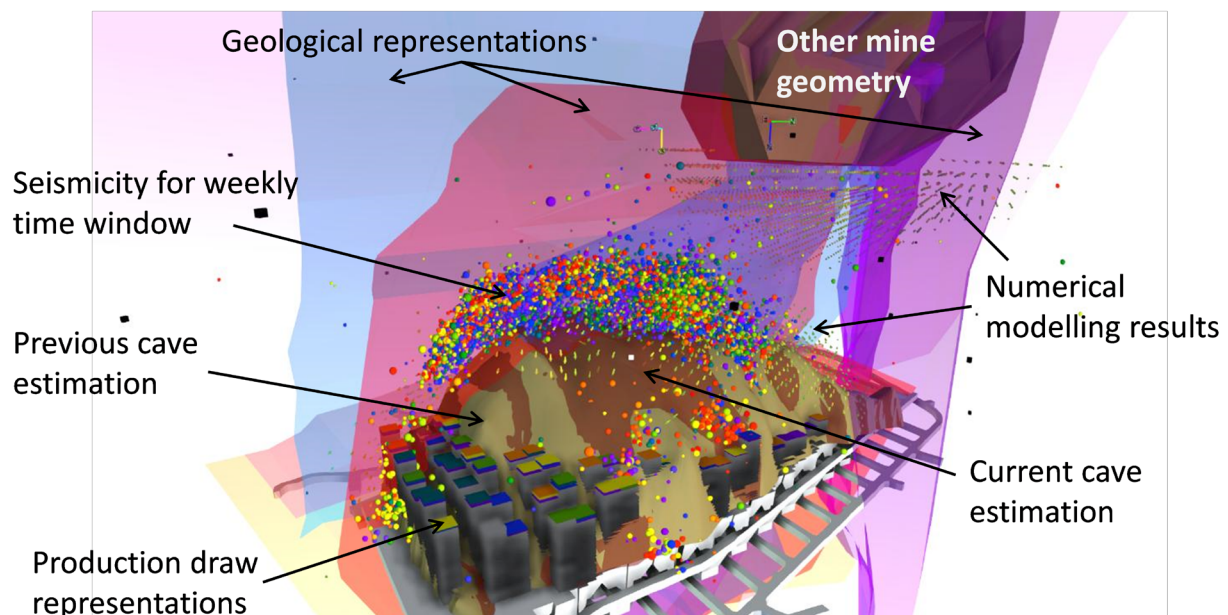


Figure 4. VR Block Cave Mining Visualization system showing seismicity, cave geometry, production draw, geology, induced stresses, and major structures (Tibbitt, Suorineni and Hebblewhite 2015).

School Mining and Geosciences VR Collaborations

In the context of Industry 4.0, the mining industry is aiming at “Zero Harm” and exploiting the benefits of BIG Data. Mining is now data and technology driven. As Suorineni (2015) cautioned, the benefits of Big Data in mining cannot be achieved without linking Big Data to the mine geometry. VR technology serves as that critical link.

The recent acquisition of the 20 Oculus headset is the start for the development of a mining technology research centre for the training future mining engineers and to meet the needs of current and future mining companies that include zero harm, green mining and optimized profits in a volatile commodity market. To achieve this goal, SMG is collaborating with UNSW Sydney, Vantage Interactive/SeePilot and other universities in the future including Akita University and Kobe University, both in Japan. Internally, within NU, we hope to collaborate with the Institute of Smart Systems and Artificial Intelligence (ISSAI) and Department of Computer Science. It is also critical to court the support of the mining industry and preliminary discussions are underway in this direction.

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WORLD TUNNELLING CONGRESS (WTC2020) HELD ONLINE



Prof. Saffet Yagiz

WTC2020 that was performed in Malaysia is one of the leading events for tunnel engineers and scientists who share experience and update knowledge around the world. The congress held as virtual on 11-17 September 2020.

Dr. Yagiz, one of the international scientific committee members of the event, and his student published a proceedings paper in the virtual event. The paper *"Prediction of drilling rate utilizing common rock properties and driller specifications: percussion drilling, 973-977, WTC2020"* is published from MSc Thesis of Yazitova.



Aitolkyn Yazitova, MSc.

