EXPO 2017

www.cuhk.edu.hk/eLearning/expo

TEACHING & LEARNING INNOVATION EXPO

7 December 2017 (Thursday)

LT6, 1/F, Lee Shau Kee Building
Central Campus

The Chinese University of Hong Kong
Shatin, Hong Kong

Jointly organised by CLEAR and ITSC

Centre for Learning Enhancement And Research
學能提升研究中心


TEACHING &
LEARNING
INNOVATION


Introduce small experiential exercises in class
plan – do – review
role plays for interpersonal skills
2
We learn faster with experience

Professor Joseph J.Y. SUNG

Vice-Chancellor / President
Mok Hing Yiu Professor of Medicine
The Chinese University of Hong Kong

MESSAGE FROM THE VICE-CHANCELLOR

I would like to invite you all to the 2017 Teaching and Learning Innovation Expo, which will be held at the CUHK on 7th December. This is where the CUHK faculty and staff showcase their recent advances in teaching and learning that have been trialed and/or implemented over the year.

All the teachers at the CUHK have a common goal and that is to maintain their teaching excellence. Indeed, from the start, we have effectively implemented many different strategies, some quite innovative in nature, to enhance the teaching and learning environment. Many of these strategies have echoed important educational concepts and beliefs, such as outcome-based, active and authentic learning methods. Our courses are therefore designed and conducted in such a way that students can gain the essential learning outcomes by engaging in learning processes that require critical thinking and the accomplishment of authentic tasks.

Recent advances in technology have certainly initiated new possibilities for the enhancement of teaching and learning strategies. The fact that for many subjects, basic knowledge can be self-learnt by the students through the provision of quality multi-media learning packages, has given us a chance to rethink whether class time could be spent more wisely. For example, teachers might use this time to focus on more challenging concepts or conduct activities that engage students in discussions, interactive activities and the application of knowledge on tasks of variable complexity.

We know that to take full advantage of any new pedagogical activities and technological breakthroughs that occur, new skills are required. Thus, practitioners can benefit from learning from each other's experiences and wisdom. The Expo this year will certainly serve as a platform for such a mode for sharing. See you all on the day.

Professor Benjamin W. WAH

Provost
Wei Lun Professor of Computer Science and Engineering
The Chinese University of Hong Kong

MESSAGE FROM THE PROVOST

The Teaching and Learning Innovation Expo has always been an extremely valuable event at the CUHK, as it provides an excellent opportunity for teachers to share their effective teaching and learning practices.

It is great news that two of our teachers, Professor Emily CHAN in the Jockey Club School of Public Health and Primary Care, and Professor Suzanne So in the Department of Psychology, have been awarded the UGC Teaching Award this year. They will share their secrets of good teaching in the keynote address sessions.

The Student Voice session this year continues to focus on the use of technology (and in particular the use of videos) for self-learning, as well as the re-design of classroom time for engaged learning following practices advocated in the Flipped Classroom approach. In recent years, this concept has aroused a great deal of interest in many institutions worldwide.

The Poster session and the Parallel Talks will continue to showcase a lot of the achievements of our teachers, such as the making of Micro-Module Courseware as well as the implementation of many innovative teaching and learning strategies in and outside classroom.

Professor Isabella Wai-yin POON

Pro-Vice-Chancellor and Vice-President
Professor, Department of Statistics
The Chinese University of Hong Kong

MESSAGE FROM THE PRO-VICE-CHANCELLOR

Time flies and without noticing it the Teaching and Learning Innovation Expo has come to its eleventh year since its' first launch in the year 2007. I still remember the time when I first presented a poster in the event and the joy of meeting the like-minded and fruitful conservations we have had that resulted in new teaching and learning ideas. I also remember how the event has slowly expanded from a scale of a dozen or so posters to the much bigger size in recent years – last year we had 72 posters and 32 talks. The Expo seems to have slowly helped to cultivate a community spirit amongst our teachers when they are more and more engaged in sharing of good practices.

One highlight this year is that Professor Emily CHAN (Jockey Club School of Public Health and Primary Care), and Professor Suzanne So (Department of Psychology) have been awarded the UGC Teaching Award. In the keynote speeches, they will be explaining their success stories and I look forward to learning their tips and advice.

Another highlight this year is a new small corner in the poster session in which a few teachers from other universities are invited to present their innovative practices. It should be a good opportunity for our teachers to learn even by making reference of practices from a wider context.

Please come back to this Expo website from time to time to look for updates before the event day. Apart from abstracts, presenters this year are also encouraged to upload additional short video clips to explain their innovative strategies BEFORE the event. The abstracts and the videos will enable participants to have basic understanding of the posters and/or the talks so that interactions on the day can be even more focused and fruitful.

Looking forward to seeing you in the Expo.

INTRODUCTION

Objective

The Expo is an annual event that provides a mutually supportive and positive environment, where creative ideas or practices that lead to learning enhancement can be exchanged through meaningful conversation and interactive seminars. We welcome all ideas and practices ranging from the course to the institutional level, regardless of whether technology is involved or not. The 'Teaching and Learning Innovation Expo 2017' had five main features: a formal opening session, keynote sessions, talks, poster presentations and a one-week poster exhibition as a follow -up.

PROGRAMME

Event date: 7 December 2017 (Thursday)
Main venue: LT6, 1/F, Lee Shau Kee Building, CUHK
Parallel session: 2/F, LSK
Poster exhibition: UG & 1/F lobby, LSK

Event Programme

Time	Programme					
08:45 – 09:15	Registration (1/F, LSK)					
09:15 – 09:25	Opening remarks by Professor Poon Wai-yin (LSK LT6)					
09:25 – 10:10	Keynote by Professor CHAN Ying Yang, Emily, Jockey Club School of Public Health and Primary Care Awardee of 2017 University Grants Committee Teaching Award and 2017 University Education Award					
10:10 – 10:25	Coffee break*					
10:25 – 11:10	Keynote by Professor So Ho-wai, Suzanne, Department of Psychology Awardee of 2017 University Grants Committee Teaching Award and 2017 University Education Award					
11:10 – 11:50	Student Voice by CUHK students					
11:50 – 13:45	Interactive poster presentation and lunch*^(1/F, UG)					
	201	202	204	208	210	212
14:00 – 14:20	T1	T2	T3	T4	T5	T6
14:25 – 14:45	T7	T8	T9	T10	T11	T12
14:50 – 15:10	T13	T14	T15	T16	T17	T18
15:15 – 15:35	T19	T20	T21	T22	T23	T24
15:40 – 16:00	T25	T26	T27	-	T29	T30
16:15 – 17:00	Poster awards & Closing & Refreshment*(LSK UG)					

Remarks:

*For environmental protection, participants are encouraged to bring along their own cups for drinks.
^Light lunch will be provided.

KEYNOTE ADDRESSES

Professor CHAN Ying Yang, Emily

Awardee of the 2017 UGC Teaching Award and 2017 University Education Award
Associate Director (External Affairs and Collaboration), JC School of Public Health and Primary Care
Professor, Jockey Club School of Public Health and Primary Care,
Faculty of Medicine, The Chinese University of Hong Kong

Title

How to Teach Interdisciplinary Global Field Experiential Teaching and Learning?

Abstract

Prof. Emily Ying Yang Chan, Professor and Assistant Dean (Development) of the Faculty of Medicine, is a disaster and medical humanitarian expert and international academic leader in global field experiential learning. Besides an excellent classroom teaching track record, she has developed various innovative global field teaching programmes based on her teaching philosophy that “insight is a function of exposure and experience”. These programmes require multidisciplinary collaborations, transnational partnerships and transborder technology-enhanced teaching methods. These community knowledge transfer activities have always been aiming to enhance and facilitate exposure and experiential learning opportunities for students, providing students with learning opportunities and cultivating them to become global leaders capable of making life-long contributions and bringing real impact to the global community. Prof. Chan was nominated by CUHK for and won the UGC Teaching Award 2017 (General Faculty Member/Teams) in recognition of her dedication and leadership in her learner-centred, outcome-based,

evidence-and-research-informed, field experiential teaching and learning approach for public health and medical humanitarian response during the past decade. She would share her education philosophy and how she has built her academic team in disaster and humanitarian teaching at The Chinese University of Hong Kong.

Biography

Emily Ying Yang Chan serves as Professor and Assistant Dean (Development), Faculty of Medicine, and Associate Director (External Affairs and Collaboration), JC School of Public Health and Primary Care, CUHK; Director, Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC), Centre for Global Health (CGH) and Centre of Excellence (ICoE-CCOUC), Integrated Research on Disaster Risk (IRDR); Co-chairperson, WHO Thematic Platform for Health Emergency & Disaster Risk Management Research Group; Member, Asia Science Technology and Academia Advisory Group (ASTAAG); Visiting Professor, Oxford University Nuffield Department of Medicine; Honorary Professor, Li Ka Shing Faculty of Medicine, University of Hong Kong; and Senior Fellow, Harvard Humanitarian Initiative, and Visiting Scholar, FXB Center, Harvard University.

Her research interests include disaster and humanitarian medicine, climate change and health, global and planetary health, Human Health Security and Health Emergency and Disaster Risk Management (H-EDRM), remote rural health, implementation and translational science, ethnic minority health, injury and violence epidemiology, and primary care. Awarded the 2007 Nobuo Maeda International Research Award of American Public Health Association, Professor Chan has published more than 200 international peer-reviewed academic/technical/conference articles. Professor Chan also has extensive experience as frontline emergency relief practitioner in the mid-1990s that spans across 20 countries. She was awarded Hong Kong Ten Outstanding Young Persons Award in 2004, Caring Physicians of the World Award in 2005, Ten Outstanding Young Persons of the World Award in 2005, Hong Kong Humanity Award in 2007, Leader of the Year Award in 2016, National Geographic Chinese Explorer Award in 2016, and UGC Teaching Award in 2017.

KEYNOTE ADDRESSES

Professor SO Ho-wai, Suzanne

Awardee of the 2017 UGC Teaching Award and 2017 University Education Award
Assistant Professor, Department of Psychology, The Chinese University of Hong Kong

Title

Five things I have learned about improving students' sense of agency

Abstract

We want our students to develop and succeed. We try our best to give and expect them to take. However, rather than making students learn, it is more effective if we cultivate an environment for learning to take place. As a clinical psychologist turned academic, Professor So has found understanding and managing people's behavior a key aspect of her career. Over the last five years at the CUHK, Professor So has formulated ways to engage psychology students into effective teaching and learning. She is determined to put students in the center stage of their learning and has experimented novel and systematic pedagogical approaches such as the 'self-practice/self-reflection' (SP/SR). This keynote address will integrate what psychological research has informed us about how we learn with practical applications for learners across disciplines.

Biography

Professor Suzanne So obtained BA in Experimental Psychology at Oxford University, followed by MSSc in Clinical Psychology at the Chinese University of Hong Kong (CUHK), and PhD in Psychology at King's College London. Dr So has practiced as clinical psychologist at the Hospital Authority, specialising in assessment and treatment of early psychosis. Professor So joined the CUHK in 2012 as Assistant Professor of Psychology, and is enthusiastic in incorporating her frontline clinical experience into teaching and research. Her research interests are cognitive models of psychosis, cognitive-behavioural therapy, and the use of experience sampling methodology as assessment and treatment. She is recipient of the 2017 UGC Teaching Award (Early Career Category), the 2016 University Education Award, the 2016 Faculty of Social Science Exemplary Teaching Award, and the 2016 CUHK Young Researcher Award.

KEYNOTE ADDRESSES

Student Voice by CUHK students

Title
Reflection on Innovative Teaching Methods

FEI Wenyan
GUAN Jinying

Title
Our Experience with Open-ended Projects in Interactive Classroom

NG Hoi Kee, Rebecca
LAO Ang, Monica
WONG Hoi Ki

LIST OF PRESENTERS

CUHK Posters P1 - 19

Title	Presenter(s)	Poster No.
Narrative Qualitative Assessment of Students' High-Level Thinking on Open-ended Problems	Dr. Kam Moon PANG, Dr. Julie Chu Lee CHIU, Dr. Xin GAO, Dr.Cherry To Kam LAM, Dr. Vivian Jun WU and Dr. Yang YEUNG	P1
NQA-inspired Study on Students' Perspectives in Controversial Science Issues	Dr. Kam Moon PANG	P2
Micro-modules for UGFN1000 Classroom Flipping	Dr. Kai Ming KIANG, Dr. Jun Vivian WU, Dr. Andy Ka Leung NG and Dr. Derek Hang Cheong CHEUNG	P3
Development of a New Questionnaire on the Cognitive and Affective Influence of Science Anxiety for a Science Core-text General Education Course	Dr. Wan Heng Sandy HOI, Dr. Wing Hung WONG, Dr. Kam Moon PANG and Dr. Vitrierat NG	P4
Engaging Students in Close Reading: Implementation of PASS as Reading Workshops in the General Education Foundation Programme	Dr. Wai Man SZETO, Isaac Ka Tai WONG, Dr. Kenneth Ming LI, Dr. Vivian Jun WU, Dr. Amber Lo Ming YIP, Ann Ka Yu LAI and Prof. Mei Yee LEUNG	P5
Virtual Experiential Learning for General Education Foundation Programme	Dr. Andy Ka-Leung NG, Dr. Derek Hang-Cheong CHEUNG, Dr. Cheuk-Hang LEUNG, Dr. Samson Pak-Nin KWOK, Chi-Tat LI, Eva Siu-Ling CHEUNG and Taylor Lik-Hang TANG	P6
Coupling Micro-modules with Online Discussion Forum: A Content Analysis Study	Dr. Derek Hang-Cheong CHEUNG, Andy Ka-Leung NG, Kai-Ming KIANG and Isaac Ka-Tai WONG	P7
Building Whiteboard Animations for Flipped Classrooms in GEF Courses	Dr. Kenneth Ming LI, Dr. Kevin Chi Wai LAI, Dr. Wai Man SZETO and Dr. Baldwin Bon Wah WONG	P8
Experiencing Classics in UGFN through Rooftop Farming	Dr. Ming LI	P9

Title	Presenter(s)	Poster No.
Establishment of New Paradigm with Feasible Models in Teaching and Learning Science for Problem Solving and Future Development	Prof. Wai Yin POON, Prof. Kwok Keung Thomas AU, Prof. Ming Chung CHU, Prof. Liwen JIANG, Dr. Kendrew Kin Wah MAK, Prof. Pang Chui SHAW and Prof. Teng Fong WONG	P10
Micro-modules for Learning in Fundamental Chemistry	Dr. Kendrew Kin Wah MAK and Dr. Yu San CHEUNG	P11
Micro-modules in Introductory Physics Courses	Dr. Shiu Sing TONG, Prof. Ming Chung CHU and Dr. Po Kin LEUNG	P12
Promoting Physics by Using e-learning Materials	Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Shu Yan LAU and Man Hoi WONG	P13
E-learning Approaches of Earth's Systems	Dr. Pui Yuk TAM and Dr. Wenzhu HOU	P14
Using YouTube Analytics to Enhance the Video Teaching Effectiveness – A Case Study of ESSC Educational Videos	Dr. Wenzhu HOU, Dr. Tammy TAM and Dr. Andie AU-YEUNG	P15
Application of Virtual Reality (VR) Technology in the Teaching and Learning of Mitochondrial Functions	Dr. Patrick NGAI	P16
Developing Video Learning Modules for Cell & Developmental Biology	Jenny LAI and Prof. Liwen JIANG	P17
Establishment of Flipped Classroom Activities for Molecular Biology Laboratory Class	Prof. Pang-Chui SHAW, Prof. Siu-Kai KONG, Yiu-Hong LEUNG, Eric, Lai-Ping KONG, Ada and Queenie Pui-Yin LAU	P18
Investigation of Non-seed Plants: A KEEP Course Promoting Self-learning	Dr. Cheung-Ming CHOW, Siu-Kwan WONG and Tin-Hang WONG	P19

LIST OF PRESENTERS

CUHK Posters P20 - 37

Title	Presenter(s)	Poster No.
Basic Statistics in Higher Education	Prof. Siu Cheung KONG	P20
Active Learning through an Immersive Virtual Reality Environment	Dr. Frankie WONG, Prof. King Ming CHAN, Prof. Vivian LE, Prof. Morris JONG, Dr. Paula HODGSON, Prof. Lawal MARAFA, Prof. Johnson CHAN, Prof. Alfred CHENG, Prof. Vivian LUI, Dr. Yuen Keng NG, Dr. Patrick NGAI, Prof. Tommy CHAN, Agnes FANG, Leo CHAN, Cathy WONG, Betty Hui and Cindi Tang	P21
An Ecotourism Scenario Game for Tripartite (Teaching, Learning and Research) Enhancement in Tourism Study	Dr. Johnson Chung-Shing CHAN, Luca Yat Hang CHAN and Agnes Tsz Heung FONG	P22
Language Map of CUHK 2.0	Dr. Pit Shun LAI, Yin Yee LAI and Pui Yee TSANG	P23
English and eLearning: Insights from Incoming International Exchange Students at CUHK	Prof. Jane JACKSON and Tongle SUN	P24
Mentoring International Exchange Students Online: An Intercultural Intervention	Prof. Jane JACKSON and Cherry CHAN	P25
A Flipped Classroom of System Dynamics Modelling for Public Health	Prof. Ka Chun CHONG and Katherine JIA	P26
Teaching Health Emergency& Disaster Risk Management Using Massive Open Online Course and Face-to-Face Classrooms: Building a Global Humanitarian Response Community	Zhe HUANG, Gloria Kwong Wai CHAN and Chi Shing WONG	P27
Strategic Training Ground for Future Public Health Practitioners	Carol WONG and Dr. Tony YUNG	P28

