

ANNUAL REPORT ON RECURRENT FUNDING FOR KNOWLEDGE TRANSFER 2023/24



KNOWLEDGE TRANSFER SUB-OFFICE 知識轉移辦公室

Submitted to University Grants Committee

sustainability<sup>+</sup>

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# 1. EXECUTIVE SUMMARY

With increased support from the HKSAR Government, the importance of knowledge transfer (KT) has grown significantly to create a vibrant innovation culture within society. Local universities have stepped up their efforts by implementing various KT initiatives, such as enhancing university activities, establishing incubators and accelerators, and forging partnerships with industry and government. With the aim to translate our multidisciplinary research into practical solutions that bring societal benefits, EdUHK is committed to commercialising research outcomes and sharing our knowledge and expertise with external organisations and the wider community.

2024 marks the University's 30<sup>th</sup> anniversary, and EdUHK achieved a series of enhancements under the stewardship of our new President. To better synergise our interdisciplinary expertise, two new Academies and two University-level Research Facilities are established and will serve as hubs of excellence to further extend our research impact in Hong Kong and beyond.

Novel inventions and efforts of EdUHK researchers and start-ups are acknowledged internationally at exhibitions across Geneva, Germany, Canada, etc. The University received a total of 30 accolades and showcased 16 innovations, with winning inventions deriving intellectual properties (IPs) spanning environmental and food monitoring, sports, health and safety technologies, and so on.

The Knowledge Transfer Sub-Office (KT Sub-office) of the University has allocated substantial time and resources to offer comprehensive support to the academic and research divisions of EdUHK, aiding them in elevating their research so as to bring impactful benefits to the broader community. As a result of our continued efforts in developing research and IP with social and commercial values, there is a notable industry sponsorship of around HK\$8.1 million engaged in EdUHK's innovation and technology development proposals. The growth in entrepreneurship development and IP commercialisation is also seen in 20 of the 40 trained start-up teams receiving sizeable funding and acquiring 35 external awards and recognitions, along with new GreenTech, HealthTech and metaverse licenses with projected value of over HK\$11 million granted to business entities.

This report summarises EdUHK's key KT and entrepreneurship activities, achievements and development in the 2023–24 academic year.

# 2. HIGHLIGHTS OF THE YEAR

Supported by the University Grants Committee's (UGC) Earmarked Research Grants, EdUHK promotes KT and conducts research to tackle industry, education, and societal challenges in Hong Kong and further afield. Our impact-focused researchers channel their efforts into domains such as EdTech, metaverse, artificial intelligence (AI), safety, green and health technologies, etc. By expanding the University's innovation and technology (I&T) capabilities, EdUHK aims to elevate its impact through synergising interdisciplinary expertise, forming strategic partnerships within the industry, developing our incubator programs, facilitating collaborations between EdUHK researchers and external experts, as well as securing additional grants and funding.

# 2.1 DRIVING INNOVATION

# 2.1.1 KNOWLEDGE TRANSFER SUB-OFFICE

The Knowledge Transfer Sub-office plays a pivotal role in facilitating knowledge exchange between the University and the wider community. Translating academic research into practical applications, the KT Sub-office serves as a dynamic hub that supports and enhances EdUHK's commitment to KT activities, fostering collaborations and partnerships that benefit both academics and external stakeholders and contribute to societal advancement and innovation.

Three core functions "Entrepreneurship Development", "IP Development and Quality Assurance", and "IP Promotion and Licensing" of the KT Sub-office support and ensure that the valuable insights and discoveries made within EdUHK are shared and utilised beyond the campus.

# 2.1.2 FUNDING SCHEMES

By establishing a robust funding infrastructure to support KT initiatives within the University, the KT Sub-office has effectively utilised internal and external resources to narrow the gap between research and practical applications. Internal funding schemes are made available to EdUHK researchers to bolster their translational research endeavours and facilitate the creation of novel research outcomes with market viability.

### 2.1.2.1 KT FUND

To facilitate knowledge exchange between the University and the wider community, the KT Fund Scheme continuously support researchers in developing EdUHK-owned IPs and carrying out KT activities or initiatives. This year, four projects in the areas of AI, cognitive science, financial literacy, etc., have been funded and are listed in Annex II. The annual funding scheme will continue in the 2024–25 academic year.

### 2.1.2.2 FUND FOR INNOVATION, TECHNOLOGY, AND SOCIAL-WELLBEING

The KT Sub-office continues to be supported by the HKSAR Social Innovation and Entrepreneurship Development Fund (SIE Fund), providing recurrent funding through the Fund for Innovation, Technology, and Social-wellbeing (FITS) Scheme for EdUHK researchers to develop sustainable solutions that relate to local social issues and align with the Government's new targeted poverty alleviation strategy. HK\$1.6 million will be distributed in 2024–25, enabling researchers to collaborate with external partners and co-create new social innovation initiatives in education, public health, art and culture, and social reconstruction.

## 2.1.2.3 KNOWLEDGE TRANSFER MATCHING GRANT SCHEME

In line with the University's dedication to fostering an active and robust culture in I&T development, the new initiative Knowledge Transfer Matching Grant Scheme (KTMGS) debuts in the reporting year to encourage external I&T grant applications. Three projects supported under the Scheme are listed in Annex III.

## 2.1.3 INTELLECTUAL PROPERTY (IP) AND COMMERCIALISATION

## 2.1.3.1 INNOVATION LICENSING

EdUHK remains committed to extending the influence of its research and development beyond traditional education by emphasising KT. While 3 licenses remain active in 2023–24, 3 new patent licenses in the fields of environmental science, metaverse application and HealthTech were granted to business entities to commercialise the University's IPs, contributing a projected value of over HK\$11 million.

### 2.1.3.2 PATENTS

After the enhancement of the KT Sub-office's patent consultation service, 15 invention disclosure applications were reviewed and processed in 2023–24 to protect the inventions and intellectual work of EdUHK academics and researchers. A total of 20 patent applications were filed with an increase in number of US invention patents filed. In addition to providing legal protection for the University's inventions, patenting also offers an opportunity to monetise EdUHK's KT to society through patent licensing. Patents filed and granted within the reporting period can be found in Annex IV.

# 2.1.3.3 TENDERS/CONTRACT RESEARCH AND CONSULTANCIES

To enhance EdUHK's research and knowledge dissemination, University staff are encouraged to work together with outside parties and participate in projects related to research and KT funded by outside sources, such as tenders, contract research and consultancy, as part of their professional duties.

In 2023–24, the University contributed to 132 contract and collaborative research and consultancy projects of over HK\$152 million in value. The Integrated Centre for Wellbeing received a total of HK\$2.75 million from 2 tender projects supported by the Po Leung Kuk Social Service Department, providing consultancy services while developing and executing children-oriented assessments and programmes that address diverse needs, e.g. emotional, behavioural, interpersonal problems, trauma, Special Educational Needs (SEN), etc.

# 2.2 FOSTERING ENTREPRENEURSHIP

To provide all-rounded support to our innovators, the Entrepreneurship Development Unit (EDuce) of the EdUHK KT Sub-office facilitates the growth of start-ups and engages potential investors, collaborators and strategic stakeholders to cultivate a vibrant entrepreneurial ecosystem, empowering EdUHK entrepreneurs to commercialise their innovative start-up ideas and research projects into sustainable enterprises.

## 2.2.1 EDUHK SEED FUNDING PROGRAMME – EDUCATION<sup>+</sup> AND SOCIAL ENTREPRENEURS (EASE) FUND SCHEME



Co-organised with the Hong Kong Science and Technology Parks Corporation (HKSTP) for Co-Ideation Programme, EASE Fund 2023–24 provided seed funding and extensive training to develop student and alumni participants' entrepreneurial mindset with support from Amazon Web Services and Hong Kong Cyberport Management Company Limited. 30 teams entered the screening and pitching rounds and polished their solutions to be market-ready, and

12 winning teams were selected in March 2024. The teams were granted HK\$2.2 million in cash and in-kind and have been offered comprehensive entrepreneurial incubation services.

### 2.2.2 EDUHK CENTRE FOR ENTREPRENEURSHIP AND RESEARCH (CEAR)

Strategically situated within HKSTP to foster a collaborative innovation ecosystem, CEAR offers incubation and collaboration resources to EdUHK faculty members and students, expediting projects' technological innovation through connections with entrepreneurs and early-stage start-ups and transforming projects into science and technology businesses with influence. During the reporting year, the 2<sup>nd</sup> Cohort of CEAR startup teams were admitted,



covering the fields of IoT Network for Smart Cities, Metaverse and AI and Social Robot.

### 2.2.3 EDUHK SEED FUNDING PROGRAMME – FUNDING SCHEME FOR YOUTH ENTREPRENEURSHIP IN GUANGDONG-HONG KONG-MACAO GREATER BAY AREA



incubation services, strategic partnerships with entrepreneurial centres, seed funding and over 120 hours of entrepreneurship workshops.