The research is about to examine rock properties and driller specifications to estimate drilling rate (DR) for percussion drillers. In order to predict the DR, data belongs to percussion drilling were collected from the literature and re-constructed to compute rock brittleness (BI) as a function of uniaxial compressive strength (UCS), Brazilian tensile strength (BTS) and density (D) of rocks. Further, simple and multiple both linear and non-linear regression analyses were performed to estimate the rate of drilling via input variables including UCS, BTS and BI; and also driller specifications such as operational pressure (OpP) and bit diameter (BitD). Concluding remark is that DR estimation for percussion drillers are multiple non-linear task. It is resulted that the BI, UCS, OpP and BitD have great effect on the DR. So, alternative equations are suggested to estimate the drilling rate of percussion driller in rock environment.

Output: Estimating the DR is complex and multivariable tasks. Due to that, multiple linear and nonlinear regression analysis were conducted among the parameters to obtain the most accurate relationship among the DR and independent variables including UCS, BTS, D, BI, OpP and also BitD. It is founds that DR could be estimated as a function of some rock properties and driller specifications each of which has impact on the DR (Table 1).

As a result of several alternative models, it is found that the Model-4 is the most accurate one to obtain the DR, as a function of rock properties and driller specifications as follows;

In the equation (Eq.1), the UCS, BTS are in MPa, BI is in kN/mm, OpP is in kPa and BitD is in mm. Further, the range of the rock type including magmatic, sedimentary and metaphoric also have an effect on the rate of drilling in the dataset. Even though rock types are not quantified herein, it is concluded that Eq. 1 (Model-2) could be used to estimate the DR in practice.

Table 1 Results of Developed Models to estimate the Rate of Drilling (DR)

Models	Equations	r- value	r ²
Model-1	$DR = 11.94 \cdot \text{BitD} - 0.058 \cdot \text{OpP} - 5.076 \cdot \text{BI} + 64.26$	0.62	0.380
Model-2	$DR = \frac{20.6 \cdot \text{OpP}^{-0.183} \cdot \text{BitD}^{1.584}}{\text{BI}^{0.617}}$	0.72	0.524
Model-3	$DR = \frac{0.032 \cdot \text{OpP}^{1.34} \cdot \text{BitD}^{1.072}}{\text{BI}^{0.754} \cdot \text{BTS}^{-0.416}}$	0.83	0.690
Model-4	$DR = \text{Eq. 1}$	0.85	0.714
Model-5	$DR = \frac{283.5 \cdot \text{OpP}^{-0.192} \cdot \text{BitD}^{1.787}}{\text{BI}^{0.331} \cdot D^{-1.303}}$	0.74	0.550