Title	Presenter(s)	Poster No.
Designing Complex Micro-modules and their Impact on the College Service Learning Experience	Prof. Ann HUSS, Pauline DAY, Maytal MARK and Madison REID	P29
Audio-visual Materials for Intermediate Cantonese Second language	Kwun Hung CHANG and Minyu SHEN	P30
Rethinking Presentation as a Teaching Tool	Hong JIANG	P31
Assessing the HKDSE in Music	Dr. Brian THOMPSON	P32
The Use of Social Media Platforms in the Classroom	Prof. Sandra MARCO COLINO	P33
Using Flipped Classroom to Enhance Interactive Teaching and Learning in Advanced Topics in Biological Electron Microscopy and Live Cell Imaging	Karen KAM, Prof. Byung-Ho KANG and Prof. Liwen JIANG	P34
Development of Visual and Narrative Inquiry: An Integrated Learning Platform for Cross-disciplinary University General Education Courses	Dr. CM CHOW (UGEB2350), Dr. HK NGAI (UGEB2361), Wai Kwan CHENG1, Dr. Lawrence CHIU (UGEB 2262), Dr. L SIOW (UGEB2360), Dr FH LO (UGEB2363), Dr. PY CHUI (UGEB3630), PS YIP (UGEB2362) and KK CHU (UGEB2364)	P35
Study Tour for High-school Students and University Science Students	Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Dr. Alvin Hoi Tik LEUNG, Shu Yan LAU and Man Hoi WONG	P36
Flipped Micro-Module for Professional Sports Skills Courses	LEE, C. W. D., HWANG, S. S. I. , JIN, Y., YUNG, L. K. A., LEE, M. F. R., CHEN, M. H. D., MA C. W. D., LIU K. S.1& TANG, T. M.	P37

LIST OF PRESENTERS

CUHK Posters P38 - 55

Title	Presenter(s)	Poster No.
Micro-modules for Pharmaceutical Dispensing: A Bi-lingual Micro-Dose Delivery of Concepts Involved in Dispensing Medications	Dr. Celeste EWIG, Alex YUNG, Yan JIN, Matthew HUI, Taylor TANG, Dr. Isabel HWANG	P38
Collaborative Sharing of eLearning Materials: Internationalization with Localization	Dr. Celeste EWIG, Manson TONG, Dr. Isabel HWANG,Keenan BEAUMONT, Keith SEWELL	P39
The Impact of Interprofessional Education in the Community	Prof. Vivian WY LEE, Prof. Janita PC CHAU, Dr. Ann LAU, Prof. Paul LAI, Prof. Samuel WONG, Prof. Wendy WONG, Dr. Michael CHUNG, Prof. Wallace CHAN, Ka Choi CHAN, Enoch, NG, Felix FONG, Amy LAM, Levia NGAI, Laadan LO, Maggie YEUNG, Sara CHIU, Tom LEUNG and Nicola LAW	P40
The Use of Virtual Reality in Clinical Cardiology Pharmacy Education	Prof. Vivian LEE, Enoch NG, Felix FONG, Amy LAM, Livia NGAI, Laadan LO, Agnes FONG, Leo CHAN, Cathy WONG, Dr. Paula HODGSON, Betty HUI and Cindi TANG	P41
Translational Stimulation by Micro-modules for Case Studies in Cardiology	Prof. Vivian LEE, Enoch NG, Felix FONG, Amy LAM, Livia NGAI and Laadan LO	P42
DigestVR: Turning Imagination into Reality	Dr. Ann LAU, Dr. Wai Kai WONG, Dr. Yuen Ken NG, Dr. Sam POON, Hugo CHEUNG, Tony WONG and Janet CHAN	P43
Micromodule + Flipped Classroom: An Effective Approach for Students to Self-learn the Anatomy of Lymphatic System	Dr Joyce SY LAM, Dr. Maria SM WAI, Flora MK LEUNG, Dawnie LAU and Agnes TH FONG	P44
Effective or Ineffective: The Application of Virtual Reality (VR) Technology in the Development of the Innovative Learning Tool for Experimental Skills Training	Dr. FlorenceMei KuenTANG, Prof. Yiu Wa KWAN, Prof. Hui ZHAO, Prof. Ellis FOK, Dr. Dewi Kenneth ROWLANDS, Dr. Olivia NGAN, Ray LEE and Taylor TANG	P45

Title	Presenter(s)	Poster No.
An Innovative Pedagogical e-Learning Micro-module Courseware in Preparation of Objective Structured Clinical Examination (OSCE): The Flipped Classroom in Clinical Examination	Dr. Florence Mei Kuen TANG (Project Leader), Prof. Henry Lik Yuen CHAN, Prof. Tony Wing-Chung MAK, Prof. Siew Chien NG, Jenny FAN, Dr. Olivia NGAN, Ray LEE, Taylor TANG, Kristy FUNG and Sarah WONG	P46
BIOMEDICAL SCIENCES OF LIVER CANCER: an e-Learning example bridging basic medical sciences with clinical knowledge	Dr. Yuen-Keng Ng, Dr. Maria Sen Mun WAI, Dr. Rebecca Kit Ying LEE, Dr. Ann Sin Nga LAU and Prof. Paul Bo San LAI	P47
Articulate Storyline as a Tool for Knowledge Integration (Nucleotide Metabolism)	Dr. Rebecca Kit Ying LEE, Daisy CHEN and Bernard Yat Nam NG	P48
Leveraging Clinical Experience of Medical Students in the Urology Rotation with a Hybrid Learning Model	Prof. Jeremy Yuen-Chun TEOH and Chi-Fai NG	P49
Interactive Radiology Anatomy	Janet SM Chan,Prof. Ann D King, Dr. Jill M Abrigo, Prof. Winnie CW Chu	P50
Micro-Modules for Nursing Students: Flipped Learning in Anatomy	Dr. Sally WS LO, Dr. Philip MW HUNG, Dr. Fiona WK TANG and Prof. Sek-Ying CHAIR	P51
Applying 3D Elements in Acupuncture Class	Michael CHUNG	P52
Laboratory Safety e-Learning Platform	Dr. George Fai WONG, Dr. Yu San CHEUNG and Dr. Wing Fat CHAN	P53
Hands-on Robotics Lectures	Prof. Darwin LAU and Samuel CHAN	P54
An Integrated Experiential Learning and Alumni Engagement Co-Curriculum	Dr. Jie TIAN, Gentiana CHEUNG and Dr. Jacqueline WONG	P55

LIST OF PRESENTERS

CUHK Posters P56 - 70

Title	Presenter(s)	Poster No.
Blended Learning in Economics and Finance Courses at Business School	Dr. Andrew YUEN and Dr. Anson AU YEUNG	P56
Why Can't I Get Into The Companies That I Wanted To Work For? Subject Knowledge Vs Job Hunting Skills	Dr. Almaz CHAK	P57
Word-of-Mouth vs. Word-of-Mouse: Use of Digital Wall (Padlet Backpack) to Teach "Learning and Development for Service Business"	Dr. Miju CHOI	P58
Developing Teachers' Craft Knowledge through Online Modules	Prof. Lai-yiu Eunice TANG, Dr. To CHAN, Dr. Yip Cheung CHAN and Dr. Mau-yuen NG	P59
CUHK Learning Management System 2017 - Blackboard		P60
CUHK Teaching and Learning Video System 2017 - Panopto		P61
An Introduction to the Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme (TDLEG)	Dr. Felix CHAO	P62
CUHK in Communities: Bringing Communities Back to CUHK	Dr. Yin Ha CHAN, Prof. Sin Piu FAN, Dr. Ka Wing YIP, Dr. Muk Chi MA, Prof. Yiu Tung SUEN, Dr. Wai Pang CHENG, Mr. Fai Hung MA, Dr. Yuen Man CHAN, Dr. Ka Lun AU, Prof. Tat Pui POON, Ms. Siu Mui CHUNG and Ka Po WONG	P63
Segmenting the Profiles of University Students' Attitudes Towards	Dr. Sally Wai-Yan WAN and Shong-Tung LEUNG	P64
From Customer to Learner: Exploring Learning Opportunities for CUHK Students through Consuming Goods from the On-campus Women's Co-op Store	Tsz Sum LAW, Ching Wong HUI, Hunn Hunn LAU, Wun Chi SIU and Dr. Sally Wai Yan WAN	P65

Title	Presenter(s)	Poster No.
Enhancing Teaching through an Interactive Course Design on KEEP	Prof. Irwin KING, Bo ZHU, Antonio CHEUNG, Eddy YET and Cathy LI	P66
Effective Implementation of the Flipped Classroom Approach in Hong Kong Higher Education for Enhanced Learning Outcomes	Prof. Paul Lai Chuen LAM, Carmen LAU, Charlene LI,Prof. Michael FUNG ,Dr. Theresa KWONG, Dr. Vincent LEUNG ,Prof. Kevin CHAN,Dr. Crusher WONG ,Dr. Ka Luen CHEUNG ,Prof. Siu Cheung KONG	P67
uReply GO Learning Trips	Prof. Paul Lai Chuen LAM, Kevin WONG, Dr. Kent King Wa LEE, Dr. Pit Shun LAI and Dr. Yin Yee LAI	P68
CUHK eLearning Community of Practice (eLCOP)	Prof. Paul Lai Chuen LAM, Dr. Isabel Shui Shan HWANG, Prof. Sidharth JAGGI , Dr. Fred Kei Tat KU, Dr. Ann Sin Nga LAU, Dr. Frankie Kwan Kit WONG, Dr. Jacqueline Wai Ting WONG	P69
Student-Centred Open-ended Project Learning with Interactive Classroom (WMY 303)	Dr. Jacqueline WONG	P70

LIST OF PRESENTERS

Posters from Sister Universities

Title	Presenter(s)	Poster No.
Immersive Mixed Reality (MR) and Virtual Reality (VR) Experience with Ancient Architectures of the Tang Dynasty for Cultural Education	Tarloff IM and Frankie FAN	U01
Piloting the Expert Learner Seminar Series	Dr. Paul C. CORRIGAN	U02
Global Environmental Leadership	Dr. Jill Man-Ying CHIU	U03
“Your Language, My City”: A Telecollaborative Project on Integrated Language Learning and Social Awareness (ILLSA)	Dr. Tushar Chaudhuri and Ivelina Dimitrova Ivanova	U04
Developing a Vegetable Garden/Orchard in the Lingnan University Campus	Prof. Kin Chi LAU and Lai Seung AU YEUNG	U05
Building an Integrated e-Textbook	Marc LEBANE	U06
A Fantasy-Adventure Approach to Experiential Computer Music	Prof. Andrew HORNER	U07
Student Innovation for Global Health Technology (SIGHT)	Prof. Ying CHAU and Malinda ABEYNAYAKE	U08
Educational Development Centre, The Hong Kong Polytechnic University	Mitesh PATEL	U09
Using Mobile Devices as Students ResponseSystems to Transform Large	Dr. Kevin CHAN, George CHEUNG and Kelvin WAN	U10
Capstone Design Project in Civil Engineering Curriculum	Dr. Ada K.H. LAW, Ryan C.P. WONG and Francis T.K. AU	U11

Title	Presenter(s)	Poster No.
Explore the Ethical Questions Encountered in International Experiential Learning Programmes by Student-developed Case Studies	Elsa LAM	U12
Blending Learning for University Enhanccement @EdUHK-Stories	Dr. Yeung Chung LEE	U13

LIST OF PRESENTERS

Talks T1 - 19

Title	Presenter(s)	Talk No.
Three Years of Flipped Teaching Law Methods, Results and Recommendations	Prof. David DONALD	T1
Examining of the Effectiveness of Audio-visual Teaching Materials for Language Learners	Dr. Siu-lun LEE and Chi Leung CHAN	T2
Regularization of Fundamental Chemistry Knowledge through Online Interactive Video Micro-modules	Prof. Steve TSE	T3
Study Tour for High-school Students and University Science Students	Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Dr. Alvin Hoi Tik LEUNG, Shu Yan LAU and Man Hoi WONG	T4
Effective or Ineffective: The Application of Virtual Reality (VR) Technology in the Development of the Innovative Learning Tool for Experimental Skills Training	Dr. Florence Mei Kuen TANG, Prof. Yiu Wa KWAN, Prof. Hui ZHAO, Prof. Ellis FOK, Dr. Dewi Kenneth ROWLANDS, Dr. Olivia NGAN, Ray LEE and Taylor TANG	T5
Teaching Health Emergency& Disaster Risk Management Using Massive Open Online Course and Face-to-Face Classrooms: Building a Global Humanitarian Response Community	Zhe HUANG, Gloria Kwong Wai CHAN and Chi Shing WONG	T6
A Partially Flipped Class in Physics Supported by e-learning: Report of an Experiment	Prof. Kenneth YOUNG and Otto A HANNUKSELA (co-author)	T7
Credit Bearing Experiential Learning Course for Physics Majors	Dr. Alvin Hoi Tik LEUNG	T8
Implementation of Commercial-Off The Shelf Digital Game-Based Learning in Higher Education	Dr. Kai Ming KIANG and Dr. Baldwin WONG	T9

Title	Presenter(s)	Talk No.
Enhancing Teaching through an Interactive Course Design on KEEP	Prof. Irwin KING, Bo ZHU, Antonio CHEUNG, Eddy YET and Cathy LI	T10
DigestVR: Turning Imagination into Reality	Dr. Ann LAU, Dr. Wai Kai WONG, Dr. Yuen Ken NG, Dr. Sam POON, Hugo CHEUNG, Tony WONG and Janet CHAN	T11
Hands-on Robotics Lectures	Prof. Darwin LAU and Samuel CHAN	T12
Using YouTube Analytics to Enhance the Video Teaching Effectiveness – A Case Study of ESSC Educational Videos	Dr. Wenzhu HOU, Dr. Tammy TAM and Dr. Andie AU-YEUNG	T13
Now You See Further from Giants' Shoulders, Then?	Prof. Hua-bai LI	T14
Enhancing Students' Cultural Competence via Interacting Across Cultures: A Series of Online Micro-learning Modules	Dr. Yvonne LOONG	T15
Strategic Training Ground for Future Public Health Practitioners	Carol WONG and Dr. Tony YUNG	T16
An Innovative Pedagogical e-Learning Micro-module Courseware in Preparation of Objective Structured Clinical Examination (OSCE): The Flipped Classroom in Clinical Examination	Dr. Florence Mei Kuen TANG (Project Leader), Prof. Henry Lik Yuen CHAN, Prof. Tony Wing-Chung MAK, Prof. Siew Chien NG, Jenny FAN, Dr. Olivia NGAN, Ray LEE, Taylor TANG, Kristy FUNG and Sarah WONG	T17
Designing Complex Micro-modules and their Impact on the College Service Learning Experience	Prof. Ann HUSS, Pauline DAY, Maytal MARK and Madison REID	T18
Flipped Micro-Module for Professional Sports Skills Courses	LEE, C. W. D., HWANG, S. S. I. , JIN, Y. , YUNG, L. K. A. , LEE, M. F. R. , CHEN, M. H. D. , MA C. W. D. , LIU K. S. & TANG, T. M.	T19