With the ongoing support from the HKSAR Home and Youth Affairs Bureau Youth Development Fund (YDF) of over HK\$11 million for 3 years, Greater Bay Area (GBA) tours and local visits were organised for EASE Fund start-ups in 2023–24, providing participants with valuable opportunities to explore the GBA ecosystems, connect with potential partners and investors and engage with local businesses. The funding also contributes to entrepreneurial support,

# 2.2.4 INNOVATION AND ENTREPRENEURSHIP STUDENT TALENT DEVELOPMENT (INVESTED) PROGRAMME & ASIAN UNIVERSITIES STUDENT ENTREPRENEURSHIP IDEATION CHALLENGE (AUSEIC)

The 1-year campus-wide INVESTED Programme received 115 applications in 2023–24, including undergraduate and postgraduate students, equipping participants to articulate their aspirations and transform their creative ideas into innovative solutions. The programme provides practical workshops, internship opportunities within start-up communities, Asian-based exposure to local and



entrepreneurship competitions, and more, offering students a transformative educational experience.

Building on the success last year, EdUHK co-organises the AUSEIC with 5 Asian Pacific universities to nurture students' innovation and entrepreneurial spirit and enable them to tackle pressing social and education-related challenges in equity, diversity and inclusion. Over 80 participants from EdUHK, Ateneo De Manila University, East China Normal University, Singapore Nanyang Technological University National Institute of Education, Royal Melbourne Institute of Technology Australia and Universiti Kebangsaan Malaysia came to Hong Kong for the final pitch and a series of innovation and entrepreneurship talks given by various industrial experts and EdUHK faculties. Team Mentorship from EdUHK won the second place against 10 other finalist teams.

# 2.2.5 EDUHK INCUBATED START-UP ACHIEVEMENTS IN EXTERNAL COMPETITIONS

Apart from facilitating the growth of start-ups, the KT Sub-office also assists start-up teams through advisory and training services to get them ready for local and global competitions, equipping EdUHK start-ups to explore further funding and business prospects by engaging potential investors, collaborators and customers through experiential learning. Highlighted external recognitions are set out in Annex VIII.

# 2.2.6 COLLABORATIONS WITH MAJOR STAKEHOLDERS IN THE INCUBATION ECOSYSTEM

The EdUHK-HKSTP Co-Ideation Programme has become a cornerstone of the University's commitment to supporting EdUHK start-ups. A total of HK\$1.1 million in entrepreneurial support was awarded to EASE Fund teams, encompassing seed capital, professional guidance, training, and resources to actualise their start-up aspirations. To foster the growth of the 11 winning teams, they will be based at the HK Science Park and have access to pitching and investment training and entrepreneurial mentoring and advice to refine their business ideas further.

EdUHK has also collaborated with Cyberport and HKSTP on various occasions to promote I&T development culture within the University, including:

- i. Cyberport Academy Series (Promotion and Participation)
- ii. Cyberport Distinguished Speaker Series (Promotion and Participation)
- iii. Cyberport Greater Bay Area Young Entrepreneurship Programme (GBA YEP) 2023–24 (Promotion)
- iv. Cyberport University Partnership Programme (CUPP) 2024 (Co-organizer, Promotion and Participation)
- v. Hang Seng x HKSTP x Wofoo Future Ecopreneur Programme (Promotion and Participation)

- vi. HKSTP City I&T Challenge (Promotion and Participation)
- vii. HKSTP Green Tech Insight Forum for Future STEM Education Change Makers (Co-organizer and Participation)
- viii. HKSTP Hong Kong Techathon<sup>+</sup> 2024 (Co-organizer and Participation)
- ix. HKSTP Shenzhen Branch GBA Trip (Collaboration)

In the CUPP 2024, "CreditGuardian" from EdUHK is admitted to participate in the entrepreneurship training camp at Draper University, the United States.

In the Hong Kong Techathon<sup>+</sup> 2024, EdUHK entrepreneur teams swept the board in the Local Open Group, winning all Gold, Silver, and Bronze awards in the Digital Economy Technology Area. Co-organized by the HKSTP and 10 local universities, the international entrepreneurship challenge gathered over 1,500 participants, including non-local teams from the National University of Singapore, Singapore Management University, Massachusetts Institute of Technology, Nanyang Technological University, MIT HK Innovation Node, etc.

# 2.3 MAKING DIFFERENCES

# 2.3.1 CREATING IMPACT ON INDUSTRY & SOCIETY

The application of EdUHK's core research findings has a profound effect on lifelong education and the evolution of I&T. The value of our work is amplified through strategic partnerships, leading to several of our notable accomplishments highlighted below.

## 2.3.1.1 ESTABLISHMENT OF ACADEMIES AND UNIVERSITY RESEARCH FACILITIES

EdUHK has restructured several subordinate centres into two new academies, the Academy for Educational Development and Innovation (AEDI) and the Academy for Applied Policy Studies and Education Futures (AAPSEF), to enhance the synergy of cross-disciplinary knowledge and explore new research areas in STEAM, AI and digital development, intangible cultural heritage, applied policy studies, and linguistics, legal, life education, etc. Moreover, EdUHK has established two new university-level research facilities, the University Research Facility of Data Science and Artificial Intelligence (UDSAI) and the University Research Facility of Human Behavioural Neuroscience (UHBN), to provide state-of-the-art technological platforms and foster multidisciplinary collaboration in AI, biology and neuroscience, learning sciences, and more.

# 2.3.1.2 1<sup>ST</sup> EDUHK INTERNATIONAL CONFERENCE FOR RESEARCH IN EARLY CHILDHOOD EDUCATION AND DEVELOPMENT (INCRECE 2024)

In celebrating the 10<sup>th</sup> Edition of the Conference for Research in Early Childhood Education (CRECE), the Department of Early Childhood Education launched biannual InCRECE to bring together a wider audience of international, regional and local researchers, practitioners and policymakers in the field. Themed "Ecologies for Development and Learning: Supporting Children to Reach Their Full Potential", the three-day conference provides a platform for more than 500 attendees from 19 countries to understand the ecologies for the development and learning of children aged 0 to 8, with stakeholder emphasis on teachers and educators, parents and families, and young children.

# 2.3.1.3 JOCKEY CLUB FINANCIAL EDUCATION PROGRAMME FOR STUDENTS

The Resource Centre for Interdisciplinary Studies and Experiential Learning (RCISEL) has received HK\$56.6 million from the Hong Kong Jockey Club Charities Trust to launch a 44-month project to develop financial education programmes for 17,810 upper primary students. Co-created with the

University of Chicago, Hong Kong Family Welfare Society and CoCoon Foundation, the Programme equips young students with essential financial capabilities, enabling them to achieve long-term financial well-being and personal fulfilment while cultivating a critical life skill that directly impacts participants' lifelong financial capability.

### 2.3.1.4 DRUG ABUSE PREVENTION EDUCATION PROGRAM IN TERTIARY INSTITUTIONS

Funded by the Beat Drugs Fund Association, the Integrated Centre for Wellbeing launched "DrugFree4Health" from 2021 to 2023, which comprises the "DrugFree Buddy" Anti-drug Abuse Ambassador Scheme, Anti-drug Abuse Lesson Plan Competition for Primary/Secondary Schools and "Life Teacher" Programme. The initiatives provided in-depth education and interactive training to nearly 950 EdUHK students, encouraging an anti-drug lifestyle, reducing drug motivation and instilling future educators with the skills to impart anti-drug messages to school children. Talks and activities were arranged within 18 secondary and primary schools. The Program also helped reduce social stigma and foster mutual understanding between participants and 120 ex-drug rehabilitees, overall contributing to a more informed and empathetic society regarding drug abuse prevention.

## 2.3.1.5 PLAY-ORIENTED SUPPORTING SYSTEM (POSS) FOR TRAINING & ASSESSING CHILDREN WITH SPECIFIC LEARNING DIFFICULTIES (SPLD)

To address the need for effective interventions for SpLDs in children (who often exhibit normal IQ levels but struggle with academic performance), the Department of Special Education and Counselling designed a 3-module POSS (assessment, single training and multiplayer training) to assess and train specific learning-related abilities and skills with dynamic difficulty adjustments tailored to each child's performance. To date, POSS has been implemented and benefited over 600 developing children, parents, primary school and university teachers, and staff from non-profit and governmental organisations in Hong Kong and different parts of China.

# 2.3.1.6 EDUHK RESEARCH REPOSITORY

Serving as the centralised digital locations of the research outputs of staff and postgraduates, the EdUHK Research Repository (<u>https://repository.eduhk.hk</u>) represents a significant knowledge management resource for the university, showcasing the range and level of research achievements of EdUHK staff. As of date, the Repository contains 44,938 validated records of citations and materials. Regarding visibility and impact, the Repository has recorded significant traction between July 2023 and June 2024, receiving 314,464 visits from various continents, indicating widespread interest and engagement with the research outputs.

# 2.3.2 TRAINING PROFESSIONALS

EdUHK is dedicated to enhancing our research and its application, annually advancing the education of teachers and practitioners by offering updated training embedded with the latest research insights. Through this ongoing endeavour, we develop and regularly introduce new groups of experts to the field, bringing innovative teaching methodologies to the educational landscape.

### 2.3.2.1 CONTINUING PROFESSIONAL DEVELOPMENT (CPD) COURSES

To facilitate continuous advancement in early childhood, primary, secondary, technical, and special education sectors, EdUHK collaborates with various external partners in providing a variety of self-funded professional development courses and training programmes, leveraging new teaching techniques and research discoveries, fostering solid links and networks between EdUHK and schools. The 72 CPD courses offered in the reporting year drive innovation in education and contribute to

cultivating highly proficient educational professionals, involving 415 key partners and generating more than \$65 million.