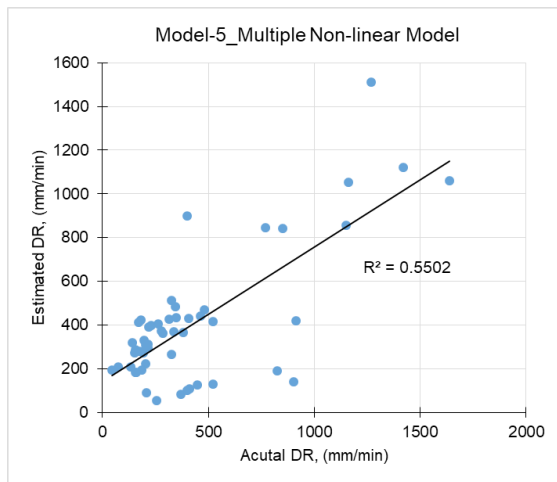
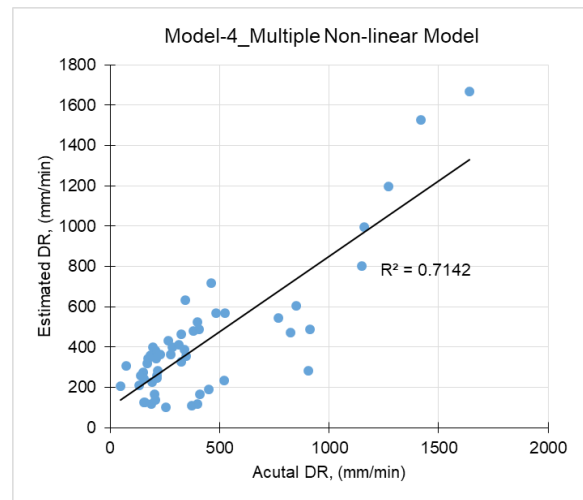
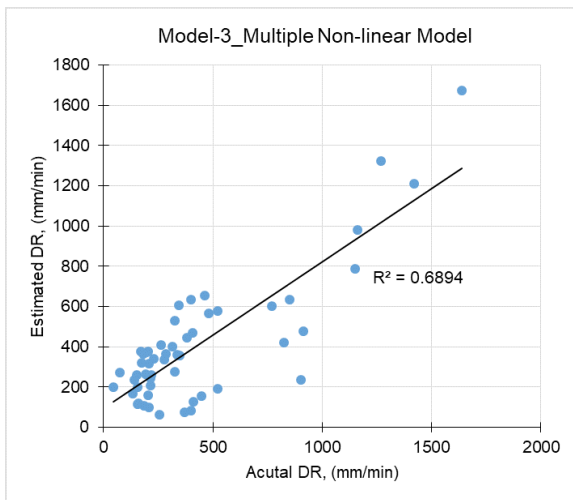
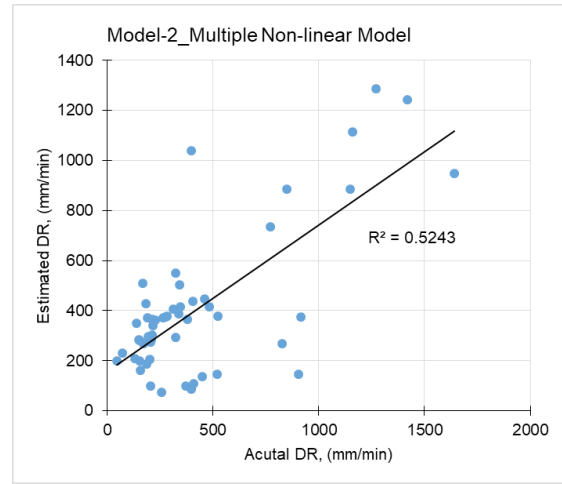
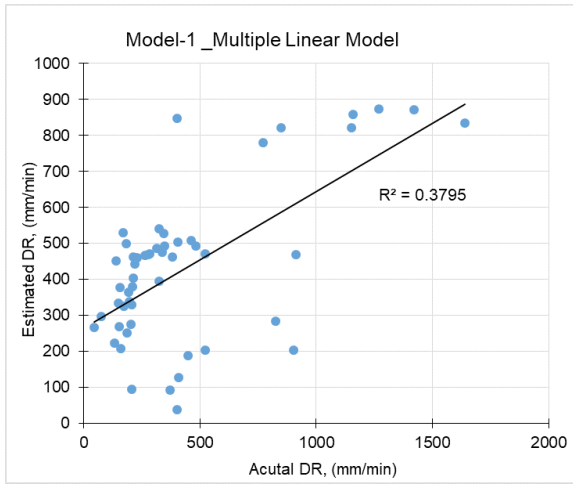


Figure 1. Model developed to estimate drilling rate for percussion drillers based on rock properties and driller specifications

The event could be reached from the [link](#).

REPORTED BY PROF. SAFFET YAGIZ

News from the Advanced Nanomaterials Lab

LATEST UPDATES

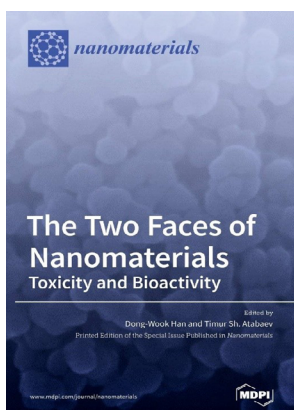


Dr. Timur Atabaev

We are pleased to inform you that Prof. Atabaev was appointed as an Associate Editor for **Micro & Nano Letters** journal starting from June 01, 2020. **Micro & Nano Letters** journal (IET Digital Library, UK) offers express online publication of short research papers containing the latest advances in miniature and ultraminiature structures and systems.

In 2020, Prof. Atabaev also served as a special issue guest editor for two reputable international journals:

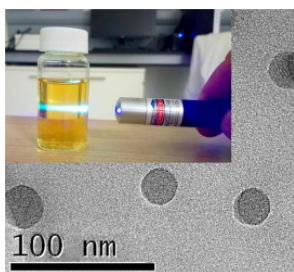
- **Frontiers in Chemistry**, Topic title: *Fluorescent carbon-based nanostructures for bioimaging applications*.
- **Nanomaterials**, Topic title: *The two faces of nanomaterials: Toxicity and bioactivity*. A collection of research articles in this special issue was published as a printed book and available for purchase in MDPI publishing house and Amazon.



