

University researchers contribute to verified social benefits, RAE 2020 finds

Conducted by the University Grants Committee (UGC), the Research Assessment Exercise (RAE) 2020 clearly identifies that research projects by Hong Kong universities deliver far-reaching positive social impact.

The advancement of society gives rise to many issues that are in need of creative solutions contributed by different sectors. Of particular significance are the contributions by academia because many university researchers and professors are at the forefront of knowledge and technologies.

The UGC has recognised the need to incentivise local universities to conduct more research of social relevance with high economic and social benefits and sought to acknowledge the impact generated by their research. Hence, UGC decided in 2016 to include a new component called 'Research Impact' in its RAE 2020. The RAE is aimed to encourage world-class research by UGC-funded universities.

Research impact, as defined by UGC, is 'the use of knowledge obtained through research to affect the world beyond academia, such as industry, health, the environment, or the society in general.'

On another level, the impact element provides solid evidence of research's benefits.

Excellent research impact

For the RAE 2020, UGC-funded universities submitted impact case studies, which were required to show a clear pathway between the initial research and the eventual outcome as well as how the submitting unit had contributed to that outcome. The submissions should also be substantiated with verifiable evidence.



Professor YUEN Kwok-yung discusses with students in a laboratory.



Professor YUEN Kwok-yung examines a sample under the microscope.

All of the assessed universities have made outstanding achievements in research impact because the ratings awarded show the overwhelmingly high-quality impact demonstrated by the cases, UGC says. Their submissions show how far-reaching and active is the engagement of all UGC-funded universities with the society and the economic developments of Hong Kong and beyond. Among the submissions, 89 percent (306 cases) claimed impact within Hong Kong and 76 percent (261 cases) claimed impact beyond the city.

Meanwhile, many submitted cases were based on multidisciplinary research and collaborations with the trade and industry, allowing the impact to reach different aspects of life and segments in the society. Collectively the case studies demonstrate the sheer energy and commitment channelled into the outreach into schools, the community and society, particularly the underprivileged.

In terms of areas of impact, the two largest ones were 'Public Policy' and 'Business', involving cases submitted to almost all 13 assessment panels, representing such specialised fields as health sciences, engineering, electrical/electronic engineering, business and creative arts. They were followed by 'Health Services' and 'Practice of Medicine', and 'Education' that also covered all panels but in slightly lower numbers.

Four exemplary and pioneering impact case studies submitted to the RAE 2020 demonstrate how research brings long-term benefits to society.

Health Sciences: Discovery of novel coronaviruses (CoV) with public health significance

During the SARS epidemic in 2002-03, researchers at a university in Hong Kong were the first in the world to discover SARS-CoV-1 and developed rapid diagnostic tests. They also discovered its ancestral virus, the bat SARS-related CoVs in Chinese horseshoe bats, which subsequently turn out to be ancestrally related to SARS-CoV-2 of 2019. The team have since taken a leading position in the discovery of novel coronaviruses. Their efforts have led to an unprecedented phylogenetic map and evolutionary model for CoVs and contributed to considerable global health and economic impacts in four areas:

How impact was assessed

The RAE 2020 is a criterion-referenced assessment that embraces international best practice. International perspectives are emphasised: nearly 70 percent of the panel members were leading experts from around the world, with the remaining 30 percent from Hong Kong universities. Also included in each panel were local 'research end-users', who were professionally qualified individuals from business, government, industry and the arts of the relevant fields. They applied their practical experience to help inform the overall assessment of the plausibility of claimed impacts and supporting evidence.

The panels evaluated impact using two criteria: 'Reach' and 'Significance' together in a holistic manner. 'Reach' is the extent and/or breadth of beneficiaries of the impact. 'Significance' is the degree to which the impact enables, enriches, influences, informs or changes the products, services, performances, practices, policies or understanding of commerce, industry or other organisations, governments, communities or individuals.

Commerce and industry

Numerous rapid diagnostic kits have been developed by companies around the world based on the Hong Kong research team's results.

Healthcare services and patient benefits

Antiviral treatments and diagnostic kits developed based on this research are in use in hospitals across the globe.

Health policies

The tracking of SARS origin in animals provided crucial guidance to public health measures internationally in segregating the animal carriers from humans, introducing continuous surveillance of animal viruses, and identifying potential emerging zoonotic viruses. Experience gained of antiviral treatments similarly underpinned disease control measures adopted internationally. The team's foundation work made it possible to rapidly identify and accurately diagnose MERS-CoV in 2012 and COVID-19, and to promptly implement corresponding public health policies.