LIST OF PRESENTERS

Talks T20 - 30

Title	Presenter(s)	Poster No.
Opening a New Window in the Instruction of the Humanities: The Overseas Fieldtrip App	Prof. Ian MORLEY	T20
An Introduction to the Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme (TDLEG)	Dr. Felix CHAO	T21
Communities of inquiry: Cultivating Collaborative Knowledge-building on An Undergraduate Course	Prof. Michael LOWER	T22
A User-friendly, Cost-effective Workflow for Rapid Micro-module Production	Dr. Yuen-Keng Ng, Prof. Paul Bo San LAI, Prof. Vivian Wai Yan LUI and Eddie Ka On NG	T23
Micro-modules for Pharmaceutical Dispensing: A Bi-lingual Micro-Dose Delivery of Concepts Involved in Dispensing Medications	Dr. Celeste EWIG, Mr. Alex YUNG, Ms. Yan JIN, Mr. Matthew HUI, Mr. Taylor TANG, Dr. Isabel HWANG	T24
Flipped Classroom in Course for Preservice Mathematics Teachers: Case Sharing of Frontline Teachers Through Micro-modules	Dr. Yip-Cheung CHAN	T25
SMART Assessment 2.0: Unfolding Student Expectations and the Approaches Adopted for Academic Performance	Dr. Paula HODGSON, B SK HUI, C SY TANG, Prof. Ching Chyi LEE, Prof. Vivian LEE, Prof. Michael LOWER, Dr Sally WAN, Prof. Kristof CROLLA, Prof. Amos TAI, Prof. Wei-li ZHAO, Dr. Frankie Kwan Kit WONG , Dr. Yvonne LOONG, Dr. Wing Hung WONG, Dr. Kenneth Ming LI, Dr. Kai Ming KIANG, Dr. William Ka LAU, Dr. Jenny Jie TIAN, Dr. Ann Sin Nga LAU, Gentiana CHEUNG and Prof. Murat Es	T26

Title	Presenter(s)	Poster No.
Teaching Cultural Diversity and Intercultural Capacity through Experiential Learning and University-Agency Collaborative Teaching	Kar Choi CHAN, Helina YUK and Noel LEUNG	T27
The Use of Social Media Platforms in the Classroom	Prof. Sandra MARCO COLINO	T28
E-learning Software for Proof-type Problems	Dr. Leung Fu CHEUNG	T29
An Integrated Experiential Learning and Alumni Engagement Co-Curriculum	Dr Jie TIAN, Gentiana CHEUNG and Dr. Jacqueline WONG	T30

LIST OF PRESENTERS

Short Papers

Title	Presenter(s)	Poster/ Talk No.
A Partially Flipped Class in Physics Supported by e-learning: Report of an Experiment	Prof. Kenneth YOUNG and Otto A HANNUKSELA (co-author)	T7
Narrative Qualitative Assessment of Students' High-Level Thinking on Open-ended Problems	Dr. Kam Moon PANG, Dr. Julie Chu Lee CHIU, Dr. Xin GAO, Dr.Cherry To Kam LAM, Dr. Vivian Jun WU and Dr. Yang YEUNG	P1
NQA-inspired Study on Students' Perspectives in Controversial Science Issues	Dr. Kam Moon PANG	P2


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ABSTRACTS

CUHK POSTERS

P1. Narrative Qualitative Assessment of Students' High-Level Thinking on Open-ended Problems

Dr. Kam Moon PANG, Dr. Julie Chu Lee CHIU, Dr. Xin GAO, Dr. Cherry To Kam LAM, Dr. Vivian Jun WU and Dr. Yang YEUNG

Office of University General Education

Students' ability to conduct objective analysis of facts and evidence, and ultimately to develop sensible, informed personal judgments, is an essential learning outcome of the two courses of the General Education Foundation Programme, namely, *In Dialogue with Humanity* and *In Dialogue with Nature*. Assessment of such ability, however, is a challenging task partly because of the lack of a well-established rubric to evaluate the skills concerned. In a Narrative Qualitative Assessment project conducted by teachers of the two courses in 2015-17, the Wolcott-Lynch Model was applied to assess students' high-level thinking on open-ended problems. Analysis of randomly selected student term paper reveals that 80% of students is of performance pattern 0 (Confused Fact Finder) or 1 (Biased Jumper). The project has also inspired us to explore an effective scheme to implement criteria for differentiating students' performance in high-level thinking.

P2. NQA-inspired Study on Students' Perspectives in Controversial Science Issues

Dr. Kam Moon PANG

Office of University General Education

The Narrative Qualitative Assessment (NQA) project aims to explore students' high-level thinking on open-ended problems and revealed that 80% of students is of performance pattern 0 (Confused Fact Finder) or 1 (Biased Jumper) according to the Wolcott-Lynch Model. This inspired me to implement a study on how students respond to a science-related controversial issue based on a selected excerpt from Carson's *Silent Spring*. Preliminary findings show that students are week in identifying an uncertainty in an open-ended problem and that their performance could be enhanced or maximized by peer collaborations and by inquiring students appropriate scaffolding questions.

P3. Micro-modules for UGFN1000 Classroom Flipping

Dr. Kai Ming KIANG, Dr. Jun Vivian WU,
Dr. Andy Ka Leung NG and Dr. Derek Hang Cheong CHEUNG

Office of University General Education

To facilitate classroom flipping, we have developed a suite of micro-modules for all 11 classics taught in the course In Dialogue with Nature over a period of three years with financial support by the Micro-Module Courseware Development Grant Scheme. In Dialogue with Nature is a compulsory general education foundation course for all students at the Chinese University of Hong Kong. It requires students to read science-related classics on their own, and to discuss core questions that arise from their reading, which are enduring in the history of human civilization. Students often report that the 1-hour lecture is insufficient to provide all the necessary background knowledge for them to handle the specific classic texts on their own. However, with this new suite of micro-modules, students can watch a variety of materials online if they wish to, at their own pace at home. These materials include: 1) Introducing the historical background of the text and the author; 2) Explaining the applications or the issues raised; and 3) Discussing the core questions raised in each text. These micro-modules were integrated as a course on The Knowledge & Education Exchange Platform (KEEP) which is available to our students. In this poster, we will show snapshots of the final product as well as some tips for the development of these micro-modules and the use in our teaching.

P4. Development of a New Questionnaire on the Cognitive and Affective Influence of Science Anxiety for a Science Core-text General Education Course

Dr. Wan Heng Sandy HOI[1], Dr. Wing Hung WONG[1], Dr. Kam Moon PANG[1] and Dr. Vitrierat NG[2]

[1]Office of University General Education
[2]School of General Education and Languages, Technological and Higher Education Institute of Hong Kong

Science anxiety hinders students from effective scientific literacy and confident application of science skills to solve problems. It commonly arises when students take traditional science and science-related general education courses. “In Dialogue with Nature” is a compulsory general education course for undergraduates of The Chinese University of Hong Kong. It encourages students to engage in reading science texts and discussion about science-related issues, thereby building up confidence in seeing things from a scientific perspective.
Our previous study showed that having taken this course, students became less science anxious, and some aspects of Nature of Science (NOS) were brought up in focus group interview. This inspired the development of a new questionnaire to evaluate how science anxiety is related to students’ understanding of NOS (cognitive) and their self-efficacy towards science (affective). The new questionnaire has been validated and revised for the ongoing pre- and post-course surveys.

Keywords: Science Anxiety, Nature of Science (NOS), self-efficacy towards science, science core texts, general education, classics reading.

P5. Engaging Students in Close Reading: Implementation of PASS as Reading Workshops in the General Education Foundation Programme

Dr. Wai Man SZETO, Isaac Ka Tai WONG, Dr. Kenneth Ming LI, Dr. Vivian Jun WU, Dr. Amber Lo Ming YIP, Ann Ka Yu LAI and Prof. Mei Yee LEUNG

Office of University General Education

The General Education Foundation (GEF) Programme, a common core programme consisting of two courses, namely In Dialogue with Humanity and In Dialogue with Nature, engages students in dialogues with the classics in the humanities and sciences respectively. Reading classic texts, however, are challenging for many students who are unfamiliar with the content, language and context of these texts. This poster will present how Peer Assisted Study Session (PASS), a well-established peer learning model, has been implemented as reading workshops in the GEF Programme to help students meet these challenges. The reading workshops are one-hour and weekly voluntary study sessions led by PASS Leaders. These are students who previously exceled in the same course and have completed their accredited PASS Leader Training. Facilitated by PASS Leaders via various reading strategies, the workshops provide a collaborative and supportive learning environment for students where they can learn and practice close reading of classic texts together. Feedback from the students has been positive and many find the workshops improve their understanding of classic texts, equip them with effective reading strategies, and enable them to read the texts on their own.

P6. Virtual Experiential Learning for General Education Foundation Programme

Dr. Andy Ka-Leung NG[1], Dr. Derek Hang-Cheong CHEUNG[1], Dr. Cheuk-Hang LEUNG[1], Dr. Samson Pak-Nin KWOK[1], Chi-Tat LI[1], Eva Siu-Ling CHEUNG[2] and Taylor Lik-Hang TANG[2]

[1]General Education Foundation Programme [2]Information Technology Services Centre

General Education Foundation (GEF) Programme, consisting of two courses “In Dialogue with Humanity” and “In Dialogue with Nature”, requires students to read classics which address critical problems and issues in human existence and knowledge; and to reflect on the meanings and values of being human, as well as the achievements and limitations of human understanding of nature. However, the discussion time in the conventional face-to-face classroom setting is limited, students may not be able to fully recognize the implications of the classics in current society and integrate the ideas of different thinkers towards certain issue until the term paper construction at the end of the semester. With the support of the Teaching Development and Language Enhancement Grants 2016-19, we are in the process of constructing a virtual experiential learning environment on a mobile platform to help students achieve the desirable outcomes at an earlier stage of the courses. The mobile app consists of five modules that cover around half of the classics from both courses of the GEF Programme. There is a script designed for a protagonist to engage in different challenging life scenarios (presented in the forms of animations, mini-games, moral dilemmas, conversations, and slide shows) in order to deal with essential issues and debates arising from the classics. In this poster, the progress of the project will be presented.

P7. Coupling Micro-modules with Online Discussion Forum: A Content Analysis Study

Dr. Derek Hang-Cheong CHEUNG, Andy Ka-Leung NG, Kai-Ming KIANG and Isaac Ka-Tai WONG

General Education Foundation Programme

E-Learning is a rapidly developing pedagogy in the universities worldwide. Funded by two MMCD grants, two sets of micro-modules have been developed in UGFN1000 “In Dialogue with Nature”, a compulsory general education foundation course for all undergraduate students. They aimed for supplementing the students with basic science knowledge that is essential for understanding the assigned texts as well as further historical and technical background knowledge related to the core questions. Since the micro-modules are still in the development stage in 2016-17, the usage of micro-modules is entirely voluntary in the course without coupling with any assessment item. In 2017-18 term 1, we couple the micro-modules with an existing assessment item, an online discussion forum, thereby making the micro-modules compulsory. This project aims to evaluate this mode of micro-modules aided teaching. Students’ learning outcome attainment and cognitive achievement will be measured through content analysis of the online discussion forum. The evaluation results would shed light on the effectiveness of eLearning in general education courses.

P8. Building Whiteboard Animations for Flipped Classrooms in GEF Courses

Dr. Kenneth Ming LI, Dr. Kevin Chi Wai LAI, Dr. Wai Man SZETO and Dr. Baldwin Bon Wah WONG

Office of University General Education

The General Education Foundation (GEF) Programme consists of two foundation courses, namely UGFN1000 In Dialogue with Nature and UGFH1000 In Dialogue with Humanity, which require all undergraduates from different disciplines to read and discuss the classics in science and humanity. Despite their interest in reflecting on the classics, they find it difficult to have in-depth discussion due to the lack of prerequisite knowledge and concepts. A lot of time in tutorial classes is thus used to explain the knowledge and clarify the concepts. In view of this, a pilot work was initiated to developed two micro-modules to flip the classroom in UGFN1000 using whiteboard animations last year. Whiteboard animations enable step-by-step illustrations with voiceover narrations to explain complicated and abstract ideas in an attractive and enjoyable way. The feedback from both students and teachers showed that the whiteboard animations are engaging and helpful in teaching and learning in UGFN1000. With these encouraging results and the positive feedback, we have expanded the flipped classroom with whiteboard animations in UGFN1000 in this year and extended it to the other GEF course UGFH1000 for the first time. A total of four short whiteboard animations have been tailor-made in two micro-modules, namely “Origin of Species” for UGFN1000 and “Ideal Society” for UGFH1000. The micro-modules are available online for students’ self-paced learning. The effectiveness will be assessed by conducting questionnaire surveys. This poster presentation gives an overview of the production of whiteboard animations and their use to flip the classrooms in the GEF courses.

P9. Experiencing Classics in UGFN through Rooftop Farming

Dr. Ming LI

Office of University General Education

In Dialogue with Nature (UGFN) is one of the courses in the General Education Foundation Programme which requires students from different disciplines to read and reflect on classics in science, such as Charles Darwin's On the Origin of Species, Rachel Carson's Silent Spring and James Watson's DNA: The Secret of Life. Although reading these classics is challenging, better understand could be achieved by various support including reference books, e-learning tools, peer-assistance, and discussion with teachers. However, the lack of direct experience of the contexts in which the ideas and issues arise may hinder full appreciation of the classics and their relevance to contemporary life. In view of this, an experiential learning activity of rooftop farming has been practised in one of the UGFN classes to foster deeper understanding and reflection of the students. This poster presents the practice of using rooftop farming for experiential learning in UGFN. In the practice, students can choose "Planting Discussion" as one of the options for "Other Participation" in the course assessment. They are required to discuss the excerpts from the classics and do hand-on farming practice on the rooftop of Hui Yeung Shing Building, CUHK. They are encouraged to share their reflection in discussion forum and written essays. Apart from farming techniques and the science behind, other topics including organic farming, seasonal vegetables, environmental protection, recycle and upcycle, development of local farming industry were also discussed. The feedback from students collected by surveys will be shared in this poster.

P10. Establishment of New Paradigm with Feasible Models in Teaching and Learning Science for Problem Solving and Future Development

Prof. Wai Yin POON[1], Prof. Kwok Keung Thomas AU[2], Prof. Ming Chung CHU[3], Prof. Liwen JIANG[4], Dr. Kin Wah Kendrew MAK[5], Prof. Pang Chui SHAW[6] and Prof. Teng Fong WONG[7]

[1]Centre for Promoting Science Education [2]Department of Mathematics [3]Department of Physics [4]School of Life Sciences [5]Department of Chemistry [6]School of Life Sciences [7]Earth System Science Programme

The rapid development of technology has changed the way students acquire knowledge and information. This project aims at engaging a large group of science teachers to explore the use of technology to enhance teaching and learning. As presented in Expo 2016, our teachers have developed a host of digital resources across various science topics and have adopted different models to use the resources to enhance students' learning. Some use the resources for flipped-classroom and the others use the resources to support students' self-learning. As early adopters of eLearning and "flipped classrooms", we are committed to share our experience and promote the successful practices. In the past year, we have paid much effort to disseminate our practices and have actively organized sharing sessions and workshops. Specifically, 23 of our project team members have joined the poster presentation of this year's ExPo and they will present a total of 10 posters to show case the works of our project. The topics of the posters are "Application of Virtual Reality (VR) Technology in the Teaching and Learning of Mitochondrial Functions", "Developing video learning modules for Cell & Developmental Biology", "E-learning Approaches of Earth's Systems", "Establishment of Flipped Classroom activities for Molecular Biology Laboratory Class", "Investigation of non-seed plants: a KEEP course promoting self-learning", "Micro-modules for Learning in Fundamental Chemistry", "Micro-modules in introductory Physics courses", "Promoting Physics by using e-learning materials", "Using YouTube Analytics to enhance the video teaching effectiveness – a case study of ESSC educational videos". Also, the Education of Hong Kong (EdUHK) is one of the collaborative institutions in this project. The representatives from EdUHK will share their experience on developing resources for flipped-classroom under the topic "Basic Statistics in Higher Education". The entire project has produced a total of 649 micro-modules by topic so far, including lecture videos, demonstration videos, assessment modules, and virtual labs. These micro-modules have been used in more than 50 courses and have benefited more than 8500 students. More details are available in the project website http://www.cuhk.edu.hk/cpse/testing/UGC/home.html .

P11. Micro-modules for Learning in Fundamental Chemistry

Dr. Kin Wah Kendrew MAK and Dr. Yu San CHEUNG

Department of Chemistry

The implementation of the "3+3+4" academic structure is widening the science background knowledge of students when they start their university life. Such heterogeneity poses a problem for teaching chemistry and conducting laboratory sessions. To cope with such learning diversity, micro-modules on various themes are being developed to facilitate the teaching and learning of fundamental chemistry topics at the junior undergraduate level.

In this project, a critical mass of learning materials are prepared for students on three main themes:

1. Essential laboratory skills: Acquiring good laboratory skills is a fundamental part of learning chemistry. A comprehensive collection of video clips are prepared to demonstrate the wide spectrum of laboratory skills that are essential for chemistry undergraduate students.

2. Micro-modules on fundamental chemistry topics: To bridge the gap between secondary school and university curricula, a series of video-based micro-modules on fundamental chemistry topics as self-learning teaching aids. We hope that these will help students catch up with these fundamental topics, and act as useful resources to support the implementation of flipped classrooms in junior undergraduate courses.