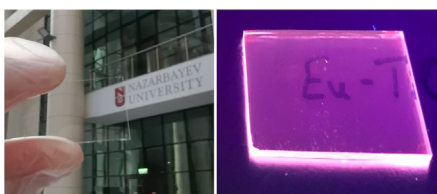
Research publications

In 2020, ANL group published 5 regular articles and 2 more submitted. It is important to mention that NU young researchers, graduate, and undergraduate students are actively involved in different research projects. For example, former SSH Chemistry undergraduate student Shynggys

Sadyk and two graduate students from SEDS investigated the effects of fluorescent coating on the efficiency of solar cells. Obtained results revealed that the efficiency of the fabricated solar cells can be improved by light management effects. Collaborative work was jointly led by Prof. A. Jumabekov (SSH), Prof. T. Atabaev (SSH), and Prof. A. Ng (SEDS). A research article entitled “PMMA thin film with embedded carbon quantum dots for post-fabrication improvement of light-harvesting in perovskite solar cells” was published in a reputable Nanomaterials journal.



In another study, Aidana Toleshova and Aiganym Abduaraimova (4th year Biology students) developed a quick synthesis (~ 30 min) of fluorescent, nontoxic and photostable carbon nanoparticles suitable for bioimaging purposes. A research article entitled “Rapid synthesis of nontoxic and photostable carbon nanoparticles for bioimaging applications” was published in Materials Letters journal.



Sagyntay Sarsenov, a graduate student (MSc in Chemistry) and Laura Khamkhash (NU Core Facilities) participated in the development of solution-based deposition of ultrathin and stable fluorescent coating. This type of coating can be useful for security marking of valuable goods and as a spectral convertor for photovoltaic industry. A research project led by Dr. Molkenova and Prof. Atabaev was published in a reputable

Nanomaterials journal with a title “Solution-based deposition of transparent Eu-doped titanium oxide thin films for potential security labeling and UV screening”.

Student Grants

We are happy to announce that members of the NU American Chemical Society International Student Club led by Prof. Atabaev have won an external ACS grant (\$ 3000) for the second year in a row. The grant will cover the organization of chemical school for children from low-income families.

In addition, we also express our congratulations to 3rd year SSH students Mussa Yedigenov (Chemistry) and Aray Adylkhan (Biology) for the winning of the NU Green Campus grant. In the framework of the project, our team will work on the development of long-lasting antibacterial coatings.

SHARED BY ANARA MOLKENOVA



Graduate School of Public Policy News

PERCEPTIONS OF NATIONAL IDENTITY IN KAZAKHSTAN: PRIDE, LANGUAGE, AND RELIGION

THE MUSLIM WORLD, VOL 110 (1):89-106.



Dr. Dina Sharipova

This article focuses on national identity and nation-building in Kazakhstan through the prism of a bottom-up approach by gauging the opinions of Kazakhstani people. It suggests that citizens' perceptions of national identity are complex and diverse and might vary across social characteristics. As the study shows, national identity consists of people's understandings and relationships to citizenship, religion, patriotism, and knowledge of history, to name a few. Previous research has shown that the citizens of Kazakhstan prioritize civic identity first followed by ethnic and regional identities. However, this study demonstrates that civic identity is not dominant in peoples' self-identification. Ethnic and religious identities also play an important role in defining citizens' self. Such coexistence of multiple identities with one overarching supra-ethnic Kazakhstani and subnational

ethnic identities highly resembles the Soviet model that continues to shape nation-building in the post-independence period. This study has also shown that the level of general pride associated with being Kazakhstani citizens has grown over the last twenty years. More people are proud to be citizens of Kazakhstan today.

Although an abundance of research has been done on nation-building in Kazakhstan, little primary research has been conducted on people's perceptions of national identity, religion, and language. This study is based on survey results in an attempt to answer the following questions: How do people perceive national identity in modern Kazakhstan? And what are the components of civic national identity according to the population?