### 2.3.2.2 PROFESSIONAL TRAINING IN PSYCHOTHERAPY IN SICHUAN PROVINCE

Supported by the Tin Ka Ping Foundation, the Integrated Centre for Wellbeing joined hands with the Narrative Drawing Intervention (NDI) Institute in providing NDI courses to seed teachers from Shimian Chengbei Middle School and Chengdu University of Arts and Sciences and healing middle-schoolers' psychological trauma from experiencing frequent earthquakes. The psychological consultation and group counselling, cooperating with the combined treatment of narrative therapy and art, was effective in improving 180 individuals' mental health and the crisis management of in-district schools.

## 2.3.3 STUDENT ENGAGEMENT

## 2.3.3.1 STUDENT INTERNSHIPS AND PLACEMENTS

To allow students to get the most out of their studies and be prepared for their future careers, the Student Affairs Office and Faculties curate internship programs that widen students' learning experiences and enhance their employment skills across various fields, including education, I&T, business, non-governmental organisations, government positions, etc., both locally and internationally. These opportunities for internships and placements expand their exposure to different industries and facilitate the two-way transfer of knowledge with the community. The KT Sub-office also provides internship opportunities for INVESTED Programme participants. 36 internship positions were offered to students from the 2023–24 cohort, allowing them a chance to gain valuable insights into Hong Kong's entrepreneurship ecosystems in start-up companies incubated by the HKSTP, including Bridge AI Limited, NerOcean Limited, Keweya Education Technology Limited, etc.

# 2.3.3.2 ENTREPRENEURIAL EDUCATION AND SOCIAL INNOVATION CULTURE

The Centre for Entrepreneurship and Innovation Education (CEIE) under the Academy for Applied Policy Studies and Education Futures fosters a culture of E&I among students, enhancing their ability to deploy and transfer entrepreneurial skills within the educational sector and beyond.

# EdUHK 30<sup>th</sup> Anniversary Student Fair

Co-organised with the Library, Alumni Affairs and Development Office, as well as the School Partnership and Field Experience Office, the two-day Fair featured over 70 stalls run by EdUHK students, alumni, and primary and secondary school students and teachers. Participants showcase their spirit and learning outcomes in entrepreneurship and innovation and practise corporate social responsibility by donating 10% of their total net profit to charitable organisations.

# Social Entrepreneurship Week – SEW for Good

This new initiative aims to inspire and empower the EdUHK community by fostering dialogues with industry practitioners on generating societal change through entrepreneurship. This year, 18 charity organisations and social enterprises actively working towards social innovation and change were invited, enabling participants to broaden their knowledge and explore potential internships.

## 2.4 EMPOWERING KT MARKETING

### 2.4.1 INNOEX 2024



To connect EdUHK innovations with the industry, the KT Sub-office arranged the University's participation in various commercial activities. Organised by the HKSAR and the Hong Kong Trade Development Council (HKTDC), InnoEX 2024 was held on 13–16 April 2024 with the aim of facilitating regional and cross-sector collaborations. The event served as a marketingoriented platform with a special focus on Asia to showcase EdUHK's market-targeted next-gen

smart solutions like "An Intelligent Ocular Misalignment Measurement System".

#### 2.4.2 INNOCARNIVAL 2023

Several innovative GreenTech and STEM education projects were featured at the annual HKSAR ITC InnoTech Month flagship event, InnoCarnival 2023 (28 October–1 November 2023), held at the HKSTP. The University's research teams have successfully incorporated cutting-edge technology into daily life by actively interdisciplinary collaborations, fostering introducing discoveries and innovative advancements that directly enhance the wellbeing of the community.



#### 2.4.3 FITS CLOSING CEREMONY

Funded by the SIE Fund, the Closing Ceremony for the FITS 2021 pilot scheme was held to share the project teams' social innovation outcomes and commend their continuous efforts for social innovation (27 September 2023). After 2 years of research prototype development, community trials and collaboration with various external parties (e.g. government units, organisations, schools, associations, social enterprises, etc.), 4 FITS project leaders showcased their inventions and presented the social capital and impact (more than 21,000 direct beneficiaries, including children, youth, the elderly and persons with disabilities) brought through their projects to representatives of the SIEF and invited guests.



## 2.4.4 INDUSTRY COLLABORATIONS

The KT Sub-office actively engages with industry players to catalyse innovation and societal progress. In the reporting year, we have hosted several delegations from Asia-Pacific regions and visits from prominent venture capital firms and local industry-leading curators in industrial knowledge and technology, presenting our cutting-edge research, fostering dialogues that paved the way for future partnerships and exploring potential investment avenues.

An EdTech Sharing session was also held on 22 September 2023, featuring two distinguished local start-ups at the forefront of using new technologies to preserve culture. The co-founders shared their insights on preserving and authenticating cultural artefacts in the digital realm and how technology can be harnessed to safeguard and promote heritage. The event offered EdUHK students and faculty a chance to meet with Art-Tech businesses and consider possible collaborations.

## 2.5 INTERNATIONAL INVENTION AWARDS AND ACHIEVEMENTS

The KT Sub-office took part in various international competitions and exhibitions and showcased 16 projects within the professional community in 2023–24, earning 30 international invention awards. In particular, the University received its inaugural Gold Medal at our first participation in the Asia Exhibition of Innovations and Inventions Hong Kong (AEII) and its first Gold Medal at the century-old iENA International Trade Fair "Ideas-Inventions-New Products" in Germany.

## 2.5.1 INTERNATIONAL EXHIBITION OF INVENTIONS GENEVA



With a record number of inventors, universities, institutes and companies, the Geneva International Exhibition of Inventions resumed its original format (17–21 April 2024), with 1,035 inventions from 38 countries and regions on showcase. 7 awards listed in Annex IX are awarded to EdUHK projects spanning across areas including healthcare, EdTech, and games & toys. Dr KAM Chi Shan Anna captured the Silver Medal with her invention Automatic Screening

System for Mild Cognitive Impairment and Dementia with Auditory Tasks. Two other Silver Medalwinning innovations, I-well Home and Pelios, are developed from collaborative efforts between EdUHK and industrial partners, demonstrating our commitment to integrating research outcomes and applied technology in fostering the well-being and development of the new generation.

2.5.2 3<sup>RD</sup> ASIA EXHIBITION OF INNOVATIONS AND INVENTIONS HONG KONG (AEII)

Partnering with Palexpo, Geneva, Asia's unique annual innovation and invention exhibition cum competition AEII is exclusively devoted to innovations and inventions from Asia. With our first participation in the event after its resumption to physical mode, the University received its inaugural Gold Medal for the invention "Rapid Quantification of Microplastics Using Total Organic Carbon Analysis with Simple



Sample Pretreatment" by Dr TSANG Yiu Fai Chris. In addition to the gold medals, two innovations were awarded Silver Medals.

2.5.3 INTERNATIONAL TRADE FAIR "IDEAS-INVENTIONS-NEW PRODUCTS" IN GERMANY



75<sup>th</sup> Celebrating its anniversary, the international trade fair iENA took place in Nuremberg, Germany (28-30 October 2023), inventions featuring 500 from around 30 countries where inventors, licensors and entrepreneurs advance the development of their innovations at the event. Dr MUNG Wai Yin Steve captured the Gold Medal with his invention "Fall Detection System for Smart City" in the life-saving category. Other participating projects received Bronze Medals.

# 3. PERFORMANCE MEASUREMENT AND PERFORMANCE INDICATORS

Performance indicators (PIs) were established to oversee and evaluate the KT efforts at EdUHK efficiently. Each entity, from faculties and central research centres to pertinent academic support units, documents its KT actions annually, providing details on the PIs associated with their principal projects.

To more accurately represent the impact of our KT initiatives, PIs were updated in the last reporting period, and the University has made incremental progress and enhancements in key areas during 2023–24. Compared with the last reporting year, EdUHK's IP portfolio contributed significantly to the revenue with a remarkable growth by a tripling rate. Surges in the incomes from contract and collaborative research projects and CPD courses by 18%, 26% and 21%, respectively, are also seen, reflecting the University's commitment to lifelong learning and external partnerships.

# 4. LOOKING AHEAD

Building on its rich legacy in education, EdUHK maximises synergies, pushes the boundaries and exemplifies a vibrant spirit of innovation. In collaboration with industrial partners and main incubation ecosystem players, the University is steering I&T development forward while also committing additional resources to bolster strategic, multidisciplinary research beyond traditional educational scopes.

In the forthcoming period, support and allocation of resources for sizeable technology transfer grants and patent registrations will be amplified to further drive innovation and entrepreneurship. Commitment will also be extended towards nurturing robust alliances with entrepreneurs, investors, and academic institutions within Hong Kong and worldwide. Through early investor engagement and market connection, EdUHK-led start-ups and spin-offs can be developed into award-winning ventures that earn significant development funds and demonstrate long-term viability.

Amidst the enhancement of I&T, the progression of entrepreneurial endeavours, and University-wide new developments, EdUHK aspires to elevate its contributions on local, regional, and international stages in the years to come.

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Annex I Impact Case History (i)

# **Project Title**

Early Advancement in Social-emotional Health and Positivity (EASP)

# Principal Investigator / Project Leader

Prof CHUNG Kevin Kien Hoa, Dr CHAN King Chung Derwin and Dr LAU Yi Hung Eva

## **Project Summary**

The EASP was a 4-year project implemented from January 2020 to December 2023. It aimed to create an evidencebased and locally derived intervention integrating social-emotional learning and positive educational practices into early childhood education.