3. Assessment items and recommended study guides: The videos and micro-modules are accompanied with collections of self-assessment items (e.g., MCQs) and study guides. These help the students with their self-learning, as well as with adopting the learning materials required for flipped classrooms.

By the end of 2017, it is expected that all lecture video clips will be ready and implemented into the course related to Chemistry in the 2nd term of 2017-18.

P12. Micro-modules in Introductory Physics Courses

Dr. Shiu Sing TONG, Prof. Ming Chung CHU and Dr. Po Kin LEUNG

Department of Physics

Growing up with the access of internet and mobile phone, the current university students are more used to learning from short videos. While it is valuable to have face-to-face time in a lecture, the availability of e-learning materials is getting more and more important. To cope with the trend, we have produced two series of micro-modules to support the teaching of two introductory Physics courses. The first series is lecture recording (~960 minutes), divided into micro-modules. The second series is supplementary and more stand-alone materials on a selection of topics (~1000 minutes) that are not covered in the courses.

From our experience, we find that the modules are useful for pre-lecture preparation, post-lecture revision, and self-learning of advanced topics. The large range of topics, and also their depth and breath, make them useful for both the stronger and weaker students. One common worry about providing previous lecture recording is that students will skip the lecture. That did not happen in our courses. We will share more about our experience on preparing and using the micro-modules in this poster.

P13. Promoting Physics by Using e-learning Materials

Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Shu Yan LAU and Man Hoi WONG

Department of Physics

One of the difficulties in promoting science to secondary students and general public, is that more and more entertainments are drawing their attention. While it is extremely hard and costly to match the production value of other entertainments produced by commercial companies, assuming that it is even possible, a reduction of “friction” of accessing popular science contents would go a long way to keep the public interested in science.

With such a goal in mind, we have chosen some research topics in Physics and produced short videos about them. We are also producing a website about solar physics, and an e-book about relativity. The creation of these e-learning materials proves to be more time-consuming than we envisioned, but we are able to learn from experience by trying out all these ideas. We will share more about the production and usage of these materials in our poster.

P14. E-learning Approaches of Earth's Systems

Dr. Pui Yuk TAM and Dr. Wenzhu HOU

Earth System Science Programme

Earth System Science Programme (ESSC) provides an interdisciplinary platform to explore our Earth's systems and understand past and current natural phenomena like natural disasters and climate change issues. However, traditional classroom teaching may hinder students' initiative to learn these systems, which could be complex in reality. In order to arouse students' interest and increase learning effectiveness, our programme has developed three different e-learning approaches as supplement to classroom learning: (1) Mini-games of "Geological Time Scale" and "Volcanoes" create an interactive learning and discussion platform for students to recognize geological history and understand the formation processes of various types of volcanoes. (2) "Virtual field trips" videos illustrate both local and overseas geological features and the key concepts to students. Together with the tailor-made "Minerals and Rocks Gallery" for ESSC courses, students are guided to self-learn and critically discuss on current geological debates in the world. (3) Demonstration videos of "Weather In A Tank" visualize real-world atmospheric and oceanic conditions, and their interaction in an experiment. Some of these e-learning approaches are being applied in ESSC courses with positive feedbacks from the students. It is believed that such learning formats would be the future trend and replenish the deficiency in traditional learning in both school and the public.

P15. Using YouTube Analytics to Enhance the Video Teaching Effectiveness – A Case Study of ESSC Educational Videos

Dr. Wenzhu HOU, Dr. Tammy TAM and Dr. Andie AU-YEUNG

Earth System Science Programme

YouTube has become a major platform for educators to publish videos for blended learning. The statistics provided by YouTube, therefore, could be a useful tool to reveal students' behavior. In this study, by comparing the statistics of two series of newly produced educational videos for Earth System Science Programme, we expect to provide practical strategies to enhance the video teaching effectiveness.

Our first series of videos is aimed to showcase the key geological phenomena students would encounter during a geological field trip, and meanwhile to deliver the fundamental knowledge. The second series demonstrates the physical experiments for a better interpretation of important phenomena in atmosphere and ocean. Both series are informative. But the average durations (AD) of videos in the two series are different. The AD of videos in the first series is 2.16 minutes (1.00~3.40), however that for the second is 6.39 minutes (4.75~8.87). Among all the analytical results, we are specifically interested in the Average Percentage Viewed (APV) which could indicate the extent of information loss during the Teaching and Learning. The average APVs for the first and the second series are 66% (58%~75%) and 36% (18%~50%) respectively. Other statistics of the Audience Retention (AR) shows that the longer videos lost retention significantly in the first 20 seconds, but the ARs of shorter ones basically remain stable from beginning to end.

Based on our reported data, we suggest that (1) short educational videos could encourage a higher viewing percentage and (2) for longer videos, an attractive beginning may effectively help to keep the audience retention.

P16. Application of Virtual Reality (VR) Technology in the Teaching and Learning of Mitochondrial Functions

Dr. H.K. NGAI

Biochemistry Programme, School of Life Sciences

The mitochondrion is an organelle which plays an important metabolic role in the cellular and organismal functions. Any defect in the functions of mitochondria may lead to series medical consequences such obesity, diabetes and cancer. Understanding the biochemical properties and structure of mitochondria is also critical to learn about its metabolic functions and various diseases related to energy metabolism. However, it is often difficult for students to conceptualize the relationship between the mitochondrial functions and its microscopic structural features. With the advancement of information technology and readily available electronic mobile device, a portable immersive learning tool becomes an effective way to help students overcome this learning barrier. Virtual reality (VR) is one of the computer technologies that can provide an immersive learning environment by generating realistic images, sounds and other sensations. In this project, it aims to develop a set of VR animations which will bring students to a wonderful exploratory journey towards the innermost compartments of a virtual animal cell. Users will be guided to learn about the sophisticated design of the mitochondrial electron transport chain and the mechanism of energy metabolism as if they were physically present in the virtual mitochondrial matrix.

P17. Developing Video Learning Modules for Cell & Developmental Biology

Jenny LAI and Prof. Liwen JIANG

School of Life Sciences

Our project aims at developing online teaching videos on the basic knowledge and the advance developments in Cell and Developmental Biology. Undergraduate Students coordinated with the Postdoc Fellows and Postgraduates in the research laboratory to produce teaching videos featuring various biological concepts, experimental techniques and advanced research findings. The videos are complemented with online quizzes to test for students' understanding. Students can watch the videos out-of-class as a way of self-learning so that the valuable lecture time could be used more intensively for interactive teaching-and-learning. In this project, multiple teaching videos have been generated to introduce various topics in Cell and Developmental Biology such as Human Gametes, Mitosis and Meiosis, Plant Guard Cell. Some of these videos have been used in teaching undergraduate courses (e.g. CMBI4001) with good feedbacks from the students.

P18. Establishment of Flipped Classroom Activities for Molecular Biology Laboratory Class

Prof. Pang-Chui SHAW, Prof. Siu-Kai KONG, Yiu-Hong LEUNG, Eric, Lai-Ping KONG, Ada and Queenie Pui-Yin LAU

School of Life Sciences

To enhance the teaching and learning in Biochemistry through innovative use of e-learning material, flipped classroom activities were designed for Molecular Biology Lab with objectives: (1)
to facilitate self-learning so that face-to-face class time will be used to its utmost in student-teacher and student-student interaction. (2) The additional contents on laboratory techniques, pre-lab talks, and quizzes will facilitate instructors and demonstrators in teaching.

Related videos of basic laboratory technique were selected from our e-learning platform (http://www.bch.cuhk.edu.hk/learnbiochem/) and pre-lab talks on the principles of the experiments for flipped classroom activities (e.g. students doing pre-class work and watching pre-lab video at home). Pre-class worksheets were designed as instruction to inform students what to do in the flipped classroom. Exercises were prepared for students to revise before each lab class.

Flipped classroom activities were conducted in BCHE3650 Molecular Biology and Recombinant DNA Laboratory and BCHE4610 Molecular Biology Laboratory courses respectively in the second term of 2016/17. In March 2017, a survey was conducted for these two courses. The survey result indicated that most students agreed that flipped classroom approach in teaching and learning can increase learning and teaching efficiency for the laboratory class in several ways, including (1) time saving, so that they can have more time for doing the experiments, (2) they can study anytime at home and they can watch the video repeatedly for better understanding. Suggestions and comments from the survey will be considered for future improvement.

P19. Investigation of Non-seed Plants: A KEEP Course Promoting Self-learning

Dr. Cheung-Ming CHOW, Siu-Kwan WONG and Tin-Hang WONG

School of Life Sciences

"BOLS1253 Investigation of non-seed plants" is a KEEP-course which guides students to learn about two types of seedless plants, bryophytes and ferns, focusing on the structure-function relationship by surfing through two mobile phone compatible e-learning resources: Virtual Lab of Bryophytes and Virtual Lab of Ferns.

Our KEEP course contains 17 subtopics with each consisting of a "Learning Guidelines" and "Review question". It walks through the two virtual labs with the learners in a step-wise manner and provides links to other resources to encourage further exploration on the topics. It not only promotes self-learning but also encourages students to become active and deep learners.

P20. Basic Statistics in Higher Education

Prof. Siu Cheung KONG

The Centre for Learning, Teaching and Technology, The Education University of Hong Kong

"Basic Statistics in Higher Education" is a blended learning course designed for undergraduate students from all backgrounds with the aim of providing necessary fundamental knowledge for research-related hypothesis testing. The course consists of minimum 12 hours of self-learning on Moodle platform and four face-to-face tutorials each with a duration of one hour. Students will learn conceptual knowledge on topics of the Sampling Distribution, Central Limit Theorem, Confidence Interval, and Hypothesis Testing as well as practical use of the SPSS in-class by working along with online videos, interactive simulations, assessment items and a concept map following a suggested learning schedule. So far, there have been over 430 students from CUHK and EdUHK enrolled in this course, and from whom we have collected feedback to improve our teaching and learning paradigm.

P21. Active Learning through an Immersive Virtual Reality Environment

Dr. Frankie WONG[1], Prof. King Ming CHAN[2], Prof. Vivian LEE[3], [4]Prof. Morris JONG, [5]Dr. Paula HODGSON, Prof. Lawal MARAFA[1], Prof. Johnson CHAN[1], Prof. Alfred CHENG[6], Prof. Vivian LUI[6], Dr. Yuen Keng NG[6], Dr. Patrick NGAI[2], Prof. Tommy CHAN[7], Agnes FANG[8], Leo CHAN[1], Cathy WONG[1], Betty Hui[5] and Cindi Tang[5]

[1]Department of Geography and Resource Management, [2]School of Life Science, [3]School of Pharmacy, [4]Centre for Learning Sciences and Technologies, [5]Centre for Learning Enhancement And Research, [6]School of Biomedical Sciences, [7]Department of Ophthalmology and Visual Sciences, [8]Centre for eLearning Innovation and Technology

Immersive reality environments (IVEs) can provide opportunities for learners to have an experience that perceptually surrounds them and enables them to have a sense of presence or actually being within it. Learners can interact with the IVE using a perceptual channel, e.g., by wearing a head-mounted display (HMD) with digital displays that project VEs. This may allow learners to visualize from two to three dimensions of an environment or an object, experience simulated situations to explore virtual locations as preparation for or replacement for actual visits or field exploration, interact with simulated clients or patients, simulate experiments and processes, and take actions while interacting with the virtual environment or object. In this project, this type of learning experience is applied in disciplines including life sciences, medical sciences, geography resources and management and education. It provides an authentic learning experience that may encourage learners to make inquiries and provoke reconceptualization of knowledge through experiencing and experimenting in the virtual setting. Most importantly, this project can bring enriched learning experiences across disciplines because research findings support positive learning outcomes: learners can find it easier to understand abstract concepts in three dimensions, bridge space over time, and examine trends and changes. Three types of VR are created in this project including (i) virtual reality with mouse interaction, (ii) AR/VR field trip and (iii) Virtual reality with physical interaction. The success of quality VR production demonstrated in this project together with students' recommendations can encourage more development on VR for learning enhancement.

P22. An Ecotourism Scenario Game for Tripartite (Teaching, Learning and Research) Enhancement in Tourism Study

Dr. Johnson Chung-Shing CHAN[1], Luca Yat Hang CHAN[1] and Agnes Tsz Heung FONG[2]

[1]Department of Geography and Resource Management,
[2]Centre for eLearning Innovation and Technology

With the rapid development of information and communication technology and e-learning, the conventional lecturing and knowledge transfer also have to incorporate innovative ways of teaching and technological advancements. Game-based learning is not new and has widely applied to various academic disciplines. Tourism studies often integrate field visit and classroom lecturing but a virtual and scenario-based experience in some real-life cases benefit both instructors and learners to stimulate discussions about circumstances of tourism planning and management.

The Ecotourism Scenario Game is an educational platform which simulates an indigenous community in the Amazon rainforest in Peru. Combining conceptual/theoretical knowledge, real world information and hypothetical storyline, this game allows students to make decisions in different scenarios in the development process. Instructors may deliver knowledge of ecotourism such as tourism impact assessment, destination planning and visitor management at certain stages of the game. Some common dilemmas between different parties are designed along the storyline and the students are encouraged to critically think and justify their decisions in attempt to balancing the multi-stakeholders' interests and achieving sustainable tourism development.

This game significantly integrates conventional lecturing, class interactions and e-learning application to tourism classes. The platform also allows students to experience the scenarios outside classroom, either individually or group-based, which would enhance the learning effectiveness.

Keywords: Ecotourism; game-based learning; scenario game; tourism

P23. Language Map of CUHK 2.0

Dr. Pit Shun LAI, Yin Yee LAI and Pui Yee TSANG

Department of Chinese Language and Literature

"CUHK Literary Walk"(中大文學散步) is an important teaching and learning activity proposed in the University Chinese Core "CHLT 1100 University Chinese I" , which students are guided by the teacher to appreciate the beauty of the campus by visit the scenic and historical spots on its campus described in the literary works by famous writers. " Language Map of CUHK 2.0"(中大語文地圖 2.0) is an mobile application which designs as an assisting tool for this learning activity which was supported by the Courseware Development Grant Scheme(2016-17).

The home page of the "Language Map of CUHK 2.0" is a CUHK cartoon map indicated with major landmarks. Users click on the landmarks will show the following three buttons:
1.Introduction(地景掌故): A descriptive record of the CUHK landmarks.
2.Writer's works(山城筆跡): Compile the works of famous authors and students.
3.Write your words(舞文弄墨): Users may submit their work through Blackboard, Facebook and google form which will be periodically updated on the app after the works being screened by our team.

According to the plan's original conception, works from famous writers are only the initial materials content of the map. In the long run, we hope to see the works of CUHK students constitute most of the content of the map. To this end, we have already been soliciting contributions from students since September by Facebook and invited teachers to recommend outstanding pieces of work from their class. We believe that students' creative work would make the map more attractive.

As CHLT 1100 University Chinese I focusing on develop the ability of observation and expressiveness of the student as the learning outcomes. We believe that the map can cultivate students' observation skills and improve their Chinese writing skills through appreciating excellent works from both the famous writers and other students. In addition to this point, we also believe that our app can encourage students to write for their beautiful campus by posting their works on this co-construction eLearning tool.

Apart from the description of function map, we would like to interpret the practical values of the map in facilitating "CUHK Literary Walk" and explain how to integrate this app into the assessment of CHLT 1100 in the poster. We will take reference to the comments and opinions from the guests and other participants for further amendment of the app.

P24. English and eLearning: Insights from Incoming International Exchange Students at CUHK

Prof. Jane JACKSON and Tongle SUN

Department of English

Throughout Asia, institutions of higher education are being asked to internationalize and substantially increase the number of non-local students on campus. To this end, many institutions are offering more courses in English, the de facto language of internationalization. To better understand the transition issues facing incoming international exchange students who are second-language speakers of English, a mixed-method study is being conducted at a Hong Kong university that now hosts 1,000+ semester and year-long international exchange students. As the University promotes interactive learning and eLearning (e.g., online Forums, flipped classrooms, group projects), the study is investigating how the exchange students are coping with the demands that are placed on them in English-medium courses. This presentation reports on the findings associated with 74 incoming semester-long international exchange students, all of whom are second-language speakers from other Asian countries or Europe. Through surveys and in-depth interviews, the participants divulged their academic sojourn experiences, pointing to the need for interventions to support their language/eLearning and academic integration. This presentation underscores the merits of undertaking a systematic needs analysis to provide direction for meaningful academic (e.g., English for Academic Purposes courses, workshops, orientations) and non-academic support (e.g., social activities that integrate local and international students). Research of this nature can benefit both local and international students, and faculty. (This project is supported by a Teaching Development and Language Enhancement Grant (TDLEG) from CUHK.)