To answer these questions, the author used the results of an original nation-wide survey (N = 1600) conducted in January 2016, focus groups held in April 2017, and secondary resources. The survey was administered in both Kazakh and Russian languages (according to the interviewees' preferences) by the local staff of the Center for Social and Political Research (CSPR). It was conducted in sixteen administrative regions of Kazakhstan—fourteen oblasts and two major cities, Almaty and Astana. A pilot survey of thirty-five respondents was also done before the actual survey was completed.

PERCEPTIONS OF NATIONAL IDENTITY: CIVIC, ETHNIC, AND BEYOND

What do Kazakh people think about their national identity? According to the survey, most people (93%) are "proud" to be citizens of Kazakhstan. No large differences were found across ethnic groups, places of residence, or gender. However, it is important to note that the percentage of those who were "very proud" of being Kazakhstani increased over time. For instance, in 2006, 50% of the respondents affirmed that they were "very proud" to have citizenship of Kazakhstan; in 2011, this number was 62%; and in 2016, it increased to 78%.

This positive trend can be explained by improved standards of living compared to the 1990s and early 2000s. Kazakhstan has some socioeconomic advantages over other Central Asian states due to substantial oil revenues. Enhanced economic opportunities have contributed to people's feelings of pride in their country. In addition, state rhetoric promoting a positive image of the country at the international arena and the Central Asian region also contributed to positive attitudes toward the country among the population.

COMPONENTS OF NATIONAL IDENTITY

One of the issues explored in this study is the composition of civic national identity. The respondents were asked whether it was important to have citizenship of Kazakhstan, be born in Kazakhstan, or speak the Kazakh language to identify them as Kazakhstani. According to the distribution, most respondents believed that it was important to hold citizenship of Kazakhstan (95%); to be patriotic (94%); to know the history of the country (93%); to respect the law and political institutions (93%); to be born in Kazakhstan (86%); to speak the Kazakh language (71%); and, to confess to Islam (54%). The understandings of national identity among citizens reflect cultural cleavages that exist in society. There is no consensus among different groups on the question of whether Kazakhstan has to choose a civic model based on citizenship or an ethnic model of nation-building based on ethnicity for its future development. Even though the government promotes the civic model, the process of ethnicization is also underway.

The lack of a unifying national idea also mirrors the absence of consensus within society on how the nation should develop. Despite the efforts of the elites, Kazakhstan lacks a unifying national idea that would be appealing to every group in society. State authorities have experimented with a number of concepts and projects including "Kazakhstan 2030," "Mangilik El," "Top 50 Developed States," and others. Although these concepts and strategies were important, to some extent, in providing directions for future development, they had a rather weak effect on the promotion of common national identity. A recent government initiative, the "Rukhani Zhangyru" or "Spiritual Revival" program, launched in 2017 aimed to consolidate society, "modernize consciousness," and boost the socio-economic development of the country. Within the framework of the program, a number of projects were implemented, including "Tugan Zher" (Native Land), "Sacred Geography," and "100 New Faces," to name a few. Although these programs focus on the cultural development of the country, the effects they might have on the development of national identity and societal cohesion is not yet clear.

Another important component of civic national identity in Kazakhstan is the sense of patriotism. Many young people interviewed for this research noted that being Kazakhstani also implies being patriotic. However, patriotism is not associated with a sense of superiority when people believe that their nation is superior or better than others; rather, young people believe that every citizen has to contribute to the development of the country and the community, commenting that: "Citizens of Kazakhstan, first of all, should be useful to their country," and "I want to do something for the country, for instance, help people who live in rural areas." Many interviewees, however, agreed that the level of patriotism is quite low in Kazakhstan, noting that: "Patriotism is weak in our country," and "We have a low number of patriots because everyone is on his or her own." In addition, this study has also shown that the role of Islam in Kazakhstan has become more prominent after the breakup of the Soviet Union.

RELIGION AS A PART OF NATIONAL IDENTITY

In 2011, the World Value Survey found that religion was important for 55% of the population of Kazakhstan. The number of those who identify with a religion grew by 2016. According to the author's survey, 67% of respondents identified with Islam, 27% with Christianity, 3.4% with atheism, and 2% with other religions. Despite the identification with Islam or Christianity, the level of religiosity remains relatively low. Religious identification is largely linked to ethnic background. The nexus between religious and ethnic identity among Kazakhs can be traced back to the period before the Russian Empire's colonization of Central Asia. At that time, people referred to a Muslim community and thus a common Muslim identity that was a mix of local and Islamic traditions.