The positive psychological intervention program has been developed and tested based on the PROSPER framework (<u>Positivity, Relationships, Outcomes, Strengths, Purpose, Engagement, and Resilience</u>). The outcomes of this project show enhancement of the socioemotional well-being and positive educational practices in 685 teachers, 84 social workers, and 161 parents. Ultimately, the outcomes strengthen the participants' roles in facilitating children's learning experiences, reducing teachers' stress, and improving teacher-child and parent-child relationships.

### **Underpinning Research**

This project drew on the PROSPER framework (Ambler, Anstey, McCall, & White, 2017), including a well-being and achievement model (Positive emotions, Engagement, Relationships, Meaning, Accomplishment, Strengths, and Resilience). Under this framework, the project examined whether the 2x2 model of perceived social influence (Chan *et al.*, 2019) would promote individual well-being in teacher education and further empower a positive learning environment at preschool and home.

It is conceptualised in the 2x2 model of perceived social influence (Chan *et al.*, 2019) that significant others, such as parents and teachers, can exert four types of social influences on children. They differ in terms of valence and conditionality. Positive reinforcement (i.e., positive conditional responses such as praises and rewards) and affiliation (i.e., positive unconditional responses such as respect and trust) are positive social influences, whereas punishment (i.e., negative conditional responses such as penalty and criticism) and dysfunction (i.e., negative unconditional responses such as penalty and criticism) and dysfunction (i.e., negative unconditional responses such as penalty and criticism) and dysfunction (i.e., negative unconditional responses such as fights and disrespect) are negative social influences. According to the research findings and tenets of the model (Chan *et al.*, 2019), positive social influences are more favourable than negative social influences in supporting children's enjoyment, resilience, and commitment. In a positive educational environment, teachers and parents are encouraged to provide positive reinforcement and affiliation and avoid punishment and dysfunction (Chan *et al.*, 2019). Based on the PROSPER framework and the 2x2 model, we will develop an evidence-based intervention that will enhance teachers' and parents' self-management skills, empathy, capacity to regulate children's emotions, positive teacher/parent-child relationship, and adaptive social-emotional development of children. Our work will promote the well-being of children, teachers, and parents, helping children learn, relieving teachers' stress, enhancing parent-child relationships, and strengthening home-school-community partnerships.

# References to the Research

Ambler, G., Anstey, A., McCall, T., & White, M. (2017). *Flourishing in faith: Theology and positive psychology.* Eugene, OR: Cascade Books, Wipf and Stock.

Chan, D. K. C., Keegan, R. J., Lee, A. S. Y., Yang, S. X., Zhang, L., E., R. R., & Lonsdale, C. (2019). Toward a better assessment of perceived social influence: The relative role of significant others on young athletes. *Scandinavian Journal of Science and Medicine in Sports, 29*(2), 286-298. doi:10.1111/sms.13320

Cheung, R. Y. M., Leung, M. C., Chung, K. K. H., & Cheung, H. Y. (2018). *Family risks and child adjustment in Chinese contexts: Testing the mediating role of emotional intelligence. Journal of Child and Family Studies, 27*(12), 3887-3896.

Kwong, E., Lam, C. B., Li, X. M., Chung, K. K. H., Cheung, R. Y. M., & Leung, C. (2018). Fit in but stand out: A qualitative study of parents' and teachers' perspectives on socioemotional competence of children. *Early Childhood Research Quarterly,* 44, 275-287. doi:10.1016/j.ecresq.2018.02.018

Li, J. B., & Lau, E. Y. H. (2019). Teacher-student conflict and preschoolers' adjustment in the transition to primary school: The role of child self-regulation and parents' positive relations with others. *Early Education and Development, 30*(3), 423-437. doi:10.1080/10409289.2018.1535227

# Details of Impact or Benefit

The project has achieved remarkable success, demonstrating significant accomplishments in promoting well-being among early childhood education stakeholders. It enhanced the socioemotional well-being and positive educational practices of 685 teachers, 84 social workers, and 161 parents. The outcomes strengthen the participants' roles in facilitating children's learning experiences, reducing teachers' stress, and improving teacher-child and parent-child relationships. The project has:

- Developed a positive education training program for pre-service and in-service teachers.
- Developed an evidence-based smartphone application to promote positive education among preschool pre/in-service teachers and parents. The effectiveness of the app was evaluated in four studies. The findings demonstrated that the app positively affected participants' levels of positivity and outcome, affirming its potential as a valuable supportive tool in conjunction with the EASP intervention.
- Organized positive education workshops for pre-service and in-service preschool teachers and parents.
- Published 5 peer-reviewed manuscripts in esteemed journals. 3 additional manuscripts are currently undergoing the review process.
- Produced 2 e-books to address the adverse effects of the pandemic on mental health. These resources aim to empower teachers, social service professionals, and parents by presenting effective, evidence-based positive psychological strategies and skills that promote well-being.
- Developed and published a comprehensive resource package, "EASP: A Positive Education Program", for educators, practitioners, and researchers.
- Organized 3 local seminars to disseminate the project findings to researchers and parents of young children.
- Presented project findings at two international conferences.

Annex I Impact Case History (ii)

## **Project Title**

AI and multimodal intelligent applications

# Principal Investigator / Project Leader

Dr FU Hong

## **Project Summary**

Dr Fu's research showcases her expertise in algorithms and multimodal intelligent system applications and contributions in both healthcare and sports domains. Her team developed the world's first Intelligent Ocular Misalignment Measurement system, which is adopted by hospitals in Mainland China and recognised internationally, and the Intelligent Multi-Modal System for Boccia Training, which also attracted the attention of the Hong Kong Sports Institution.

## Underpinning Research

Motivated by a visit to an optical clinic, Dr Fu developed an alpha version of the strabismus evaluation system using digital video based on the cover test. This system employed a six-stage algorithm, including eye region extraction, iris boundary detection, keyframe detection, pupil localisation, deviation calculation, and strabismus evaluation. The assessment system demonstrated promising results by achieving an accuracy of over 91% in the horizontal direction and over 86% in the vertical direction.

Dr Fu and her team proposed and developed a comprehensive contour-eye image recognition model in 2021 to further enhance accuracy and efficiency. <sup>[R1]</sup> This model addressed the limitations of previous research by incorporating a set of parametric curves to create a comprehensive eye model. Training a deep neural network to evaluate the fitness of the Contour-Eye image, evolutionary computation was utilised to search for the best-fitting curve set. The evaluation of the algorithm using 2,498 eye images from 50 subjects confirmed its accuracy, surpassing other relevant studies in contour-eye fitting.

The robust algorithm has been integrated into the strabismus system, enhancing the accuracy of diagnosis. Moreover, this technology has been incorporated into the Boccia athletes' training system to improve eye-tracking accuracy during visualisation.

In 2023, Dr Fu and her team conducted further research on visual-motor tracking tasks with a focus on examining behavioural differences among groups with varying levels of motor coordination: low motor coordination (LMC), moderate motor coordination (MMC), and high motor coordination (HMC) <sup>[R2]</sup>. A specific aiming and throwing task was designed to investigate these differences, during which participants' eye gaze, body movement, and interaction with objects were recorded. Visual components were identified, and kinetic features were extracted for subsequent group significance testing.

The results revealed significant variations in gaze movement among participants with different degrees of motor coordination performance, specifically in terms of effective aiming time (EAT) and reactive gaze time (RGT). Furthermore, analysing the disparity between hitting-on trials and missing trials, it was discovered that the preparation time for object throwing and releasing played a crucial role in task performance. This phase highlighted the importance of duration and concentration levels in successfully executing the throwing task. These findings provide a theoretical foundation for enhancing throwing and aiming task performance and contribute to future research in visual-motor studies.

In the same year, building upon previous studies, Dr Fu and her team recognised the limitations of hand joint detection algorithms due to factors such as hand gesture variability, background and illuminance changes, and unfixed hand scale. To address these challenges, they proposed a novel anatomy-oriented hand joint detection approach using a cascaded multiscale feature fusion network, capable of locating hands and detecting hand joints from a single unmarked image <sup>[R3]</sup>.

The proposed network architecture consists of two stages. In stage I, a hand localisation module called 'shallow spatial hand feature representation (SSHFR)' is incorporated to extract hand region data. In stage II, a series of cascaded feature extraction modules known as 'multi-scale feature fusion (MSFF)' generate the initial hand joint heatmap. Manual reinforcement of the heatmaps is performed based on anatomical connections between hand joints. A loss function is integrated to effectively balance the weight of each MSFF module, ensuring accurate hand joint detection.

The effectiveness of the network proposed by Dr Fu and her team was evaluated using both synthetic and real-world images, demonstrating satisfactory performance and robustness across both categories. Moreover, the network effectively handled self-occlusion, different hand complexions, complex hand gestures, and background changes by utilising diverse datasets. The network improved the accuracy and efficiency of anatomical hand joint detection tasks. It offered potential solutions to related computer vision problems such as human pose detection and hand gesture recognition.

These studies contribute a theoretical foundation <sup>[R2]</sup> and technical support <sup>[R3]</sup> to advancing Dr Fu's boccia ball training system.