P25. Mentoring International Exchange Students Online: An Intercultural Intervention

Prof. Jane JACKSON and Cherry CHAN

Department of English

To enhance the intercultural learning of international exchange students, micro modules (eLearning materials) were developed for Intercultural communication and engagement abroad, a fully online, credit-bearing general education course. Each week, while the course participants were in their host country, they viewed the micro modules on Blackboard and digested related readings and YouTube links. In full-class Forum discussions, small fieldwork groups, and a reflective essay, the participants shared their intercultural experiences and evolving understanding of intercultural concepts and issues. Throughout the semester, guided critical reflection prompted them to think more deeply about how their intercultural attitudes and actions may have affected their interactions with people who have a different linguistic/cultural background from them. Through online mentoring, the participants were encouraged to make connections to the intercultural concepts and theories that were explained in the micro modules and assigned readings. After providing an overview of the course (e.g., aims, activities, approach to learning and teaching, micro-modular content, modes of assessment, grading scheme), key findings related to the most recent offering (learning outcomes, student perceptions of micro modules/intercultural mentoring) will be presented, along with implications for future offerings. (This project has been supported by a Micro-Module Development grant (eLearning pedagogy research) and a Teaching Development grant from CUHK.)

P26. A Flipped Classroom of System Dynamics Modelling for Public Health

Prof. Ka Chun CHONG and Katherine JIA

School of Public Health and Primary Care

PUBH6001/BIOS5001 and PUBH6003/HSYS5001 are two fundamental courses for research postgraduate students in Public Health programme. The programme aims to introduce the basic knowledge of using statistical methods on their research and to introduce the principles of health policy and healthcare management. Nevertheless, the majority time of the courses was spent on teaching the basic theory supplemented with several tutorials, and there is a lack of demonstrations and discussions on applying statistical tools in health policy evaluations. This lead to a lower proportion of health policy modelling research when comparing with other traditional epidemiological research designs. Besides, some students indicated they were hard to apply the acquired knowledge to their practical needs.

With the previous experience and success of the flipped classroom development, we are developing a micro-module model to encourage students acquire skills of systems dynamics methodology – a common statistical skill in health policy research. The project team includes course coordinators from both courses in order to monitor the adequacy of courseware development. It is expected that students can learn the materials outside classroom and leave more time for in-class discussions, thus to bridge the gap between two disciplines.

Three modules have already been developed (http://micromodule17.comuf.com/Index%20for%20DM.html) and evaluated by five students. The students indicated the modules were practical, well-organized, and illustrated clearly, yet improvements could be made on content delivery (e.g. outline and subtitles) and visual impacts (e.g. focus on small or vague diagrams was needed).

P27. Teaching Health Emergency& Disaster Risk Management Using Massive Open Online Course and Face-to-Face Classrooms: Building a Global Humanitarian Response Community

Zhe HUANG, Gloria Kwong Wai CHAN and Chi Shing WONG

Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response, The Jockey Club School of Public Health and Primary Care

CCOUC research team taught health emergency and disaster risk management through a face-to-face and an online course, aiming to i) examine what factors may affect course completion among online course students; and ii) understand students' learning experience, course perceptions and outcomes in face-to-face and online format.

Data from students of online course (registration, Moodle log, evaluation and follow-up survey) and face-to-face classroom (pre-course and post-course surveys) were collected. Ethics approval was obtained from CUHK and consents sought from each participant before survey. Descriptive analysis, chi-square test and logistic regression were conducted.

This project recruited 3,457 online students from >150 countries, mostly in disaster-prone areas. The course completion rate was 20.6%. Males and students with healthcare qualifications were found more likely to complete the course, and time spent on the course was significantly associated with course completion after adjusting for gender, age and education level.

Additionally, 22 and 392 students from face-to-face classroom and online course were followed up. Although no significant difference in course achievement was observed between face-to-face classroom and online course participants, the former format was more preferred among all participants. Flexible time management and location of study were reported as two advantages of online course while more interaction and in-depth content the merits of face-to-face teaching.

This study suggests implementing multiple tools (e.g. webinars, videos and audios) and more discussion platforms could improve knowledge transfer and build up a wider study community, while face-to-face classroom and online course should be combined to create a better study environment.

P28. Strategic Training Ground for Future Public Health Practitioners

Carol WONG and Dr. Tony YUNG

Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response, The Jockey Club School of Public Health and Primary Care

This presentation will describe how the field-based training programme of the Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC) has been well-placed to strategically facilitate capacity building activities to train up the next generation of public health researchers and field-based practitioners.

The Nepal field based training programme evolved from the Ethnic Minority Health Programme (EMHP) in China, flagship programme of CCOUC, have both provided advanced technical training and been a field action laboratory for undergraduates and postgraduates of CUHK who aspire to plan, implement and evaluate public health and disaster risk reduction programmes in rural communities of less developed countries.

Using the training of trainer programme in Nepal as the case-study, the presentation will reveal the process of knowledge transfer to the student trainees with multidisciplinary background through workshops, training manuals and online courses; meanwhile, how the CCOUC team strives to identify communities which are affected by the earthquake with different intensity and is pragmatically using its resources to target and train the future practitioners using the frontline setting.

P29. Designing Complex Micro-modules and their Impact on the College Service Learning Experience

Prof. Ann HUSS, Pauline DAY, Maytal MARK and Madison REID

Morningside College

In Term 1 (2017/18), Morningside College introduced a two-part interactive self-paced micro-module unit in the College's capstone course, GEMC3001 – Service Learning/Civic Engagement. The micro-modules were designed by the College's Junior Fellows (Teaching Assistants) and produced using Articulate® E-learning software. Production was supported by a courseware development grant.

In the first micro-module, designed to be viewed before a service learning project proposal is submitted, a student travels through the fictional town of Greenberg, stopping at charity-based, project-based and advocacy-based service organizations. During the journey, the student learns about the different types of service each organization provides and is encouraged to choose the type that best fits her/his skills and interests.

The second micro-module, which is meant to be viewed after the service learning project has been completed, helps the student think critically about the service learning experience so that s/he can confidently turn it into academic work. Students are led through a series of exercises culminating in the production of a project poster that is discussed afterward in small group meetings.

Our presentation will introduce the script-writing, design and production processes, followed by a preliminary review of the impact of these micro-modules on College Service Learning learning and teaching.

P30. Audio-visual Materials for Intermediate Cantonese Second language

Kwun Hung CHANG and Minyu SHEN

Yale-China Chinese Language Centre

This project is aiming to seek funding to develop three micro-modules with audio-visual input that supports flipped classroom learning and teaching. With the use of Powtoon and Camtasia, we produce short videos to introduce Cantonese sentence structure and provide additional oral skills practice to our students. Videos are uploaded on the Vimeo for easy access.

Apart from producing learning videos, we have developed Quizlet exercises for students in order to promote self-learning with the use of mobile phones. Students are encouraged to search our course code from the Quizlet so that they can access our exercises and do their preparation freely before and after the lectures.

Finally, in order to evaluate the effectiveness of our new teaching materials, we require our students to complete 'post video assignments' after watching our videos. The output of our work offers extra learning experience to international/ exchange students who are choosing Cantonese as their elective courses. Instead of imitating native speakers passively, students are required to take their initiative to ask questions. Our goal is to increase their ability to give immediate response to native speakers in Cantonese through listening and oral skills training.

P31. Rethinking Presentation as a Teaching Tool

Hong JIANG

Department of Translation

Interpreting, as the oral form of translation, imposes high demands on oral language proficiency of all active working languages of the interpreter. It also requires fast processing of incoming speech information in preparation for reformulation into the target language. In the consecutive interpreting mode, interpreters are also required to have the appropriate stage presence in the tripartite communications process with the interpreter as the mediator. In training, presentation has proven to be a multi-functional device to train a diverse set of skills of the interpreter. This poster demonstrates now presentations can be organised to produce the most results from one single training activity.

P32. Assessing the HKDSE in Music

Dr. Brian Thompson

Department of Music

In 2012 the Hong Kong Education Bureau launched the New Academic Structure (NAS). Under what was known as 3-3-4, students complete three years of compulsory junior secondary school and three years of senior secondary before entering what is usually a four-year bachelor's degree programme. Replacing the colonial-era system of O-Levels and A-Levels, the HKDSE aimed to prepare students for a range of possible future directions, including both associate degrees and undergraduate studies. With five years of the NAS behind us, it is time to assess how well the HKDSE is preparing students for university studies.

This poster aims to provide some insights into how well the HKDSE in Music is preparing students for university studies. It is based on a careful comparison of the secondary and university curriculum and a survey of 120 CUHK music students, conducted in May 2017. Preliminary evidence suggests that in a number of ways the secondary curriculum fails to provide students with adequate preparation for university studies. In addition to illustrating the discrepancies between the objectives and outcomes of the HKDSE in Music and university entrance requirements, the poster aims to offer recommendations in how we might bridge the gap between secondary and tertiary education in music.

P33. The Use of Social Media Platforms in the Classroom

Prof. Sandra MARCO COLINO

Faculty of Law

Students love social media. Incorporating the use of social media in teaching can greatly enhance their learning experience. Not only can the learning process be more fun and engaging, but feeding students valuable information through a channel which they are fond of and which they use regularly has been proven to encourage them to access and eventually retain that information. The use of social media also has external benefits. By posting useful information publicly, this tool can also help to showcase and disseminate the work carried out in academic institutions, and can be used to raise their international profile and reputation. However, to have internal and external value, the use of social media must be rational, carefully thought out and adequately tailored to meet the specific requirements of the field being taught. In this presentation, I will explain how I use social media in legal education. I will do so by sharing the experience I have gathered over 12 years, explaining the various ways in which I have integrated social media into the classroom and covering the "dos and dont's" of the use of such platforms in education.

P34. Using Flipped Classroom to Enhance Interactive Teaching and Learning in Advanced Topics in Biological Electron Microscopy and Live Cell Imaging

Karen KAM, Prof. Byung-Ho KANG and Prof. Liwen JIANG

School of Life Sciences

LSCI5012 Advanced Topics in Biological Electron Microscopy and Live Cell Imaging is a newly established three-unit advance course (first taught in September 2016) designed for postgraduate students in the School of Life Sciences.

The pedagogical goals of this course are 1) to discuss the theory of Electron Microscopy and Live Cell Imaging as well as how the advanced Microscopy techniques can be put into use for the latest research discoveries; and 2) to provide rich hands-on practice of advanced 3D Tomography TEM (transmission electron microscopy) and advanced live cell imaging of biological science research to the students.

To achieve these goals, we aim to revolve the traditional lecturing to a more self-driven flipped classroom with more reliance on virtual learning platform. We will produce a flipped classroom containing two sets of teaching videos which will serve as a useful learning tool for students taking the course. Both sets of videos will be supplemented with corresponding question sets to be answered by students before the class or lab and for discussion during the class or hands-on sessions. In the hands-on sessions in the laboratory, students will practice TEM sample preparation, tomography reconstruction, fluorescent microscopy imaging of live cells, as well as image analysis software.

So far, we have developed and uploaded the first set of videos to our online learning platform for 2017-2018 teaching term. This will enhance students out-of-class learning so that the lecture period can be more focused on discussion among students and presentations.

P35. Development of Visual and Narrative Inquiry: An Integrated Learning Platform for Cross-disciplinary University General Education Courses

Dr. CM CHOW[1] (UGEB2350), Dr. HK NGAI[1]* (UGEB2361), Wai Kwan CHENG[1]*
Dr. Lawrence CHIU (UGEB 2262)[2], Dr. L SIOW (UGEB2360)[1], Dr FH LO (UGEB2363)[1],
Dr. PY CHUI (UGEB3630)[1], PS YIP (UGEB2362)[1] and KK CHU (UGEB2364)[1]
Corresponding presenters

[1]*School of Life Sciences* [2]*Convener, General Education Committee in School of Life Sciences*

Eight UGEB courses offered by School of Life Sciences involve diverse fields of scientific theories, appreciation and the ethical concerns of new biotechnology like genetically modified food and stem cells research. To help our students to master the abstract scientific concepts, make connections among the seemingly isolated topics, apply knowledge to daily life scenarios and extend their learning beyond the course, we have been developing an integrated learning platform, Visual and Narrative Inquiry based on the principle of a modified social science research method called “photo-elicitation”.

Our visual narrative platform allows students to construct and recall their scientific theories based on their prior knowledge and learning experience during the class by selecting a photo of interest from a database, writing a descriptive narrative and commenting others’ narrative. Through the exercise, students will be motivated to integrate the knowledge of what they learnt from the course with their personal experience as students can make use of their imagination, creativity, logical thinking and learning experience to analyze and describe the photo in form of the narrative to show their unique personal interpretations. It can enhance the synergistic effect of students’ learning in multi-disciplines of life sciences by facilitating their role in active learning and making connections of each ground-breaking discovery from different perspectives. To cater learners’ diversity background, moreover, this platform aims to boost students’ engagement and collaborative learning by encouraging participative and peer-to-peer learning.

In this presentation, we will explain the design and the key features of our platform, and also the current progress.

P36. Study Tour for High-school Students and University Science Students

Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Dr. Alvin Hoi Tik LEUNG,
Shu Yan LAU and Man Hoi WONG

Department of Physics

In the last summer, we co-organized with the HK Science Museum a study tour for 20 high-school students, with 15 university Science students as group leaders. We visited several research facilities in the US, Grand Canyon, and observed the total solar eclipse. It took a whole year to prepare for and organize the trip, and we have learned a lot in the selection of students, preparation, and the tour itself.

The selection process of the high-school students was a competition of several rounds. The students had to demonstrate their basic knowledge and interest in Astronomy and Earth-System Science. The selection process of the university students (who serve as group leaders) was mainly interviews. We chose students based on their scientific knowledge, willingness to share with others, and maturity. By mixing three university students from different disciplines with four high-school students, the goal is to facilitate the learning for both groups of students. We will share in this talk about the details of the processes, and whether our plan worked out.

We also spent lots of time to plan the itinerary. We will share the underlying thinking of the design, and the difficulty that we faced. One important lesson that we have learned in the trip is the importance of including time for experience sharing. The time is essential for the students to consolidate what they have learned and experienced.

P37. Flipped Micro-Module for Professional Sports Skills Courses

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The Department of Sports Science and Physical Education (SSPE) is dedicated to electronic and flipped learning strategies, which are consistent with the University's strategic themes. Therefore, SSPE has committed to Micro-Module Courseware Development, not only in PE, sports science and health lectures, but also in professional skill courses (PSCs). In this project, eight short interactive and self-directed bilingual Micro-Modules have been developed in Swimming (Front Crawl, Breaststroke, Backstroke, Butterfly, Diving and Treading Water) and Cycling (Introduction of Bicycle and Gear Shifting); these were produced with SSPE students and course teachers on the CUHK campus. Each Micro-Module consisted of a 2–4-minute video emphasizing a particular sport's skills and assessments presented with Cantonese or English narration and descriptions and supplemented with three interactive questions to enhance the learning effectiveness of the students on the particular sport's skills. The Micro-Modules are uploaded to Blackboard for students to reference before and after class. Based on our Team's experience in Micro-Module production and application, we predict that the Micro-Module can provide further learning flexibility and serve as a reliable source of teaching materials for our students and that it can be used to evaluate their knowledge before and after class and enhance their learning progress. In addition, four more Micro-Modules on Woodball will be produced and applied in Physical Education Unit (PEU) classes in the second semester of 2017–18. The project will be closely monitored and evaluated by students, by collecting their feedback through an online survey and direct discussions during classes.

P38. Micro-modules for Pharmaceutical Dispensing: A Bi-lingual Micro-Dose Delivery of Concepts Involved in Dispensing Medications

Dr. Celeste EWIG[1], Mr. Alex YUNG[2], Ms. Yan JIN[2], Mr. Matthew HUI[1], Mr. Taylor TANG[3], Dr. Isabel HWANG[4]

[1]School of Pharmacy, [2]Office of Medical Education, [3]Information and Service Technology Centre, [4]School of Biomedical Sciences

Preparing students for their future roles as healthcare professionals goes beyond materials learned in a classroom setting. It involves teaching students the fundamental knowledge required, how this knowledge is translated into concepts, and the application of these knowledge and concepts to a patient.

One common challenge encountered was the students' difficulty in connecting what was learned in class to patient care. To address this challenge, we sought to integrate information from various modes of learning. Our objective was to encourage a broader yet cohesive understanding of the materials learned and introduce students earlier to the concept of patient care.

We developed micro-modules covering various topics related to the dispensing of pharmaceutical products. Each micro-module includes: 1) the key information students needed to know, 2) demonstration videos and illustrations of this information when applicable and 3) patient cases to illustrate the clinical application of the learning outcomes. Key concepts were linked throughout each micro-module to establish correlation within the subtopics. We also collaborated with the Department of Pharmacy of the Prince of Wales Hospital to create videos enabling students to appreciate the application of these concepts in the local practice setting. To further facilitate students' understanding, bi-lingual versions of each micro-module are available for students to select their preferred learning language while strengthening their English and Chinese (Cantonese) professional language skills.