Education

The team members have actively played a wide range of advisory roles, with direct influence on international and local protocols for promoting personal and environmental hygiene and good travel advice. Their expert advice helps raise public awareness of all aspects of CoV transmission and control through the media to all segments of society.

Built Environment: Enhancing construction workers' health and safety in hot weather

A multi-disciplinary team from the submitting unit, together with partners from another Hong Kong university, and others in Mainland China and the UK, pioneered a series of heat stress research projects since 2010. The projects' goal was to address industrial heat stress issues. The work involved evaluation of fabric types coupled with developmental work on fabrics and ergonomic design; and a novel approach to occupational intervention research which moved beyond randomised control trials in laboratory settings to include field experiments, a field survey of construction workers and exhibitions, engaging many stakeholders at early stages. The positive impact delivered by this research was on:

Product manufacturing

An affordable anti-heat-stress work uniform was developed. It offers around 29-percent heat storage reduction and more than 14-percent improvement in thermal comfort.

Construction industry

The uniform was licenced to the Construction Industry Council in 2015 and was specified by the government as standard workwear for all public works contracts in 2018. The detailed evidence-based garment specification from this project has also led to changes in working practices.

The cleaning, gardening and logistics sector

The garments have been adopted for use by these sectors in Hong Kong, Macau, Cambodia and Saudi Arabia, to promote occupational health.



The testing of an anti-heat stress work uniform.



Professor Albert CHAN (left) and Professor Francis WONG (right) receive an award for the anti-heat stress work uniform.

Engineering: Motion capture and assistive systems

This mechanical engineering case study centred on the innovative combination of technologies developed by an engineering department. They include smart actuators for assistive knee braces and robotic exoskeletons for people with mobility problems. A new, energy-efficient, magnetorheological actuator, that can work as a clutch or a brake, was developed. As a clutch, it enables an electric motor to transfer torque to the leg; while as a brake, it provides controllable passive torque. Meanwhile, the department developed a novel method for real-time and convenient modelling and evaluation of human gait to support rehabilitation. The department developed a fuzzy expert system by combining the several innovations and brought positive impact on:

Patient rehabilitation

The system takes the patient's physical condition and gait analysis results as inputs, and derives suitable levels of different assistive functions of the knee braces. It provides effective assistance during gait rehabilitation.

Technology commercialisation

A startup was established in 2012 to further develop the motion capture paradigm. The company employs more than 300 staff for its operations in China and the USA and has been working on an affordable, adaptable and versatile motion capture system.

Sports training

The system is used for training golfers, including over 60 percent of USA PGA top 100 coaches.

Space programme

A scalable commercial VR version of the system, developed for multi-users with physical props and motion capture, has been used in NASA's commemoration of the 50th anniversary of the Moon Landing.



Motion assistive devices aid gait rehabilitation.

Social Sciences: Better responses to youths-at-risk

This cross-country research project focused on welfare responses to street youths and restorative approaches to school delinquents. The 'street youths' research explored the channels through which they were 'tridised' and assimilated gang values. It identified modes of outreach work and community support that could channel the youths' energies into more constructive goals. The 'school delinquency' research identified a strategy called 'Restorative Whole School Approach', based on tolerance and acceptance, combined with appropriate social disapproval of delinquency and mediation tactics. This sociology project delivered impact on:

Youth and Family Services

The team developed for the Macau Government a youth service blueprint which, after initial trials, was transformed into several programmes. New Integrated Youth and Family Services Centres were established, and social workers and police superintendents were trained to work with police-cautioned youths. About 66,000 service recipients have benefited from the programme.

School Support Network

A Hong Kong Government-funded social worker supervision project aimed at building a positive discipline-oriented school support network and forging an anti-bullying culture among youths, together with development of practitioners' guidelines and tools. The project benefited nearly 15,000 students, over 2,000 parents and about 3,000 teachers.

Community Support

In Guangzhou in 2019, training was provided to 200 outreach workers and advice was given to the authorities to consolidate an at-risk youth service model that benefited nearly 20,000 young people. In Singapore, the government received advice on the development of an at-risk youth service model. Forty outreach workers received training on youth gang work and 200 youths received assistance.



Professor LO Tit-wing speaks as the host of an international conference.



Professor LO Tit-wing discusses with students on better responses to youths-at-risk.



More Impact
Case Studies