# **References to the Research**

<sup>[R1]</sup> Zheng, Y., Fu, F., Li, R., Hsung, T., Song, Z., & Wen, D. (2021). Deep neural network oriented evolutionary parametric eye modeling. Pattern Recognition, 113, 107755. https://doi.org/10.1016/j.patcog.2020.107755

<sup>[R2]</sup> Li, R., Fu, H., Zheng, Y., Gou, S., Yu, J. J., Kong, X., & Wang, H. (2023). Behavior analysis with integrated Visual-Motor tracking for developmental coordination disorder. IEEE Transactions on Neural Systems and Rehabilitation Engineering, 31, 2164–2173. https://doi.org/10.1109/tnsre.2023.3270287

<sup>[R3]</sup> Li, B., Li, R., Wang, W., & Fu, H. (2023). Serial-parallel multi-scale feature fusion for anatomy-oriented hand joint detection. Neurocomputing, 536, 59–72. https://doi.org/10.1016/j.neucom.2023.02.046

# **Details of Impact or Benefit**

Supported by a KT internal grant, Dr Fu and her team successfully developed the world's first prototype machine for Intelligent Ocular Misalignment Measurement in 2021. This fully automated machine offers a solution for measuring ocular misalignment, addressing the shortage of eye professionals and providing an objective method with highly precise measurements. Strabismus, affecting approximately 4% of the global population, often faces delays in diagnosis due to limited medical resources and high costs. The system enables fast and accurate diagnosis within minutes, reducing costs by 86% compared to manual measurements. Leveraging advanced AI algorithms, it objectively tracks eye movements, facilitating rapid and precise diagnoses.

The innovation has been recognised through various international accolades. In 2023, it received two gold medals, including one from the International Exhibition of Inventions Geneva and another from the International Invention Innovation Competition in Canada, where it also earned the Jury's Choice Award. Additionally, in the HKDAS Innofront 2024, Dr Fu's team garnered the Innovative Award and Excellence Award for their research in computer vision algorithms with applications in healthcare and education.

In the meantime, due to its recognised potential, Dr Fu's Strabismus assessment system caught significant attention from industry stakeholders. As a result, the knowledge and technology were successfully transferred to a prominent high-tech biomedical company in Beijing, China, through a non-exclusive license valued at over HK\$ 1.10 million. By licensing her innovative technologies and promoting their practical application, Dr Fu actively ensures that her research positively impacts society. Additionally, hospitals in various cities across mainland China have adopted a trial for the machine prototype, further validating its potential and real-world applicability.

The invention has also attracted significant media attention in Hong Kong, shedding light on the shortage of ophthalmologists and the risks associated with delayed strabismus diagnosis. In an exclusive interview with Dr Fu conducted by the Hong Kong Commercial Daily, the challenges faced in Hong Kong regarding the utilisation and commercialisation of medical equipment were discussed, highlighting the barriers between the bioengineering and healthcare industries.

Furthermore, Dr Fu's research extends beyond the Strabismus measurement system. Her work on eye modelling has resulted in a more comprehensive and accurate eye-tracking technology for the eye-body coordination system used in Boccia ball training. This system has attracted the attention of the Hong Kong Sports Institution, benefiting coaches and athletes by improving hand and eye tracking during a throw, providing a clear and direct visualisation of the movement path, which ultimately enhances performance.

Annex I Impact Case History (iii)

# **Project Title**

Fostering cross-sectoral collaborations, student agency and parental engagement in career and life development education for youth empowerment

# Principal Investigator / Project Leader

Dr TANG Hei Hang Hayes

# **Project Summary**

In Hong Kong, students struggle with self-agency and confidence in setting personal goals, which constrains their ability to pursue future aspirations. Their participation in career and life development (CLD) activities falls below the OECD average. Furthermore, teachers need more capabilities, knowledge, and professional networks to deliver impactful CLD education. Strong parental influence situates Hong Kong in a unique cultural context. Based on research integrating academic entrepreneurialism, youth perspectives, and parental engagement, our KT team engaged in a territory-wide programmatic intervention that develops an ecosystem for cross-sectoral collaborations, self-evaluation and sustainable improvements. In particular, the team influenced the adaptation of a school self-evaluation tool called the Hong Kong Benchmarks for Career and Life Development (HKBM), policymaking of CLD education and stakeholders at various levels.

# **Underpinning Research**

The transition from education to work is a critical life trajectory. However, our research <sup>[R2, R3]</sup> reveals (1) misalignments between education and youth engagement in the workplace after graduation and (2) declining employment prospects of young graduates <sup>[R3]</sup>. Our research <sup>[R1, R2, R3, R4, R5]</sup> consistently reveals the influence of the Confucian Heritage Culture on the context of high-performing education systems in East Asia. One of our GRF studies <sup>[R5]</sup> found that 40 per cent of disadvantaged Hong Kong youth view parental influence as pivotal for their educational plans.

Delivering impactful, meaningful, and contextually appropriate career and life education requires cross-sectoral and interprofessional collaborations between schools and the world of work. Student agency <sup>[R1]</sup> and parental engagement <sup>[R5]</sup> are equally important for youth to take ownership of their CLD learning while navigating their possible futures. Universities, as 'innovative learning organisations' <sup>[R4]</sup>, are best positioned to create enabling platforms that link education, economy, and society, and advance contextualisation <sup>[R6]</sup> in CLD education.

In Hong Kong, career education is in its infancy. Underdeveloped school-to-work transition reveals that existing patterns of graduate employment outcomes do not fully capture the contextual processes that align graduates' qualifications with suitable jobs <sup>[R2, R6]</sup>. Our research that integrates academic entrepreneurialism, youth perspectives, student leadership, parental engagement, and contextualisation has directed an impact agenda of reimagining new paradigm thinking of educational systems that foster youth empowerment, future imaginaries, optimism and collective thriving.

# **References to the Research**

<sup>[R1]</sup> Keung, C. P. C., & Ho, E. S. C. (2020). Structure and agency in adolescents' expectations of pursuing post-secondary education. *Research in Higher Education*, *61*(2), 270-295.

<sup>[R2]</sup> Lam, B. O. Y., & Tang, H. H. H. (2021). Making sense of 'graduate employability' in Hong Kong: a contextualized analysis of experience and interpretations of graduates of self-financing higher education institutions. *Journal of Education and Work*, *34*(1), 14-28.

<sup>[R3]</sup> Tang, H. H. H., & Dang, B. Y. Y. (2023). Warming up or cooling out? Educational desire and higher education participation in an Asian context. *The Australian Educational Researcher, 50*(3), 823-844.

<sup>[R4]</sup> Tang, H.H.H., & Zhang, Y. (2023). Is academic entrepreneurialism a universal concept? New ideas and insights from contextualisation beyond East and West. *International Journal of Chinese Education*, *12*(2).

<sup>[R5]</sup> Yuen, C.Y.M, Cheung A.C.K., Leung, S.C.S., Tang, H.H.H. & Chan, L.C.H. (2021). The success and obstacle factors in pursuing post-secondary education: The differences between Hong Kong mainstream and non-mainstream students. Education Journal, 49(2), 137-160 (in Chinese).

<sup>[R6]</sup> Wright, E., & Mulvey, B. (2021). Internships and the graduate labour market: how upper-middle-class students 'get ahead'. *British Journal of Sociology of Education*, *42*(3), 339-356.

<sup>[R7]</sup> Wright, E., Lee, M., Walker, A., Bryant, D., Choi, S., & Hassan, K. (2023). Developing the next generation of leaders: A global study of student leadership. *Educational Studies*, 1-21.

# **Details of Impact or Benefit**

Research on academic entrepreneurialism and youth leadership has led to the wide adoption of the Hong Kong Benchmarks for Career & Life Development (HKBM). This tool aligns with local education policies and supports schools in self-evaluation and improvement, particularly in career and life development (CLD) education. HKBM, a framework for self-improvement, helps schools align with global standards and fosters a whole-school approach to career education. It encourages collaboration among teachers and clarifies roles for all stakeholders.

The research also introduced two benchmarks specific to Hong Kong's Confucian culture. BM5 promotes student engagement through co-creation, while BM10 focuses on the significant role of parental support in CLD, reflecting the profound influence of family in Hong Kong's student career planning.

Nearly one-third of local secondary schools have embraced HKBM for self-evaluation, positively affecting student engagement and career readiness, with a notable 25% improvement in school performance. This mirrors the success of the UK's Gatsby Benchmarks. HKBM's adaptability makes it suitable for diverse academic environments. It has notably advanced CLD education, with experiential learning activities boosting students' career preparedness and aspirations.

The programme has trained 416 school leaders and 1,568 teachers and involved over 2,300 audiences in more than 55 educational seminars, certificate courses and sharing events. It has directly benefited 149,520 students and supported 323 at risk of dropping out to find alternative future pathways, while 322 student leaders were trained through the CLD Clubs. HKBM aids schools in identifying strengths and areas for growth in career education, fostering a comprehensive understanding of school development and facilitating targeted improvements. It also encourages data-driven evidence and collaboration with parents, enhancing support for students' career journeys. The ten HKBM benchmarks offer a structured, cooperative framework for implementing life development education incrementally, tailored to each school's unique context and trajectory.

School principals and teachers have raised that the ten HKBM benchmarks are comprehensive in coverage and promote cooperation among different stakeholders. Clear guidelines allow schools to carry out life development education plans and programmes with school-based characteristics in stages, step by step, and according to school conditions and development trajectories.

At the corporate level, over 100 Enterprise Advisors have joined forces with schools to provide students with realworld insights and career guidance. This partnership allows students to explore various industries and plan their educational and career paths through activities like company visits and internships. Additionally, 26 companies have provided job placements for teachers. The social work profession also revealed the programme's effectiveness in helping potential dropout or underachieving students to enhance their career decision-making progress, sense of hope for the future, and level of engagement and connection with communities.