This project demonstrates bridging the gap between classroom and clinical practice with the use of an integrated eLearning environment. Doing so strengthens the learning process, provides a more sound foundation of knowledge and encourages students to start thinking like a healthcare provider early on in their career path.

P39. Collaborative Sharing of eLearning Materials: Internationalization with Localization

Dr. Celeste EWIG[1], Manson TONG[1], Dr. Isabel HWANG[2,] Keenan BEAUMONT[3], Keith SEWELL [3]

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[3] Monash University Pharmacy Faculty of Pharmacy and Pharmaceutical Sciences

Background:
Getting students ready for their future roles as healthcare professionals requires preparing them intellectually, mentally and emotionally.

Challenges:
Students often graduate with very minimal practical training throughout their university education. Furthermore, summer practice sites are often are limited in the number of spaces available. This lack of practice may lead to anticipatory stress most notable during the students' final year of studies.

Strategies: Virtual learning platforms
Virtual learning platforms specific to pharmacy courses (MyDispense, Pharmatopia and Pharmville) have been developed by Monash University (Australia). These platforms provide a simulated and interactive eLearning environment for students. The activities within the virtual platforms are created through the collaborative efforts of member institutions which include schools of pharmacy from various countries all over the world.

Working with Monash University, we created a CUHK (Hong Kong) version of MyDispense. This version incorporates the same learning activities as other partnering institutions yet takes into account local differences in the practice (i.e. legal classification of medications, largely Chinese population, etc). Through this program, pharmacy students are exposed to a simulated learning experience early on in their studies. They also participate in international learning activities, yet have these experiences relevant to local practice.

Preliminary Results:
MyDispense CUHK has been developed already and is currently in its finishing touches. It will be available to pharmacy students in early December, 2018. Activities and online exercises will be assigned to students in early 2018.

Conclusion:
The use of virtual eLearning platforms can provide an additional environment for students to practice the integration of knowledge onto patient care.

P40. The Impact of Interprofessional Education in the Community

Prof. Vivian WY LEE[1], Prof. Janita PC CHAU[2], Dr. Ann LAU[3], Prof. Paul LAI[4], Prof. Samuel WONG[5], Prof. Wendy WONG[6], Dr. Michael CHUNG[6], Prof. Wallace CHAN[7], Ka Choi CHAN[7], Enoch NG[1], Felix FONG[1], Amy LAM[1], Levia NGAI[1], Laadan LO[1], Maggie YEUNG[1], Sara CHIU[1], Tom LEUNG[1] and Nicola LAW[2]

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Background: Inter-professional collaboration and service learning are integral parts of the CU CHAMPION community outreach programme every year. The programme aims to offer students of different disciplines from Faculty of Medicine the opportunities to work as an inter professional outreach team and engage students in raising health education and promoting medication safety in the aging community.

Methodology: Before attending outreach events, enrolled student volunteers had to attend workshops to learn the outreach logistic, and participate in case discussion. They were also enrolled in an e-learning platform called CATALYST 2017. The platform was designed to develop a cross-disciplinary platform in health sciences education.

Results: 290 CUHK students, 117 secondary school students, and 73 alumni volunteers participated in the 2017 programme year. The team successfully conducted 60 outreach sessions, and reached out to 4235 subjects from October 2016 to September 2017.

Programme evaluation surveys among CUHK student volunteers showed that there was a 11.6% increase in the knowledge about medication safety, 17.1% increase in understanding dementia, 29% increase in atrial fibrillation knowledge, and a 19% increase in geriatric care knowledge. The secondary school students also expressed their interest towards diverse medical-related disciplines at CUHK.

Conclusion: CU CHAMPION 2017 successfully demonstrated inter-professional service learning to improve students' attitudes toward geriatric medicines, elderly care, and enhancing their awareness of health needs in the community.

P41. The Use of Virtual Reality in Clinical Cardiology Pharmacy Education

Prof. Vivian Lee[1], Enoch NG[1], Felix FONG[1], Amy LAM[1], Livia NGAI[1], Laadan LO[1], Agnes FONG[2], Leo CHAN[2], Cathy WONG[2], Dr. Paula HODGSON[3], Betty HUI[3] and Cindi TANG[3]

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Pharmacy students in Hong Kong face the common challenge of having limited opportunities to experience professional clinical practice, even though they are required to interpret clinical cases and attend pharmacy ward rounds during Years 3 and 4 of their study. However, there is a chronic lack of systematic teaching materials for pharmacy students on the preparation of clinical cases, the interpretation of clinical notes and clinical abbreviations, and the assessment of clinical cases. The current project is a pioneering project in Hong Kong for the development of clinical cardiology pharmacy pedagogy using immersive virtual reality (IVR) techniques to enable students with no clinical experience to work through interactive cases. We have developed two IVR teaching modules using real patient cases from Prince of Wales Hospital. In effect, we have brought the clinical ward setting into the classroom. Students experienced first-hand clinical exposure in class with guided, step-by-step teaching material to translate clinical knowledge into practice. In general, IVR in pharmacy education is still new in Hong Kong, although students did find the use of IVR in this context interesting. However, proper guidance and instruction are required prior to the use of IVR. We present the perspectives of both students and teacher in this project, and we also compare the use of paper-format and IVR case discussions.

P42. Translational Stimulation by Micro-modules for Case Studies in Cardiology

Prof. Vivian Lee, Enoch NG, Felix FONG, Amy LAM, Livia NGAI and Laadan LO

School of Pharmacy

Clinical case illustration is important for pharmacy students to understand the application of pharmacology and therapeutics knowledge that they have learned in class. However, actual ward round in the acute setting may not be feasible with a student group size of 60. Therefore, the use of micro-modules for clinical case presentation will be ideal for better translational applications in real world clinical environment. We have introduced micro-module into our PHAR 3413 course during the Fall semester 2016 already. We have developed a total of 51 micro-modules and case studies in (1) hypertension, (2) heart failure, (3) dyslipidaemia, (4) thromboembolic diseases, and (5) acute coronary syndrome. Each disease topic has 8 micro-modules on related topic materials plus 2-3 micro-module e-cases on Blackboard. Additionally, another 1-3 clinical cases were further discussed in class for more student-teacher interactions to facilitate teaching and learning. We have accumulated hit rates of over 18,000 for PHAR 3413 cardiology micro-modules with an average of 11.37 hours spent per student during the course on e-learning. In addition, there is a significant change on the students' attitude and understanding towards cardiology pharmacotherapy.

P43. Digest^{VR}: Turning Imagination into Reality

Dr. Ann LAU[1], Dr. Wai Kai WONG[1], Dr. Yuen Ken NG[1], Dr. Sam POON[1], Hugo CHEUNG[2], Tony WONG[2] and Janet CHAN[2]

[1]School of Biomedical Sciences, Faculty of Medicine, CUHK, [2]Contractors

A key challenge studying biomedical sciences is students need to use their imagination to relate the text-based content or 2D figures to real life situation where biochemical or physiological processes, like absorption of drugs, digestion and assimilation of food, travelling of molecules are in action within a 3D anatomical environment. The multidisciplinary nature of this subject also makes teaching and learning very challenging. An integrative and interactive approach is essential to make teaching and learning biomedical sciences motivating and interesting. The current project makes use of the fast-growing technology virtual reality (VR) on a Unity-powered platform to develop a pilot module **"Digest^{VR}"** on selected regions of the digestive system for multidisciplinary biomedical sciences teaching. Three-dimensional environment of the stomach was created and as a "map" on which teachers can furnish with information like histological structure, pharmacological and biochemical actions, physiological functions and pathological conditions in designated regions that can be holistically visualized in this **Digest^{VR}** "map". Students can operate the system under a contactless mode by using the VR cardboard together with a mobile device. Learners can have the first-person experience travelling along the digestive system with a selected mode, at the same recognizing the 3D environment and changes in anatomical structures when travelling along different regions of the digestive tract. The platform also allows teachers to easily add and edit text- or image-based auto-marking questions at designated locations of the organ's 3D environment. **Digest^{VR}** is a new generation tool with great potential to facilitate integrative learning and collaborative teaching.

P44. Micromodule + Flipped Classroom: An Effective Approach for Students to Self-learn the Anatomy of Lymphatic System

Dr Joyce SY LAM[1], Dr. Maria SM WAI[1], Flora MK LEUNG[2], Dawnie LAU[3] and Agnes TH FONG[2]

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The lymphatic system is an important system in the human body for body defense and the generation and removal of blood cells, among other functions. It plays an important role in the well-being of the body and is thus essential for medical students in their foundation years to have general knowledge of it. Despite of its importance, this system has not been emphasized in the anatomy teaching in medical year one curriculum. To fill this learning gap, micromodules containing key concepts of the anatomy of the lymphatic system were designed and introduced to medical year one students.

Each micromodule makes use of tailor-made 2D drawings and photographic images taken from human specimens. Several interactive motion graphics have been included to illustrate difficult concepts. The micromodule package, developed using the Articulate Storyline software, was then delivered to students via Blackboard for their ease of access. After viewing, the content in the micromodules was discussed in a flipped classroom environment with the use of response device UReply.

Preliminary data shows that students were able to self-learn the main concepts included in the micromodules by watching the motion graphics, listening to narrated text, and viewing annotated images and photos. They showed that they were able to grasp the fundamentals of the system by answering correctly to revision questions in the flipped classroom session. The combined strategy of using micromodule and flipped classroom was proved to be an effective approach for students to self-learn the anatomy of lymphatic system.

P45. Effective or Ineffective: The Application of Virtual Reality (VR) Technology in the Development of the Innovative Learning Tool for Experimental Skills Training

Dr. Florence Mei Kuen TANG[1], Prof. Yiu Wa KWAN[1], Prof. Hui ZHAO[1], Prof. Ellis FOK[1], Dr. Dewi Kenneth ROWLANDS[2], Dr. Olivia NGAN[3], Ray LEE[4] and Taylor TANG[4]

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Science in Biomedical Sciences Programme (JS4550) was launched since academic year 2016 by School of Biomedical Sciences, Faculty of Medicine. Biomedical research is the study of investigation of the new solutions to cure human illness. To strength the broad-based knowledge in biomedical sciences, teaching in research techniques, including animal handling, theories in electrophysiology, cell cultures, basic histology, transgenic technology and proteomic, are essential to introduce students before the laboratory induction. The use of animals in experiments is a common practice in clinical laboratory research. It, however, raise concerns related to animal welfare and ethics in animal research. This programme is consistent with worldwide ethical standards and contributes to animal welfare and the humane use of animals in effective biomedical research, i.e. it teaches the 3Rs (Replacement, Reduction and Refinement).

This proposed learning courseware has been embedded into our project which aims to develop a lively learning environment and mobile application, called “electronic techniques in practice (eTips).” Regarding the animal ethic, the experimental animals are suggested to reduce their usage number, especially for the laboratory skills practicing. The VR technology is used to create an alternative training environment. In this pilot study is to target in reducing the number of animals used and any suffering caused by students in the practical laboratory. We will further perform the courseware evaluation which is based on questionnaires and group interviews to explore whether it

- can be applied and used as an educational tool for the training the technical skills;
- can facilitate and deepen experiential experience of the new learners; and
- can make students’ awareness for the concept of 3Rs in their future research study.

P46. An Innovative Pedagogical e-Learning Micro-module Courseware in Preparation of Objective Structured Clinical Examination (OSCE): The Flipped Classroom in Clinical Examination

Dr. Florence Mei Kuen TANG (Project Leader)[1], Prof. Henry Lik Yuen CHAN[2], Prof. Tony Wing-Chung MAK[3], Prof. Siew Chien NG[2], Jenny FAN[4], Dr. Olivia NGAN[5], Ray LEE[6], Taylor TANG[6], Kristy FUNG[7] and Sarah WONG[7]

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Under the MBChB medical curriculum, medical students are trained in 3-year preclinical basic sciences courses plus 3-year clinical skills courses. The Medical Year 4 students are regarded as the junior clerkships who participate in the first year of the clinical practice will receive the clinical training in Surgery and Internal Medicine. The junior clerkships will attend the Objective Structured Clinical Examination (OSCE) with every academic year end. The transition between preclinical and clinical training, however, can be challenging and stressful for students as they need to apply learned knowledge and find solutions solving clinical problems during the bedsides training. Application of knowledge is crucial in clinical curriculum. Other than book knowledge, students also need to be drilled to inspect (look), palpate (feel), percuss (tap), and auscultate (listen). The increased cohort size around 240 medical students, nevertheless, challenge in the teaching and learning of clinical curriculum. While there is a limited resource in teaching students the proper to take patient's history, physician examination, and counselling skills, students may not be confidently prepared for the OSCE.

The modern pedagogical methods – *flipped classroom and micro-modules* – are a combination learning processes of e-learning activities with the face-to-face in the class period. It can be applied to strike a balance between the clinical skills training and OSCE assessment, which can facilitate medical clerkships to grow on their clinical competencies. Therefore, the proposed new innovative micro-modules platform called The flipped classroom Clinical Examination ($_{\text{Flipped}}$ CExam) platform, would serve as an important learning courseware for medical students to gain important clinical skills essential for the success of their medical career.

The $_{\text{Flipped}}$ CExam aims to equip students with the accurate pre-clinical knowledge and essential post-clinical counselling skills for clinical examination and consultation. Clinical skills learning and teaching is a vital part in medical education. We not only develop an e-learning platform but also share the experiences to showcase Faculty teaching capacity. Students can map their learning process at the high-quality level of materials in this elearning platform.

P47. BIOMEDICAL SCIENCES OF LIVER CANCER: an e-Learning example bridging basic medical sciences with clinical knowledge

Dr. Yuen-Keng Ng[1], Dr. Maria Sen Mun WAI[1], Dr. Rebecca Kit Ying LEE[1], Dr. Ann Sin Nga LAU[1] and Prof. Paul Bo San LAI[2]

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Currently, many of our medical students (MBChB) conceptually divided their medical education into 2 distinct phases: the first 3 years for preclinical basic sciences while the last 3 are for clinical studies. This unintentional division in their mindsets on medical learning cause our students fail to integrate various medical disciplines and apply basic science knowledge on their clinical studies on patients. To better nurture the 21st century medical students for applying biomedical scientific principles, methods and knowledge in daily medical practices, medical schools worldwide are encouraged to promote both horizontal and vertical integration between and across various medical disciplines. Horizontal Integration means the linkage between different subject areas in a meaningful manner while vertical integration bringing basic and clinical science together explicitly in all years of the medical training. As a means to demonstrate the knowledge integration of basic and clinical biomedical sciences to our students, we have developed an e-learning package to demonstrate how to connect different fields of biomedical sciences for understanding a patient's clinical condition and the related available clinical management options. Using primary liver cancer as the conceptual framework, our package introduces to our student how their knowledge gained in their first 3 years of medical education, namely molecular medicine, cell biology, pharmacology, physiology and anatomy, can be integrated together for a better understanding on a disease and its clinical relevance.

P48. Articulate Storyline as a Tool for Knowledge Integration (Nucleotide Metabolism)

Dr. Rebecca Kit Ying LEE, [1], Daisy CHEN[2] and Bernard Yat Nam NG[2]

[1]School of Biomedical Sciences, [2]Information Technology Services Centre

Students always encounter difficulties in studying biochemical pathways. They are especially **weak in understanding the relationships** between metabolic pathways and **integration** of multiple pathways together because these pathways are always taught one by one in class. The **Metabolism Metro** is a self-learning tool which aims to arouse students' interest in exploring human metabolic pathways. In **Phase 2** of this courseware, **fragmented concepts were integrated** and presented as a **metro map** (**concept map**). Key molecules involved in the pathways will be presented as "railway stations". Students can easily identify common "railway stations" present in different pathways and link those concepts that they have learnt in class together. This is also the first time that we use the "**ticket machine concept**" for students to revise individual metabolic pathway. Students can begin their journey by selecting different "railway lines" (metabolic routes). This interactive self-learning tool will be packaged as a courseware using the articulate storyline.

P49. Leveraging Clinical Experience of Medical Students in the Urology Rotation with a Hybrid Learning Model

Prof. Jeremy Yuen-Chun TEOH and Chi-Fai NG

Division of Urology, Department of Surgery

Introduction

In the Traditional Learning Model, medical students were first taught through group lectures, followed by a clinical attachment in which students meet patients in real life settings. We aimed to leverage the clinical experience of medical students in the urology rotation with a Hybrid Learning Model (HLM).