The link between religious and ethnic identity has continued in the post-Soviet period. According to one interviewee, "Islam is a part of the Kazakh identity. Seventy percent of us are Muslims; that is why to be Kazakh means to be Muslim."

However, some changes emerged regarding the perceptions of the link between Kazakh ethnicity and Islam. One of the interviewees noted: "In the first place, everyone has a right to choose... My family professes Islam, but I do not think that I am very religious and that I will be living according to the Sharia and only observe Islamic laws. I do not think that you have to be Muslim to be Kazakh." The association of Islam with ethnicity depends, to a large extent, on family values. Of the respondents, 58% answered that they became religious due to family influence. If a family is religious, then its members will be more likely to associate their ethnic background with a particular religion, although this is not always true. For instance, there is 1% of ethnic Kazakhs who are Christians.

According to the survey, religion does not overshadow ethnic or national identity. Regarding the statement, "My attachment to the Kazakhstani nation is stronger than the attachment to my religion," 63% answered positively and 25% disagreed with the statement. The variation was observed across ethnic groups: Kazakhs (75%) have a stronger attachment to the Kazakhstani nation than to religion, whereas only 40% of Russians and 48% of other ethnic groups believe so. In sum, religion is an important element of national identity in Kazakhstan. The majority of the population identifies with Islam due to the demographic dominance of ethnic Kazakhs. However, the level and degree of religiosity are still quite low since many people do not strictly follow religious rituals, largely due to a long history of atheism during the Soviet period.

CONCLUSIONS

As this study shows, language is one of the essential markers of self-identification. Although many Kazakh people claim that the Kazakh language is an important component of Kazakhstani national identity, and the role of the Kazakh language has increased significantly since the collapse of the USSR, its role in everyday life is still limited. Even though the percentage of those who speak the Kazakh language has grown, the Russian language continues to dominate the public sphere. There will be a gradual transition from Cyrillic to Latin script when all documents in state agencies, educational organizations and institutions, and mass media will be transferred to Latin script in Kazakhstan.

Historically, the majority of Kazakhstani citizens identify with either Islam or Christianity, and this religious identity is closely connected to ethnicity. As evidence suggests, more people became religious after the demise of the USSR, especially the young generation. However, the level of religiosity in the population remains low. It varies across Russian-speaking and Kazakh-speaking Kazakhs, with the latter being more religious than the former. We observe a similar trend among Christians. Although there is a high percentage of those who affiliate themselves with Orthodox Christianity and celebrate Christian holidays, very few of them practice religion regularly.

Overall, the processes of nation-building in Kazakhstan are quite similar to those in other Central Asian states. A common feature is that many countries of the region can be characterized as "nationalizing states," a concept introduced by Roger Brubaker implying the process of ethnicization when institutions and policies are designed to defend the interests of a titular ethnic group. The processes of Kazakhization, Uzbekization, and Kyrgyzization, however, take place to a different degree and with some peculiarities in each country. All nation-building policies of Central Asian states are top-down government projects promoted by the political elites. To consolidate the nation, the elites seek to find common points of reference for various social groups. One such point is the glorification and rediscovery of the past, which results in the revision of history and the search for historical heroes. All Central Asian states refer to their "Golden Age," or the glorious past, to construct and consolidate the nation.

In sum, this study shows that people's perceptions of their national identity are diverse and fluid. In this regard, the bottom-up perspective could shed light on people's beliefs and attitudes, and provide "reality checks" on the effectiveness of the government's nation-building policies. Future research should focus on other dimensions of citizens' self-identification to go beyond the civic-ethnic dichotomy for a more comprehensive picture of nation-construction in Kazakhstan.