Regarding policy impact, the Education Bureau (EDB) has recognised HKBM as one of the self-assessment mechanisms for CLD education in schools. Meetings were held on 22 September 2023 and 2 January 2024 to explore potential adoption and partnership in implementing HKBM and strengthening the Business-School Partnership Programme (BSPP) and District Development Networks (DDN). Evidence shows the compatibility (33 points in total) between the new HKBM and the HKSAR government key document for career guidance, "Guide on Life Planning Education and Career Guidance for Secondary Schools" (EDB Guide 2014).

International interest in HKBM is growing, with Kohana International School seeking to implement a system similar to HKBM, and Hiroshima University and Guangdong's Department of Education engaging with the HKBM team for insights into CLD practices.

Annex I Impact Case History (iv)

## **Project Title**

Novel Technologies (Animation Art, Interactive Art & AR) in Modern Puppet

# Principal Investigator / Project Leader

**Prof HUNG Keung** 

## **Project Summary**

Funded by an EdUHK internal KT Fund, the research project in Modern Puppetry harnesses novel technologies such as digital moving images and interactive and generative art while integrating 3D scanning, 3D printing, 3D interactive animation and real-time generative digital images, and exhibitions as a delivery platform. This innovative approach aims to redefine the traditional art form of puppetry, creating a multi-sensory and immersive experience for audiences. The project commences with 3D scanning, enabling the precise digital capture of physical objects and performers. These detailed scans serve as the basis for the subsequent phase, which involves leveraging 3D printing technology to produce intricately designed puppets and set pieces. This process allows for creating customisable and visually stunning puppets, expanding the artistic possibilities within puppet performances.

### **Underpinning Research**

The core objective of this research project is to pioneer the exploration of the potential of 3D scanning, 3D printing, and 3D interactive animation within the realm of Modern Puppetry.

By leveraging these advanced technologies and utilising exhibitions, the project endeavours to redefine the boundaries of traditional puppetry, striving to create an immersive and captivating artistic experience that harmoniously merges the physical and digital domains.

### **References to the Research**

Hung, K. Portable interactive mediation mirror: A novel approach to mindfulness practice through art and technology. *Proceedings of the 10<sup>th</sup> International Conference on Digital and Interactive Arts*. 2021

# **Details of Impact or Benefit**

The integration of 3D scanning, 3D printing, and 3D interactive animation within Modern Puppetry has the potential to significantly influence future puppetry innovations, setting a precedent for the evolution of the art form. The innovative approach pushes the boundaries of traditional puppetry, creating a transformative and captivating artistic experience that bridges the physical and digital worlds, potentially inspiring further advancements and explorations in the field. The project's pioneering approach and its potential to redefine the art form may serve as a catalyst for future innovations and creative endeavours within the realm of puppetry, potentially shaping the direction of the art form in the years to come. Exhibitions as a delivery platform provide a unique opportunity for audiences to engage with the innovative fusion of technology and puppetry, fostering an environment for experiencing Modern Puppetry in the digital age.

After project completion within EdUHK, the "digital puppet project" further received a grant from deTour 2023, particularly in the context of the "New Know How – Crafting Design Future" segment at PMQ, a 10-day international grand design festival (<u>https://detour.hk/main/en/exhibition/digital-puppet/</u>) which attracted more than 10,000 visitors. Supported by Create Hong Kong of HKSARG, the event serves as an annual celebration of creativity and features a rich lineup of activities, including workshops, designer dialogues, film screenings, and guided tours, contributing vibrancy to the global community and highlighting the reach and significance of the project.

Annex I Impact Case History (v)

# **Project Title**

Evaluation study, tool development and professional development on generic skills, bench mark adaptation and tailor-making of self-assessment tools for special schools

# Principal Investigator / Project Leader

Prof SIN Kuen Fung

# **Project Summary**

The project supports the career education of SEN students in Hong Kong special schools with the following objectives:

- To provide professional advice/input on the design, development, research, learning hub and dissemination for developing the Hong Kong Bench Mark Adaptation for Special Schools and Tailor-making Self-Assessment Tools.
- To conduct evaluation among stakeholders on using Hong Kong Bench Mark Adaptation for Special Schools and Tailor-making of Self-Assessment Tools.
- To further validate and develop instrument the three remaining generic skills for measuring ID individuals' attainment.
- To evaluate the effectiveness of the CV360 and VASK training program.
- To provide training of pre-service teachers on knowledge and skills in assessment, interventions and career support through the ABL, VRBL activities, CV360 and VASK.
- To support the knowledge dissemination on the project outcome to in-service teachers local, regionally and internationally.

# Underpinning Research

In response to the contextual needs of career education in SEN, the team will develop the VRL curriculum, providing the transition support from school to career planning, and training students in community adjustment, career, and personal care. Members will help examine the program's effectiveness by developing instrument for measuring the attainment of the remaining 3 generic skills of individual students with different extents of intellectual disabilities, by evaluating the effectiveness of resources, services and training of the project programs, and by identifying successful evidence-based practices through a wide range of investigation. Furthermore, for sustainability, ISNIE will offer training to pre-service teachers to be ABL/VRBL mentors/coaches, as well as organise knowledge transfer activities for outcome dissemination. The outcome will provide evidence and good practice for career education and planning for SEN students. That will fill in the missing gaps of practice and research in this particular aspect.

# **References to the Research**

Yang, L., Sin, K. F. & Savickas, M. L. (2023). Assessing factor structure and reliability of the career adaptability scale in students with special educational needs. *Frontiers in Psychology*, *14*, 1030218 (Rank A)

Yang, L., Pang, F., & Sin, K. F. (2023). Assessing the Psychometric Properties of the Practice and Product Inventory of Supporting Students with ASD (PPI-SSA): A Concise Assessment Tool for Teachers in Inclusive Classrooms. *Sustainability*, *15*(19), 14576. (Rank B)

Ye, T. F. F., Gao, F., Yang. L., Hsu, C. L. & Sin, K. F. (2022). Development and psychometric evaluation of the Generic Skills Teacher-Rating Scale for students with SEN in Hong Kong. *Hong Kong Journal of Special Education, 24*, 1-20.

洗權鋒、李子建、盧成皆、楊蘭(2022)。《認識自我創未來: 4C 個人資源評測工具》。 香港,中國: 香港教育大學特殊學習需要與融合教育中心https://julac.hosted.exlibrisgroup.com/primoexplore/search?query=any,contains,991018071856703410&vid=EDUHKFind@EdUHK Library

彭梓鳴、洗權鋒、蘇建群、李子建、盧成皆、楊蘭、鍾燕嫻、司徒勝營 (2021):「香港特教畢業生持續進修的機遇:賽馬會特教青年學苑」,《香港特殊教育期刊》,第二十三期,64-68 頁。(Rank C)

Cheng, S. & Sin, K. F. (2021). Thinking styles and career decision-making self-efficacy among deaf or hard of hearing, and hearing students. *Exceptionality*, 29 (3), 167-181 (Rank B)

Yang, L., Yuen, M. T., Wang, H., Wang, Z. Y. & Sin, K. F. (2020). Assessing career life skills self-efficacy of students with special educational needs: A comparative study in Hong Kong. In M. Yuen, W. Beamish, and V. S. Solberg (Eds.), *Careers for students with special educational needs: Perspectives on development and transitions from the Asia-pacific region* (313-326). Singapore: Springer.

# **Details of Impact or Benefit**

# **Services**

- Consultancy and visits for the project team and teachers of the seed schools and satellite schools in embedding generic skills in meetings and school visits, HKBM Adaptation for Special Schools and Tailor-making of Self-Assessment Tools in the three years period. (Weekly consultancy visits to the 36 participating schools)
- A number of VRBL programs resulting from the study for the project team and teachers of the special schools and satellite schools in preparing the VRBL programs in school visit meetings, visits and staff development programs. (Schools to be served, N=36)

# **Deliverables**

- HKBM Adaptation for Special Schools and Tailor-making of Self-Assessment Tools for Hong Kong special schools. (Potential beneficiaries: N=62, 8700 SEN students)
- Validated measuring instrument (including manual) for measuring ID individuals' attainment of generic skills in ABL and VRBL. (Potential beneficiaries: N=62, 8700 SEN students)
- A mid-term report and final report for the program effectiveness of CV360 and the VASK training program resulting from the wide range of research activities and data collection.
- Two manuscripts submitted to local and international journals for knowledge transfer.