Methods

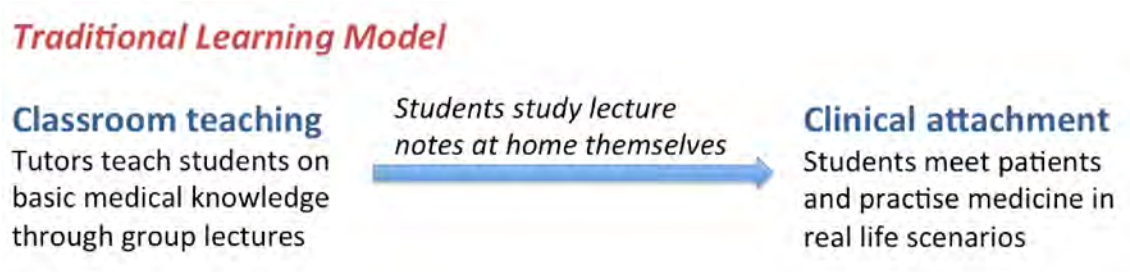
In the HLM, we first utilized a flipped classroom approach and asked students to watch 8 e-learning modules. Apart from the usual clinical attachment, we also developed 9 'e-learning cases' based on real life scenarios as a form of blended learning. The combination of clinical attachment and e-learning cases aimed to complement each other to leverage the clinical experience of medical students. We implemented the HLM and conducted a survey from our medical students.

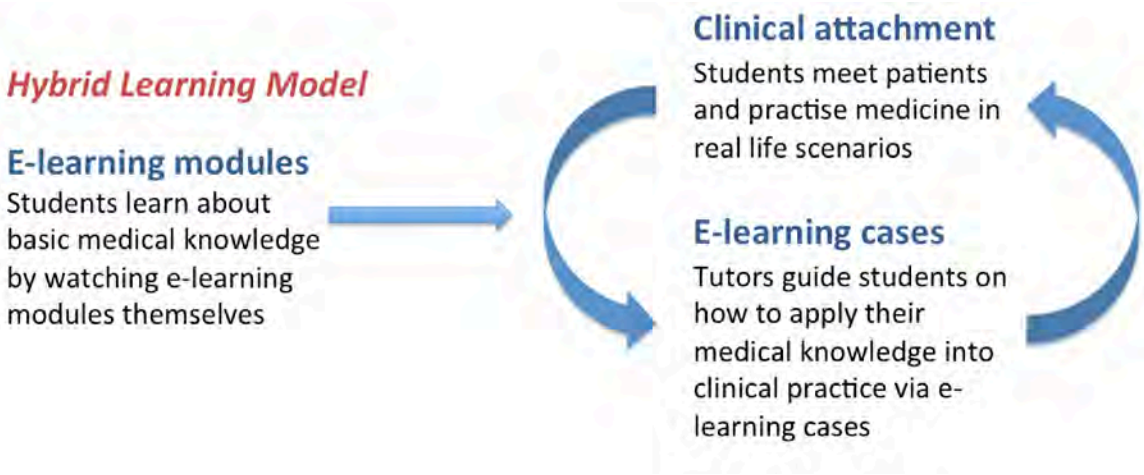
Results

A survey was conducted from 77 medical students. 89.3% of them had watched the e-learning modules before attending the clinical attachment and e-learning cases tutorial. 92.2% of them agreed or strongly agreed that the tutor was able to guide them through the case discussion. 92.2% of them agreed or strongly agreed that the HLM could help them apply their acquired knowledge into clinical practice. 87% of them agreed or strongly agreed that the HLM allowed a more in-depth understanding about the conditions being taught in this specialty. 75.3% of them agreed or strongly agreed that the HLM should be used in other medical specialties.

Conclusion

The HLM is practically feasible for medical students with promising feedback. This model could be considered in learning other medical specialties.




Hybrid Learning Model
E-learning modules
Students learn about basic medical knowledge by watching e-learning modules themselves
Clinical attachment
Students meet patients and practise medicine in real life scenarios
E-learning cases
Tutors guide students on how to apply their medical knowledge into clinical practice via e-learning cases

P50. Interactive Radiology Anatomy

Janet SM Chan[1,2], Prof. Ann D King[1], Dr. Jill M Abrigo[1], Prof. Winnie CW Chu[1]

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[2] 42 Arte

Radiology is best taught in small groups or in one-on-one sessions because every detail of each scan is different and can affect the diagnosis, yet, the number of tutors available to teach students, especially in our teaching hospitals, is limited, making a significant imbalance between supply and demand. Medical knowledge also is expanding rapidly and overwhelming the medical school curriculum Therefore, up-to-date and accurate learning materials need to impart knowledge efficiently. They also need to be delivered in an effective and engaging manner.

We present an interactive radiology program designed to teach pre-clinical medical students the anatomy on a chest X -ray. It is a self-paced, non-linear, learning program where medical students learn to 1) identify normal anatomy on chest x-rays, 2) identify abnormal anatomy on chest x-rays, leading them to 3) deduce possible causes for the abnormalities and conclude with some very basic differential diagnoses. Relevant background information, as text, illustrations or animations, are provided to aid students in verifying their diagnoses on their own and stimulating an early interest in radiology, which is one of the core elements in medical diagnosis.

Interactive Radiology Anatomy is designed to reinforce or replace part of the radiology anatomy teaching curriculum. Its effectiveness will be assessed by a student survey at the end of each module.

P51. Micro-Modules for Nursing Students: Flipped Learning in Anatomy

Dr. Sally WS LO, Dr. Philip MW HUNG, Dr. Fiona WK TANG and Prof. Sek-Ying CHAIR

The Nethersole School of Nursing

This project aims to develop micro-modules for the major topics in the Anatomy course offered to Year 2 Nursing students. The objectives of the project are: (1) to enhance students' understanding of the human anatomical structures and arrangement using micro-modules; (2) to consolidate the knowledge learnt in micro-modules and apply them into nursing clinical practice; (3) to facilitate students' learning at their own pace and time; and (4) to support the implementation of flipped classroom in the course.

The two topics selected for developing the micro-modules were "The Musculoskeletal system" and "The Nervous system". With the support from MMCDG, four micro-modules were produced and published using the Articulate Storyline 360 software package.

Micro-modules produced were uploaded and logged to the LMS of CUHK (Blackboard) under the course. To complement with flipped classroom, students were asked to go through the micro-modules and complete the self-check questions before class. During class time, course teachers revisited the important concepts in the micro-modules and encouraged active learning through in-class activities.

With the innovative use of the micro-modules, it is our hope that the teaching and learning process could be enhanced. In the mean time, the evaluation of users' experience in using the micro-modules is pending.

P52. Applying 3D Elements in Acupuncture Class

Michael CHUNG

School of Chinese Medicine

The understanding of 3D relationship of the body surface is essential in the study of acupuncture for TCM students and many other courses in health care studies. Published 3D coursewares are available in the market but with costly subscription fee, and the production of own subject content could be technically demanding. With the increased popularity of 3D multimedia, low-cost production and sharing of 3D gadgets to students are now much more easier than ever. The author has tried applying the following 3D elements in the teaching of acupuncture practical class with the following low-cost solutions: 3D photo capture by smartphone, free-hand drawing with 3D-paint in Windows 10 and Sketchfab, an online 3D presentation platform which allow annotation of 3D model. The current solution allows an easy way for sharing of knowledge and interactive discussion among the students.

P53. Laboratory Safety e-Learning Platform

Dr. George Fai WONG, Dr. Yu San CHEUNG and Dr. Wing Fat CHAN

Department of Chemistry

Experiment classes are important for science learning where students apply the abstract concepts through experimentation. In Chemistry Department, laboratory classes account for around 40% of the curriculum. However, there is no single course on chemical safety. It does not mean that it is not important. On the contrary, there were some fatal accidents in laboratories such as burning, fire and inhalation of very toxic gases in the past. To this end, we are underway to develop an online e-Learning platform to teach laboratory safety.

Laboratory Safety e-Learning Platform (LabSafe Platform) is an interactive platform developed by Articulate Storyline 2. It includes narrated lecture slides, case studies, animations, videos, and quizzes. We are producing teaching materials on personal protective equipment, material safety datasheet, chemical incompatibility, fume hood and emergency protocols.

P54. Hands-on Robotics Lectures

Prof. Darwin LAU and Samuel CHAN

Department of Mechanical and Automation Engineering

Traditionally, the primary method in the teaching of the fundamentals in undergraduate robotics is through lectures, where concepts, equations and examples are presented to the class. The difficulties with teaching a subject such as robotics through lectures include: (1) concepts are abstract and mathematical; (2) problems require 3-D spatial imagination while lectures slides are 2-D; and (3) content is difficult to relate with practice.

In this work, we present a new concept of hands-on robotics lectures. In this approach, lectures are taught in an interactive classroom where students, placed into small groups of 4 to 5, learn with a robot arm in front of them. The CUHK developed robot arm is also paired with an Android tablet application that is tailor-fitted to the course content. With approximately fifteen sub-pages covering a range of different, the app aims to complement the lecture content in the form of exercises or demonstrations. Students are not required to program the robot arms, but simply observe the abstract concepts and mathematical content on a physical robot.

Throughout the course, many benefits have been observed with this approach. First, a highly interactive teaching environment results, with teacher to student learning, peer learning and robot to student active self-learning. Second, students are more interested and alert as they are able to play with the robot. Third, students can gain a physical understanding of abstract concepts. Finally, the teacher can quickly observe the student's understanding. The preliminary teaching experience will be shared in this talk and poster.

P55. An Integrated Experiential Learning and Alumni Engagement Co-Curriculum

Dr Jie TIAN, Gentiana CHEUNG and Dr. Jacqueline WONG

[1]*School of* Hotel and Tourism Management
[2]*Department of Decision Sciences and Managerial Economics*

This project aims to create a structured co-curriculum that facilitates students' experiential learning and alumni's engagement in teaching & learning (T&L) at the School of Hotel and Tourism Management (SHTM or the School). The co-curriculum includes three independent and correlated modules linked to different major required courses (or T&L programs), featuring different learning activities, and targeting different student cohorts. The three modules adopt the same structure but can be implemented along separate timelines systematically and regularly.

Each module involves a contest that requires students to design, plan, and implement a learning activity. Module 1 features a study tour design contest mainly targeting Year-1 students (as participants). Module 2 features a cross-cultural learning event contest mainly targeting Year-2 students. Module 3 features an alumni interview video contest mainly targeting Year-3 and Year-4 students. In each module, students need to form teams and submit proposals. The winning team then needs to implement their plan in the real world.
All modules are structured to connect real-world learning activities with the SHTM Intranet (Microsoft SharePoint site.) Intranet serves as a secure online platform for the School, current students, and alumni to launch learning events, submit proposals, share information, collaborate on team tasks, collect feedback, and store deliverable outputs in various formats (text, image, audio, and video).

P56. Blended Learning in Economics and Finance Courses at Business School

Dr. Andrew YUEN[1] and Dr. Anson AU YEUNG[2]

[1]Department of Decision Sciences & Managerial Economics [2]Department of Finance

The study aims at evaluating the teaching and learning effectiveness of micro-modules in macroeconomics and finance at undergraduate and postgraduate levels in CUHK Business School. Using micro-modules in the flipped classroom strategy has attracted lots of attention from educators and pedagogical specialists. It is believed that this 'flipped' approach can enhance students' learning experience and also improve their motivation and engagement in class.

Built upon the micro-modules developed since 2015, the study aims to investigate the impacts of flipped classroom in Business School, and at the same time identify the differences in impacts of flipped classroom for students with different background.

The study will be conducted in DSME1040 Economics for Business Studies II (a faculty package course for undergraduate business programs), FINA2010 Financial Management (a required course for the programs), DSME5012 Macroeconomics for Business Executives and FINA5010 (required courses in MBA programs).

P57. Why Can't I Get Into The Companies That I Wanted To Work For? Subject Knowledge Vs Job Hunting Skills

Dr. Almaz CHAK

Department of Management, Business School

Despite the various learning experiences (overseas exchanges, internship, services learning, in-class learning) that undergraduates have possessed in their university education nowadays, it is still not easy for them to get into the companies that they wanted to work for. This exploratory study tries to investigate the reasons behind for the difficulties and hurdles in getting through the job-hunting process. We have collected data from final-year students who are major in MIB concentration for the study. Findings have shown that improvements could be made in the curriculum design and yet, the preparation, knowledge and skills needed for job-hunting process could play a more important role to increase employability of our fresh graduates.

P58. Word-of-Mouth vs. Word-of-Mouse: Use of Digital Wall (Padlet Backpack) to Teach "Learning and Development for Service Business"

Dr. Miju CHOI

School of Hotel and Tourism Management, Faculty of Business Administration

Learning is a journey, not a destination, and ultimately, it is the student's obligation to take responsibility for this learning. It is the instructor's role to make learning opportunities available to the student and to facilitate these opportunities. As such, the course "Learning and Development for Service Business" utilized a number of different pedagogical methods to maximize the learning potential for the student. Class lectures, readings, in-class activities and online discussions, individual and group assignments were designed to provide a holistic learning experience.

In particular, the instructor used a digital wall (Padlet Backpack) to extend classroom conversations and learning by getting students to engage with class material online.
There's a good chance you've done the "write on a sticky note and put it on the wall" activity — or have seen it happen before. "Padlet Backpack" is a web app that lets users post notes on a digital wall. "Padlet Backpack" lets those sticky notes have images, links and videos AND be available with practically any Internet-ready device. "Padlet Backpack" is a web app that lets users post notes on a digital wall.

This post displays how to apply a digital wall to stimulate students' participation.

P59. Developing Teachers' Craft Knowledge through Online Modules

Prof. Lai-yiu Eunice TANG, Dr. To CHAN, Dr. Yip Cheung CHAN and Dr. Mau-yuen NG

Department of Curriculum and Instruction, Faculty of Education

This poster documents an online education hub created to host subject-specific and generic modules of teaching videos in Hong Kong classrooms. The teaching videos are accompanied with lesson plans, instructional materials, reflective questions and further readings to develop critical awareness of teaching in the local context, and to realize the craft knowledge development in "learning to teach". The online education hub is made available to all undergraduate and postgraduate students from the English Language, Chinese Language and Mathematics programmes at the Faculty of Education, The Chinese University of Hong Kong. One special feature of this online education hub is the trial adoption of full length teaching videos edited with time markers and short descriptions to present key concepts or stages of a lesson instead of editing the lesson into short clips. The presentation of a full length lesson helps display a macro view and a coherence flow of the actual teaching scenario in which student teachers can visualise how key concepts or important stages emerge in the process of the classroom activities. Future research can be conducted to evaluate the effectiveness of using micro-modules and full-length module with time markers to develop student teachers' craft knowledge.

P60. CUHK Learning Management System 2017 - Blackboard

Information Technology Services Centre

P61. CUHK Teaching and Learning Video System 2017 - Panopto

Information Technology Services Centre

P62. An Introduction to the Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme (TDLEG)

Dr. Felix CHAO

Independent Learning Centre

The Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme is a project funded by TDLEG 2016-2019. It is a collaboration between Independent Learning Centre (ILC) and University General Education Programme (UGE). The modules aim to teach students of the General Education Foundation (GEF) Programme a set of skills necessary for proper reflective-journal writing. The ILC has been collaborating with UGE in offering workshops for students on reflective journal writing since 2013. Each year, the workshops attract over 1000 voluntary attendances. In order to continue the good practice, to promote e-literacy and to enhance its quality by encouraging students to learn proactively and to think more critically about different subjects, a series of micro-modules is suggested. The modules involve combination of a trilingual online learning platform (responsive website) and corresponding workshops. The various aspects of reflective-journal writing—namely, its definition, its ways of analysis, the thinking process involved, the language requirements and the proper academic style--will be introduced through the online learning platform. Students will learn through guided video presentations, interactive and reflective exercises, suggested readings and writing submitted through the Platform. After students have gone through all the learning steps on the online platform, face-to-face workshops will be provided for discussion and further explanation on areas of greatest concerns. Feedback submitted by students through the online learning platform will be used by the ILC teachers to develop the content of the workshops.

P63. CUHK in Communities: Bringing Communities Back to CUHK

Dr. Yin Ha CHAN [1], Prof. Sin Piu FAN[2], Dr. Ka Wing YIP[2], Dr. Muk Chi MA[3], Prof. Yiu Tung SUEN [4], Dr. Wai Pang CHENG[5], Mr. Fai Hung MA[6], Dr. Yuen Man CHAN[7], Dr. Ka Lun AU[7], Prof. Tat Pui POON[7], Ms. Siu Mui CHUNG[8] and Ka Po WONG[9]

[1]Independent Learning Center [2]Department of Chinese Language and Literature [3]Department of History [4]Gender Studies Programme [5]General Education Foundation Programme [6]New Asia College Ch'ien Mu Library & United College Wu Chung Multimedia Library [7]School of Journalism and Communication [8]The Office of the Arts Administrator [9] CUHK in Communities

"CUHK in Communities" is a writing-oriented project that aims at cultivating students' writing ability with solid research and deeper perspectives when they are engaging in their own communities. Our project not only encourages students to understand the making and evolving of the communities they grow and live, but also develops students' stronger involvement and sense of belonging in their communities as CUHK members and local citizens, who have deeper understanding of Hong Kong society.