GSPP PROFESSOR PUBLISHED AN ARTICLE IN A LEADING INTERNATIONAL PEER-REVIEWED JOURNAL



Prof. Maxat Kassen

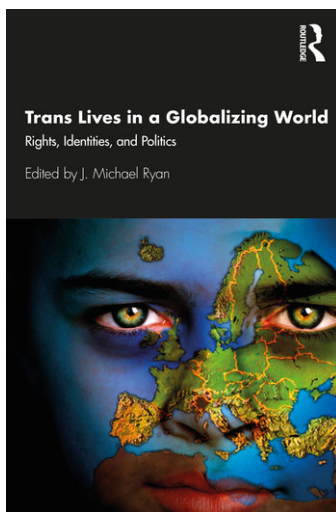
Dr. Maxat Kassen, Assistant Professor of the Graduate School of Public Policy at Nazarbayev University, has recently published an article in an international peer-reviewed research journal: *Transforming Government: People, Process, and Policy* (Scopus CiteScore 4.1). The article titled *"Politicization of e-voting rejection: reflections from Kazakhstan"* focuses on implications of political debates around the prospects of e-voting to replace traditional ballot, which have always been uneasy and, in many cases, highly speculative and politicized. Despite certain political, organizational, technological, and socioeconomic benefits that e-voting brings, governments around the world are beginning one by one to denounce its further use in the electoral process. In this regard, in the article, the author aims to analyze reasons that led to the discontinuation of e-voting, resorting to the case of Kazakhstan, a transitional post-soviet country, which actively used the technology in 2004-2011, as a poster child of the global trend, elaborating on key political, socioeconomic, organizational and technological risks that could be associated with the possible return of this innovation in future elections. The results of the case study research could be useful for academia in understanding better e-voting as a public trust bench-marking phenomenon. The study can also be used to inform ways of how to improve the current e-voting platforms, especially in ensuring better security and transparency of the systems, which could be useful for e-government policymakers and practitioners who work on developing more innovative blockchain-driven solutions in the area.

The full article can be read [here](#).



School of Sciences and Humanities News

SSH PROFESSOR PUBLISHES A BOOK



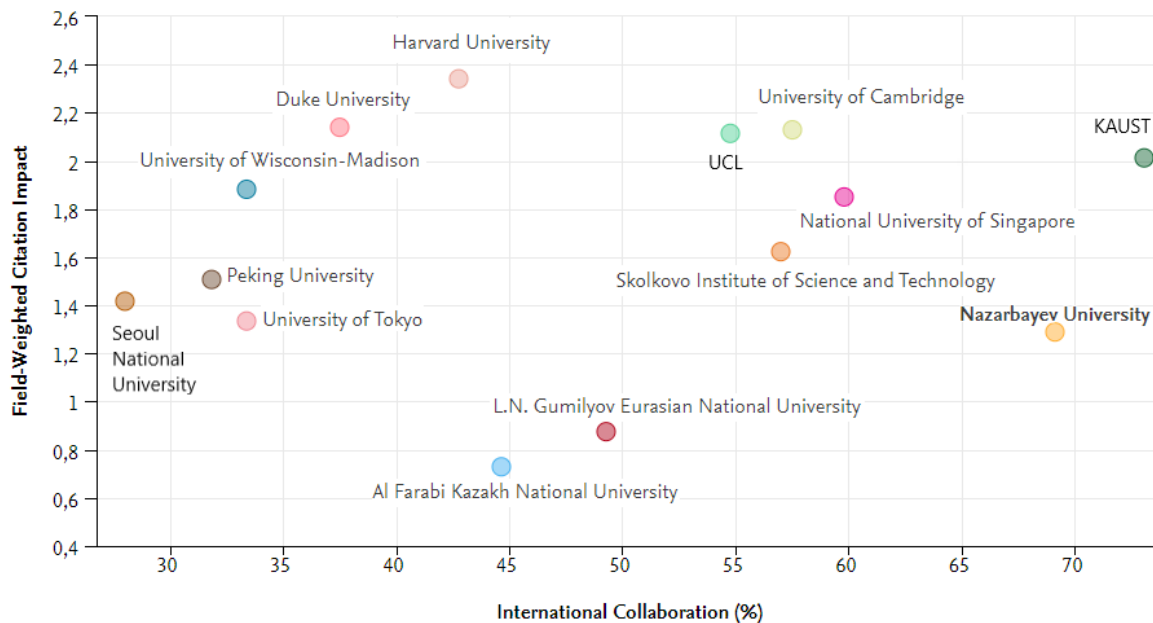
Assistant professor Michael Ryan from Sociology and Anthropology Department published a book.

This volume explores contemporary trans lives in a world that is both global and increasingly globalizing, examining the nuances of the rights, identities, and politics that make up the varied spectrum of what has come to be included under the largely Western imposed label of «trans».