# Knowledge Transfer

- 6 training workshops (15 hours training and 15 hours service learning) for 120 pre-service teachers for assisting the CV360, VASK training, ABL and VRBL programs in special schools.
- Seminars and professional development courses to in-service teachers in special education. (N=900)

# Annex II

Approved KT Fund Projects 2023–24

Project Investigator	Project Title
Dr CHEN Hsueh Chu	Teacher training: Revolutionizing English Intonation and Stress Pedagogy in Hong Kong Classrooms with Cutting- Edge Technological Approaches
Dr TAN Weiqiang	Designing a Sandplay Game Mobile App for Enhancing the Financial Literacy of Low-income Group in Hong Kong SAR
Dr TSE Choi Yeung Andy	Application of a Validated Eye-Tracking Mobile App in Children with Autism
Dr YEUNG Kin Chung Michael	Developing a Home-based Executive Function Training Program for Autistic Individuals

# Annex III Approved KTMGS Projects 2023–24

Project Investigator	Project Title
Dr KONG Siu Hang Eric	Empowering Underprivileged Children with an AI-driven Music Tutor: Unlocking the World of Music Education for All
Dr LEUNG Chi Hin	e-Orch Artificial Intelligent Music Platform
Dr TAN Weiqiang	RoboAdvisor for Financial Competence Assessment and Advisory for Low-income Groups

# Annex IV List of Patent Applications 2023–24

# Note: Entries with patents granted are highlighted

Inventor List	Name of Patent	Serial Number of Patent	Country/ Region	Date of Application / Grant
Dr LEUNG Chi Hin Michael	一種方格樂譜生成系統	ZL201910373046.0	China	07/2023
Dr FU Hong Dr SONG Yanjie External Partners	A System for Strabismus Assessment and a Method of Strabismus Assessment	CN202310890028.6	China	07/2023
Dr LEUNG Ka Man Dr CHAN Ka Man External Partners	A Garment for Sports or Activities	НК30085200	Hong Kong	07/2023
Dr TSANG Yiu Fai Chris Ms CHENG Yan Laam Ms LI Ziying	Method of Quantifying Microplastic Mass	НК30085204	Hong Kong	07/2023
Dr SONG Yanjie Prof LEE Chi Kin John	Method and Apparatus for	US18/497,001	United States	10/2023
Mr WU Kaiyi External Partners		HK32023081720.9 HK30100427	Hong Kong	10/2023 04/2024
Dr HU Xinyun Dr LEUNG Wai Man Vivienne External Partners	Make-Play Station	CN202330690747.4	China Design Patent	10/2023

Inventor List	Inventor List Name of Patent		Country/ Region	Date of Application / Grant
Dr LI Wai Chin Dr LEUNG Ho Man External Partner	Mycorrhizas Embedded Microbead and Manufacturing Method and Utilizing Method Thereof	1818227	Taiwan	10/2023
Dr MUNG Wai Yin Steve	Microstrip Phase Inverter	US18/518,627	United States	11/2023
Dr LIU Duo Mr WANG Lei Dr WANG Tingting External Partners	一種現代漢語發展性讀寫障 礙評估方法	CN202311753332.2	China	12/2023
Dr FU Hong	Machine Vision-Based Method And System For	US18/399,471	United States	12/2023
Miss HOU Beibei Prof CHAN Che Hin Chetwyn	Motion Of A Joint Of A Hand Of A Subject	HK32023084756.0 HK30101591	Hong Kong	12/2023 05/2024
External Partners	基於機器視覺的確定受試者 手關節運動範圍的方法和系 統	CN2024105018109	China	04/2024
Dr KAM Chi Shan Anna	An Apparatus for Performing a Hearing Test	HK32024086236.9 HK30101315	Hong Kong	01/2024 05/2024
Prof YEUNG Siu Sze	A Learning Coaching	US18/428,479	United States	01/2024
Susanna	Apparatus and System	HK32024086323.5 HK30101596	Hong Kong	01/2024 05/2024
Prof YU Leung Ho Philip External Partners	Multi-Scale 3D Convolutional Classification Model for Cross-Sectional Volumetic Image Recognition	US18/576,722	United States	01/2024

Inventor List	Name of Patent	Serial Number of Patent	Country/ Region	Date of Application / Grant
Dr MUNG Wai Yin Steve Prof CHAN Che Hin Chetwyn External Partners	Method and System for Controlling Noise	US 18/414,752	United States	01/2024
Prof YU Leung Ho Philip	Generative adversarial network-based lossless image	US18/580,989	United States	01/2024
External Partners	compression model for cross- sectional imaging	CN117769722 A	China	03/2024
Dr YEUNG Kin Chung Michael	System and Method for Interacting with Capturing Human Brain Activities using EEG-FNIRS Neurofeedback	US18/613,064	United States	03/2024
Dr KONG Siu Hang Eric External Partners	Apparatus and Method based on Convolutional Neural Network for Sound Recognition on Music Learning	HK32024089435.4	Hong Kong	03/2024
Dr FU Hong Mr HE Ziyu Miss WANG Yitong Mr LI Xiao	Machine Learning-Based Method for Calibrating a Camera with respect to a Scene	US18/625,232	United States	04/2024
Dr MUNG Wai Yin Steve Prof CHAN Che Hin Chetwyn Mr LIAO Jason External Partners	Headrest with Noise Reduction Function	HK32024089964.3	Hong Kong	04/2024

Inventor List	Name of Patent	Serial Number of Patent	Country/ Region	Date of Application / Grant
Dr ZOU Di (former staff) Prof CHOU Kee Lee Dr XIE Haoran (former staff) External Partners	Automatic Emotion Recognition Method, System, Computing Device, and Computer Readable Storage Medium	HK20027788	Hong Kong	04/2024

# Annex V EASE Fund Winning Teams 2023–24

#	EASE Fund Team	Team Summary
1	Al Buddy for Learning Futures	Al Buddy for Learning Futures' vision is to develop social robots that act as interactive learning companions. The innovative approach has led the team to design a social robot specifically tailored for early childhood English education. Looking ahead, the team plans to broaden their applications to address the needs of different age groups. Ultimately, their goal is to provide cost-effective robotic solutions, thereby fostering lifelong learning and quality of life.
2	E-Bridge	With the value of trust, quality, and senior empowerment, E-Bridge aims to establish the first seamless technological platform promoting cross-border eldercare between elderly individuals in Hong Kong elderlies and high-end eldercare providers in GBA cities. This platform utilizes various technologies, including 3-D scanning and VR production technology, care-on-call services, senior-friendly website and mobile application, as well as experiential travels.
3	Focus Tech	Focus Tech specializes in AI technologies, utilizing advanced computer vision algorithms in healthcare and education. Their mission is to provide personalized experiences through innovative solutions and technology commercialization. Focus Tech offers comprehensive solutions by using integrating big data analytics, high-precision diagnostic instruments, and assistive technologies. The team at Focus Tech is dedicated to making a lasting impact through expertise and forward- thinking approaches.

#	EASE Fund Team	Team Summary
4	InnoFuture Lab	InnoFuture Lab aims to elicit children's curiosity wherever they go by using data from users' mobility patterns and learning preferences. Their unique solution is a contextual learning AI platform that generates relevant experiential learning content and sustainable education for students. InnoFuture Lab aspires to cultivate the next generation of changemakers.
5	Iris's Palette	Iris's Palette is a game software based on art therapy theory, which uses AI technology to analyse users' mental health status and help schools and organizations to prevent emotional problems among teenagers. Iris's Palette is made up of members with expertise in art therapy and data analysis.

Annex VI EASE Fund 2023–24 Special Awards Winning Teams

#	Special Award	EASE Fund Team
1	Social Impact Award	E-Bridge
2	Technology Excellence Award	Focus Tech
3	Award for Best Presentation	KongPaper

# Annex VII EdUHK-HKSTP Co-Ideation (2023–24) Winning Teams

#	EASE Fund Team	Team Summary
1	Al Buddy for Learning Futures	Al Buddy for Learning Futures' vision is to develop social robots that act as interactive learning companions. The innovative approach has led the team to design a social robot specifically tailored for early childhood English education. Looking ahead, the team plans to broaden their applications to address the needs of different age groups. Ultimately, their goal is to provide cost-effective robotic solutions, thereby fostering lifelong learning and quality of life.
2	DzogClear	DzogClear is poised to serve the SEN population by offering a range of original design products, including Community of Practice, AI Headband, and AI-based digital game equipment. These innovative solutions are built upon the principles of mindful movement therapy. With a vision that extends beyond Hong Kong, DzogClear aims to bring benefits to the SEN population in the GBA, Asia, and beyond.
3	EduAssess Solutions	EduAssess Solutions empowers K-12 schools (Secondary schools) with technology- driven assessment solutions, comprehensive analysis report and improvement strategies by academics to enhance student learning outcomes, facilitate personalised education, and contribute to lifelong learning. Simultaneously, reducing the heavy workload of educators in Hong Kong by streamlining assessments, automating grading, and providing instant feedback through technology to promote efficient evaluation and tailored instruction.
4	FARM W	Agricultural industry is facing many significant challenges, including food security, labor shortages, reductions in soil fertility due to poor land management, unpredictable variability in the climate, and the growing need to implement more sustainable practices. FARM W is a cross-sector partnership, district-based approach and synergy among social enterprises for providing different types of IOT agricultural solutions for the agricultural industry, local farms, urban farming households and corporations.
5	Focus Tech	Focus Tech specializes in AI technologies, utilizing advanced computer vision algorithms in healthcare and education. Their mission is to provide personalized experiences through innovative solutions and technology commercialization. Focus Tech offers comprehensive solutions by using integrating big data analytics, high-precision diagnostic instruments, and assistive technologies. The team at Focus Tech is dedicated to making a lasting impact through expertise and forward- thinking approaches.

#	EASE Fund Team	Team Summary
6	InnoFuture Lab	InnoFuture Lab aims to elicit children's curiosity wherever they go by using data from users' mobility patterns and learning preferences. Their unique solution is a contextual learning AI platform that generates relevant experiential learning content and sustainable education for students. InnoFuture Lab aspires to cultivate the next generation of changemakers.
7	Iris's Palette	Iris's Palette is a game software based on art therapy theory, which uses AI technology to analyse users' mental health status and help schools and organizations to prevent emotional problems among teenagers. Iris's Palette is made up of members with expertise in art therapy and data analysis.
8	JSBM	JSMB is an online academy to address the shortage of qualified music teachers in Hong Kong's kindergartens, offering an engaging curriculum based on the Colour strings method. With the interactive platform, kindergartens can provide qualitied music education regardless of location or resources, while the scalability allows for long-term growth and potential partnerships.
9	SporTEA <sup>2</sup> M	SporTEA <sup>2</sup> M combines sports, AI, and STEAM education to provide avant-garde STEAM sports courses, revolutionizing sports education. The team has established initial collaborations with local primary and secondary schools in Hong Kong to conduct curriculum research aimed at cultivating the STEAM mindset of students and sports educators while simultaneously advancing the development of sports education in Hong Kong and the GBA through professional and scientific research in sports.
10	YoSTEM-GPT!	YoSTEM-GPT! Team, with over 20 years of success in science, math education, and educational technology, envisions advancing research-backed generative Al- integrated pedagogies. Their multi-user, multi-LLM, and text-to-scientific-diagram YoSTEM-GPT! platform enhances personalized and collaborative science and math learning, making it more engaging and fun!
11	24/7 MENTAL UP	24/7 MENTALUP is a One-Stop Online Mental Health Platform, leading emotional support and becoming the preferred solution for individuals who are facing emotional challenges. Al-driven psychological counselling has become the trend in the platform, it provides AI Counsellor Chit Chat, assess mental health conditions and Online/Offline Mental Health programs.

# Annex VIII Highlighted External Achievements of EdUHK Start-ups 2023–24

EdUHK Start-up	Nature of Business	External Achievement
Financial Quest	FinTech	<ul> <li>HSUHK Inter-University Innovation Project Competition 2024 - FinTech x ChatGPT 1<sup>st</sup> runner up</li> </ul>
Focus Tech	Healthcare Technology	<ul> <li>HKDAS InnoFront 2024 Best Innovation Award</li> <li>HKDAS InnoFront 2024 Merit Award</li> <li>Incubatee of Deep Tech Lab</li> <li>The 10<sup>th</sup> Hong Kong University Student Innovation and Entrepreneurship Competition Second Prize</li> </ul>
Fraud Detection - Anti Fraud	FinTech	<ul> <li>HSUHK Inter-University Innovation Project Competition 2024 - FinTech x ChatGPT 2<sup>nd</sup> runner up</li> </ul>
Headset Limited	Early Childhood Education	<ul> <li>iCAN 2023 Gold Medal</li> <li>iCAN 2023 Special Award</li> </ul>
INSUREEDU	FinTech	<ul> <li>HSUHK Inter-University Innovation Project Competition 2024 - FinTech x ChatGPT 2<sup>nd</sup> runner up</li> </ul>
InsureLink	FinTech	<ul> <li>HSUHK Inter-University Innovation Project Competition 2024 - FinTech x ChatGPT Champion</li> </ul>
Newbie Trade (BTAP)	FinTech	<ul> <li>Hong Kong Techathon<sup>+</sup> 2024 Bronze Award (Local Open Group, Digital Economy Technology Area)</li> </ul>
Pink Dolphin	Female-friendly Swimming Service	<ul> <li>HKSEC 23/24 Champion</li> <li>HSBC Hub for the Future In Action (June 2023)</li> </ul>
PlanSeed	Cantonese Learning Tool	<ul> <li>Hong Kong Techathon<sup>+</sup> 2024 Silver Award (Local Open Group, Digital Economy Technology Area)</li> </ul>
Project e-MUSE	Music Education	<ul> <li>Hong Kong Techathon<sup>+</sup> 2024 Gold Award (Local Open Group, Digital Economy Technology Area)</li> </ul>

# Annex IX International Award-Winning Projects 2023–24

2024					
Project Title	Principal Investigator(s)	Award(s)			
International Exhibition of Inventions Geneva 2024					
Total no. of projects: 7	Total no. of awards: 7				
Automatic Screening System for Mild Cognitive Impairment and Dementia with Auditory Tasks	Dr KAM Chi Shan Anna	Silver Medal			
I-well Home	Prof LEUNG Chi Hung	Silver Medal			
Pelios: Revealing and predicting emotion through wearable and digital biomarkers for SEN children	Mr WONG Chun Man Victor	Silver Medal			
Smart Headset featuring Adaptive Noise Filters for Individuals with Autism Spectrum Disorder	Dr MUNG Wai Yin Steve	Silver Medal			
A+Sleep: Personalized Acoustic Control Pillow	Dr MUNG Wai Yin Steve	Bronze Medal			
Digital Puppetry System: Connecting Young Generation and Cultural Heritage with Novel Technology	Prof HUNG Keung	Bronze Medal			
Make-Play Station	Dr HU Xinyun, Dr LEUNG Wai Man Vivenne	Bronze Medal			

2023				
Project Title	Principal Investigator(s)	Award(s)		
3 <sup>rd</sup> Asia Exhibition of Innovations and	Inventions			
Total no. of projects: 3	Total no. of awards: 3			
Rapid Quantification of Microplastics Using Total Organic Carbon Analysis with Simple Sample Pretreatment	Dr TSANG Yiu Fai Chris	Gold Medal		
An Intelligent Ocular Misalignment Measurement System	Dr FU Hong	Silver Medal		
Nano-Sensor System for Meat and Seafood Monitoring	Prof CHOW Cheuk Fai Stephen	Silver Medal		
iENA - International Trade Fair "Ideas	-Inventions-New Products" in German	ıy 2023		
Total no. of projects: 4	Total no. of awards: 4			
Fall Detection System for Smart City	Dr MUNG Wai Yin Steve	Gold Medal		
Audio-Tactile Chinese Characters: Bringing Multisensory & Novel Learning Experience to people with visual impairment and with Special Needs	Prof HUNG Keung	Bronze Medal		
Nano-Sensor System for Meat and Seafood Monitoring	Prof CHOW Cheuk Fai Stephen	Bronze Medal		
Rapid Quantification of Microplastics Using Total Organic Carbon Analysis with Simple Sample Pretreatment	Dr TSANG Yiu Fai Chris	Bronze Medal		
International Invention Innovation C	ompetition in Canada (iCAN) 2023			
Total no. of projects: 8	Total no. of awards: 16			
Rapid Quantification of Microplastics Using Total Organic Carbon Analysis with Simple Sample Pretreatment	Dr TSANG Yiu Fai Chris	Gold Medal, Organizer's Choice Award		

<b>2023</b> (cont'd)			
Project Title	Principal Investigator(s)	Award(s)	
International Invention Innovation Competition in Canada (iCAN) 2023 (cont'd)			
An Intelligent Ocular Misalignment Measurement System	Dr FU Hong	Gold Medal, Jury's Choice Award	
Fall Detection System for Smart City	Dr MUNG Wai Yin Steve	Gold Medal, Special Award	
Nano-Sensor System for Meat and Seafood Monitoring	Prof CHOW Cheuk Fai Stephen	Gold Medal, Special Award	
Revolutionizing Early Childhood Education with Vision AI-led Games for Active Learning and Balanced Technology Usage	TREE BEAR Limited Headset Limited	Gold Medal, Special Award	
Sitting Light Volleyball and Its Functional Sports Garment	Dr LEUNG Ka Man	Gold Medal, Special Award	
Learningverse - A 3D Metaverse for Online Collaborative Learning	Dr SONG Yanjie	Silver Medal, Special Award	
Game-basis Learning Materials for Children to Promote Healthy Eating and Be a Germ Fighter	Dr CHUNG Ming Yan	Bronze Medal, Special Award	

# Annex X Summary of Performance Indicators

Summary of Performance Indicators of Knowledge Transfer Activities			2022–23 (1 Jul – 30 Jun)	2023–24 (1 Jul – 30 Jun)
1	Contract Research	Number of Projects	53	42
		Income from Projects	\$68,313,509	\$80,320,149
		Number of Key Partners	130	124
2		Number of Projects	45	41
	Collaborative Research Projects	Income from Projects	\$23,626,942	\$29,850,826
		Number of Key Partners	135	208
	Consultancy	Number of Projects	50	43
3		Income from Projects	\$63,598,556	\$36,835,159
		Number of Key Partners	63	35
	Intellectual Properties	Number of Patents Filed	19	20
4		Number of Patents Granted	9	9
4		Number of International Invention Awards Received	39	30
-		Number of Active Licences	5	6
5	IP Licensing	Income Generated	\$51,258	\$222,220
	Entrepreneurial Activities	Number of Entrepreneurial Activities	78	87
		Number of Start-up Teams Supported	58	47
6		Number of Attendance by Students	2,351	3,614
		Number of Attendance by Alumni	135	121
		Number of Attendance by Staff	89	23
7	Social, Community and Cultural	Number of Activities	25	25
,	Engagement	Number of Key Partners	90	40
	Continuing Professional Development (CPD) Courses	Number of CPD Courses	73	72
_		Income from CPD Courses	\$53,531,294	\$65,032,024
8		Number of Key Partners	193	415
		Number of Student Contact Hours	50,267	29,868
9	Public Dissemination and Speeches	Number of Activities	411	325
9		Number of Key Partners	1,113	1,061
10	Staff Engaged as Professional Consultants or Members of External Advisory Bodies	Number of Staff Engaged	156	148