Trans identities and rights have become increasingly prominent in the social imagination in recent years, and in a growing number of locales have also become hot button political issues. As trans individuals are demanding, and gaining, their rights, these debates are bringing issues of trans lives to the forefront of politics and into social discussions in nearly every country in the world today.

In a series of essays covering the key themes of Identities, Rights, and Politics, this interdisciplinary collection presents an international range of topics spanning human rights and asylum seekers, to the Hijras of South Asia, to the development of the academic field of trans studies, and gender-affirming surgeries, all placing trans lives in a global(ized) context.

RESEARCH PERFORMANCE EVALUATION USING SCIVAL



In this issue, we are delighted to present you an overview of research activities conducted under the auspices of Nazarbayev University.

Since its inception in 2011, Nazarbayev University faculty members and researchers have released 4,220 peer-reviewed publications indexed by Scopus, and have been cited 25,106 times for 2011-2020 period (Source: Scopus, October 26). The approximate number of citations per peer-reviewed publication is 5.95. The overall H-index of NU is 53, whereas H5-index is 33. The field-weighted citation impact is 1.29, meaning that our publications have been cited 29% more than would be expected based on the world average for similar publications.

For getting more comprehensive information on the research performance at NU, please have a look at the following [presentation](#) prepared using SciVal research evaluation platform.

If you have any questions regarding the provided information, please contact Saule Sadykova (ssadykova@nu.edu.kz)

FUNDING OPPORTUNITIES

#	Opportunity	Funder	Deadline	Source link
1	SOCIAL SCIENCE RESEARCH GRANT PROGRAM	World Anti-Doping Agency (WADA)	November 22, 2020	URL
2	The Wenner-Gren Foundation	Conference and Workshop Grants	December 1, 2020	URL
3	NuSTAR Guest Observer - Cycle 6 (ROSES 2020)	National Aeronautics and Space Administration	January 22, 2021	URL
4	Strategic Technologies	DARPA - Strategic Technology Office	March 1, 2021	URL
5	ROSES 2020: Rapid Response and Novel Research in Earth Science	NASA Headquarters	March 29, 2021	URL
6	Annual Program Statement for Development Innovation Ventures	Agency for International Development	March 31, 2021	URL
7	USAID	Higher Education for Leadership, Innovation, and Exchange (HELIX) New Partnerships Initiative (NPI)	April 2, 2021	URL
8	Locally Led Development	Agency for International Development	April 8, 2021	URL
9	New Partnerships Initiative (NPI): Conflict Prevention & Recovery Program (CPRP)	Agency for International Development	April 29, 2021	URL
10	Research Initiatives at The Naval Postgraduate School	Naval Supply Systems Command	May 31, 2021	URL
11	Broad Agency Announcement (BAA) for Energy Sector Self-Reliance (ESSR)	US Agency for International Development	February 5, 2022	URL
12	Pollution Prevention & Mitigation BAA	US Agency for International Development	February 5, 2022	URL
13	U.S. Ambassadors Fund for Cultural Preservation Grants Program	Department of State Bureau Of Educational and Cultural Affairs	June 30, 2022	URL
14	Use of the NASA Physical Sciences Informatics System	National Aeronautics and Space Administration	September 14, 2022	URL
15	NIH	Eradication of HIV-1 from Central Nervous system Reservoirs (R01 Clinical Trial Not Allowed)	May 7, 2023	URL
16	Research Opportunities in Space Biology (ROSBio)	National Aeronautics and Space Administration	June 31, 2023	URL
17	National Geospatial Intelligence Agency Boosting Innovative GEOINT Research Broad Agency Announcement	National Geospatial-Intelligence Agency	July 31, 2023	URL
18	Defense Threat Reduction Agency	"Fundamental Research to Counter Weapons of Mass Destruction Department of Defense Defense Threat Reduction Agency"	September 30, 2024	URL
19	Agency for International Development	Annual Program Statement (PACE)	March 12, 2025	URL
20	USAID	MOMENTUM	September 30, 2025	URL
21	Knowledge SUCCESS (Strengthening Use, Capacity, Collaboration, Exchange, Synthesis, and Sharing) APS	US Agency for International Development	June 18, 2028	URL
22	Implementation Science for Strengthening Family Health	Agency for International Development	May 30, 2029	URL

New research publications indexed by Scopus (count: 242)

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