In order to achieve the above goals and ensure students acquire the best knowledge and learning experiences, our project involves experts in different fields, including literary researchers, social historians, anthropologists, sociologists, writers and documentary filmmakers. By providing students with opportunities to practice writing, documenting and social research with professional guidance, their language skills as well as social research and documenting skills are consolidated.

There are channels for students to publish their works: a website for publishing essays and multimedia productions like galleries and documentaries, and a collection of selected essays to be published in 2019. While the workshops target at current CUHK students of all disciplines, our project welcomes all CUHK members to participate. To be specific, we have engaged several alumni to capitalize on their expertise in enhancing students' learning experiences through, for instance, community tours. The impact will certainly go beyond a unit/ department/ faculty and extend to the CUHK community as well as the society — In doing so, our project binds our students, colleagues and alumni in a strong esprit de corps.

P64. Segmenting the Profiles of University Students' Attitudes Towards Sustainability: Relations to Their Perceptions of Future Employment

Dr. Sally Wai-Yan WAN[1] and Shong-Tung LEUNG[2]

[1]Department of Curriculum and Instruction, Faculty of Education
[2]Department of Geography and Resource Management

The growth of the sustainability labour market is now in a rising trend. University education plays vital roles in fostering and empowering new generations in sustainable development. Yet scarce studies were done to understand the local university students' attitudes towards sustainability and their perceptions about employment in sustainability markets. The poster first attempts to present the profiles of university students' attitudes towards sustainability using a hierarchical cluster analysis. The poster then explores if there are any relationships between university students' attitudes towards sustainability and their perceptions of sustainability labour markets as well as learning expectations about sustainability using Chi-square tests and multivariate analysis of variance (MANOVA) tests. Data collection method mainly included an online survey which was conducted to 101 university students. Implications for university course development will be discussed at the end of the poster.

P65. From Customer to Learner: Exploring Learning Opportunities for CUHK Students through Consuming Goods from the On-campus Women's Co-op Store

Tsz Sum LAW[1], Ching Wong HUI[2], Hunn Hunn LAU[3], Wun Chi SIU[4] and Dr. Sally Wai Yan WAN[5]

[1]Student of Department of Environmental Science
[2]Student of Department of Chinese Language and Literature [3]Student of Department of Music
[4]Student of Department of Economics [5]Department of Curriculum and Instruction

The Women's Co-op Store has been serving CUHK staffs and students since 2001. Unlike some chain stores, the Women's Co-op Store has a clear vision and mission to promote the principles of co-operatives, striving for a more democratic economy as well as advocating for equality among workers. The purposes of this study are: (1) to identify whether the Women's Co-op has its intention to promote the co-operative principles through specific channels to CUHK students based on the Lasswell's model of communication (Lasswell, 1948); (2) to assess students' knowledge on the co-operative principles; (3) to examine if students' knowledge is correlated to different factors (including students' consuming behaviour and attitude, and the extent of exposure to the channels the Women's Co-op Store used); and (4) to investigate students' attitude change in response to the co-operative principles. In this study, a self-developed online survey was distributed to a convenience sample of 204 CUHK students in September 2017. Key findings included: (1) Moderate correlation was found between student's knowledge and the extent of their exposure to channels in which the Women's Co-op Store was used. (2) Using a pre-and post-test design concerning students' exposure to the co-operative principles about the Women's Co-op Store, the paired t-test indicated significant differences in students' attitudinal changes. The results concluded that learning is not limited to the process of consuming goods from service providers, especially those with determined vision and mission. Implications regarding students' preference on social media and interactive chats with the workers, together with the volunteering service offered by the Women's Co-op Store on the impacts of channels to deliver messages to learners and experiential learning opportunities will be discussed at the end of the poster.

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P66. Enhancing Teaching through an Interactive Course Design on KEEP

Prof. Irwin KING, Bo ZHU, Antonio CHEUNG, Eddy YET and Cathy LI

Knowledge & Education Exchange Platform (KEEP)

KEEP (Knowledge & Education Exchange Platform) is a UGC-funded project for empowering educators and learners with impactful resources and innovative technologies for lifelong education. Teachers from local universities and outside has hosted 200+ online courses on KEEP, creating an interactive and convenient environment for 12,000+ students to learn effectively.

New features are rolling out on KEEP, giving teachers more ways to engage their students in learning. The Peer Instruction tool allows students to consider alternative ideas from classmates before submitting the final answer. Flexibility in quizzes and exams, like question types and time limits, allows teachers to tailor-made learning activities and assessments for their students. The dashboard summarizes course activities and performance, guiding ways to improve course design and thus enhancing teaching effectiveness.

Users are reporting more benefits of putting their course online, including but not limited to more interactive knowledge delivery, more communication channels, better-prepared students, reduced administration costs and easier reuse of course materials. These also drive KEEP to thrive for refining our course platforms and ultimately support teachers in providing quality education.

Teachers and e-learning support units are welcomed to our parallel session for a demonstration on enhancing teaching effectiveness by employing KEEP tools. We also welcome inquiries at info@keep.edu.hk.

P67. Effective Implementation of the Flipped Classroom Approach in Hong Kong Higher Education for Enhanced Learning Outcomes

Prof. Paul Lai Chuen LAM[1], Carmen LAU[1], Charlene LI[1],Prof. Michael FUNG[2] ,
Dr. Theresa KWONG[3], Dr. Vincent LEUNG[4] ,Prof. Kevin CHAN[5],Dr. Crusher WONG[6] ,
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This UGC-funded project is a collaboration of five universities in Hong Kong – The Chinese university of Hong Kong (CUHK), Hong Kong Baptist University (BU), The Hong Kong Polytechnic University (PolyU), The Education University of Hong Kong (EdUHK), and City University of Hong Kong (CityU). The notion of 'flipped classroom' has attracted much attention in recent years because it regarded to have strong theoretical basis of the learning enhancement. However, both teachers and students may encounter a lot of challenges in this new mode of learning. For example, the approach may disfavor less active learners, and students do not prepare before class. Through the collective effort of the participating universities, experiences and expertise will be shared to provide effective support in the following areas: Exposure, Incentive, Assess, Activities, and Evaluations. Good practices and resources will also be shared to allow practitioners to overcome the many challenges and harvest the best possible from the new pedagogy.

P68. uReply GO Learning Trips

Prof. Paul Lai Chuen LAM[1], Kevin Wong[1], Dr. Kent King Wa LEE[2], Dr. Pit Shun LAI[3] and Dr. Yin Yee LAI[3]

[1]Centre for Learning Enhancement And Research, [2]Department of Sociology, [3]Department of Chinese Language and Literature

uReply GO is a location-aware learning tool for teachers to easily customize learning paths for their students. Teachers simply drag-and-drop questions onto a map and then define the show/hide behavior of each of them. Complex learning trips can be easily compiled by teachers all by themselves. A number of interesting learning trips are now being designed by our pilot teacher-users.

P69. CUHK eLearning Community of Practice (eLCOP)

Prof. Paul Lai Chuen LAM[1], Dr. Isabel Shui Shan HWANG[2], Prof. Sidharth JAGGI[3], Dr. Fred Kei Tat KU[4], Dr. Ann Sin Nga LAU[2], Dr. Frankie Kwan Kit WONG[5], Dr. Jacqueline Wai Ting WONG[6]

[1]Centre for Learning Enhancement And Research, [2] School of Biomedical Sciences, [3] Department of Information Engineering, [4] Department of Decision Sciences and Managerial Economics,
[5] Geography and Resource Management,
[6] Department of Decision Sciences and Managerial Economics

Background

CUHK eLearning Community of Practice (eLCOP) is a teacher community at The Chinese University of Hong Kong formed in June 2017 to facilitate the dissemination, sharing and advancement of good practices through teachers' forming community of practice and giving each other mutual support.

Interest Groups

- Educational emerging technologies (e.g. virtual reality and augmented reality)
- Enriching classroom interactions and learning with technology
- Flipped classroom and blended learning pedagogical explorations
- Learning opportunities outside classroom with technology
- Micro Module Courseware Development
- Project-based learning and learning spaces

Activities in the Community

- regular interest group meetings
- experience-sharing workshops
- invited talks by service providers, practitioners in other local or overseas institutes
- nurturing of collaborative efforts to pioneer and write-up the innovative strategies.

P70. Student-Centred Open-ended Project Learning with Interactive Classroom (WMY 303)

Dr. Jacqueline WONG

[1]Department of Decision Sciences and Managerial Economics

I have been using the Student-Centred Open-ended Project for more than ten years. As one of the pilot testers of using the Interactive Classroom, which was launched in 2016. I have designed a set of activities (team building, guided learning, group discussion, role play…) to help student enjoy the innovative methods of teaching and learning by allowing students to communicate and collaborate in the effective way within their group and class. Students from DSME 2051 Business Information Systems (for year 2+), DSME 4220 Data Mining for Business Intelligence (for year 3+) and DSME 5210 Strategic Information Systems (for year 1+), all are invited to join this pilot test.

ABSTRACTS

POSTERS FROM SISTER UNIVERSITIES

[U1]

Immersive Mixed Reality (MR) and Virtual Reality (VR) Experience with Ancient Architectures of the Tang Dynasty for Cultural Education

Tarloff IM and Frankie FAN

Office of Education Development and Gateway Education, City University of Hong Kong

The new advancements of virtual reality (VR) was utilized to enhance teaching and learning experience of students for development of an immersive educational strategy application. A VR environment of Tang Dynasty referencing Dunhuang Mural has been fabricated with three-dimensional computer aided design (3D CAD) models of Chinese ancient architectures with remarkable feature of structural mechanics. The project was further integrate with Mixed Reality (MR) to elevate the VR experience involving peer viewers for immersive experience of valuable heritage of ancient culture of China in teaching and learning activity.

[U2]

Piloting the Expert Learner Seminar Series

Dr. Paul C. CORRIGAN

City University of Hong Kong

The Expert Learner Seminar Series has been created to help new university students at City University of Hong Kong identify and apply a range of learning and study strategies to help them meet their potential and responsibilities as a university student. The pilot series anticipates a larger such project in the coming years and was offered as ‘blended learning’, meaning that each week for six weeks participants studied a short lecture on-line before coming to a seminar that week to discuss it with the module facilitator and other students as well as to engage in follow-up activities.

[U3]

Global Environmental Leadership

Dr. Jill Man-Ying CHIU

Hong Kong Baptist University

Despite that environmental issues are typically multi-facet by nature, environmental education programs currently being offered in most countries are predominately mono-disciplinary with primary emphasis on classroom learning. With concerted efforts of environmental, anthropology, public policy, culture and communication experts from six universities in Hong Kong, USA and Canada, we launched a multi-disciplinary education program incorporating science, socio-economic, politics and cultural dimensions in 2015. This programme provides a diverse suite of teaching and learning activities (including guided self-learning, experiential and service learning, role-play and brainstorming exercises and public engagement) to nurture students from participating universities as global environmental leaders to meet the challenges presented to us in coming decades. Observation, feedback and evaluation showed that this approach is highly successful and have a significant impact on student learning and development. They are not only able to tackle environmental issues using a holistic view built upon weight of evidence from science, socioeconomic, politics and cultural dimensions, but also able to develop their own ideas and effectively communicate them to stakeholders and general public.

[U4]

"Your Language, My City": A Telecollaborative Project on Integrated Language Learning and Social Awareness (ILLSA)

Dr. Tushar Chaudhuri and Ivelina Dimitrova Ivanova

Senior Lecturer SoSc/GIS, Hong Kong Baptist University

The teaching & learning project will connect foreign language classes of higher education institutions in Hong Kong & the European Union (EU) on an internet platform, and introduce initiatives to students on healthy living practices at government and citizen levels. The project will encourage students to collaborate with each other on community actions and evaluate their own communities in the target languages German, French, Italian & Spanish. The project will broaden participants' global vision by encouraging students to look at different practices in Hong Kong and Europe and will enhance their communicative skills in the respective target language that they are learning. Each project cycle of approximately 12 weeks will consist of three phases: 1. Knowledge Gathering, 2. Research Tasks & 3. Group Community Project. To successfully complete each phase, the students on both sides would have to work in intercultural groups and collaborate with each other throughout the duration of the project cycle. The students will create a portfolio for the phases 1 and 2 and a PowerPoint/video documentation of the Group Community Project. Each participating institution would be responsible for developing the materials for one of the language according to the priorities and needs of the institution. The entire project will be hosted on one common platform and students in Hong Kong and Europe would be free to register for the language of their choice.

Lead University: Hong Kong Baptist University
Collaborating Universities:
The University of Hong Kong,
The Hong Kong Polytechnic University

[U5]

Developing a Vegetable Garden/Orchard in the Lingnan University Campus

Professor Kin Chi LAU and Lai Seung AU YEUNG

Lingnan University

[U6]

Building an Integrated e-Textbook

Marc LEBANE

Centre for English and Additional Languages, Lingnan University

[U7]

A Fantasy-Adventure Approach to Experiential Computer Music

Professor Andrew HORNER

Hong Kong University of Science and Technology

For this poster presentation, we will share our experience in restructuring the Computer Music course as an experiential course with fantasy-adventure lab assignments. The talk will also demonstrate how the same fantasy-adventure approach can be applied to any course, even technical courses. Our inspiration was to set up the course like a *Harry Potter* potions class at *Hogwarts*. Just as a potion might change the disposition of someone, music rather magically modulates the mood of listeners. We made each weekly lab assignment a wild *Dungeons&Dragons* musical adventure into the dark arts of mood modulation. Students had a chance to explore fully how "plastic" music really is, radically adapting it to different situations. For example, they spent 4 weeks making the UST Congregation music maximally Majestic, Scary, Romantic, and Sad over 4 lab assignments. This allowed a super-strong linkage and scaffolding of concepts, and prompted in-class discussion/reflection questions that were fun and deep follow-ups to the lab adventures. The lecture sessions changed accordingly to more of a briefing and de-briefing session format that revolved around the lab assignments, where we gave them some hints, and let them explore the rest on their own. The assignments were very open-endedly experiential and emotive tasks that allowed great freedom in musical and technical approaches. It was really fun to play the soundtracks generated by all the groups in the de-briefing lecture session, since they were wildly different. Lectures were much livelier this way, and generated many delightful surprises! It made a class of 60 students feel like a group of 6!

[U8]

Student Innovation for Global Health Technology (SIGHT)

Prof. Ying CHAU and Malinda ABEYNAYAKE

Hong Kong University of Science and Technology

[U9]

Educational Development Centre, The Hong Kong Polytechnic University

Mitesh PATEL

The Educational Development Centre (EDC) at the Hong Kong Polytechnic University (PolyU) provides high quality support and training, promoting pedagogical best practices to enhance course goals and student learning outcomes. Traditionally, the eLearning Development & Support (eLDSS) section of EDC offered workshops, supplementary online modules and technical/multimedia support.

Senior management recently agreed to invest in eLearning to encourage greater active learning by increasing LMS (Blackboard) training and preparing staff for MOOC development. Around that time EDC acquired new training facilities, and more recently access to a new prototype classroom – the Zone – designed to enhance collaborative learning. All of the above has helped transform how we do our training.

[U10]

Using Mobile Devices as Students ResponseSystems to Transform Large Classes into an Interactive Learning Environment

Dr. Kevin CHAN, George CHEUNG and Kelvin WAN

The Department of Applied Social Sciences, The Hong Kong Polytechnic University

An increasing number of researchers and educators underscore the efficiency of knowledge transfer through active participation of students. Nonetheless, emergence of large classes and fewer opportunities of in-class interactive activities in higher education sector poses new challenges of effective learning. To engage students in large classes in university settings, the Clickers@PolyU project advocates the promotion of active learning through peer instruction, a pedagogy in which students discuss and learn from each other in a flipped classroom context, with facilitation by students' response system (SRS), a mobile application allowing students to answer questions and obtain instant feedback in class towards formative assessment and an engaging classroom. Clickers@PolyU has grown from a small-scale pilot to an institutional campaign to engage students in classroom. By the end of the 2016-2017 academic year, the cumulative frequency of students engaging in clickers activities at the PolyU has reached a total of 28,800+ students. Over 120+ teachers have adopted SRS in their classes respectively. Over 2,200 sessions of SRS have been launched in 300+ classes. In the future, Clickers@PolyU will extend as a community of practice and engage more students and teachers to explore new pedagogies to promote active and innovative learning in classroom and beyond.

[U11]

Capstone Design Project in Civil Engineering Curriculum

Dr. Ada K.H. LAW, Ryan C.P. WONG and Francis T.K. AU

The University of Hong Kong

Background

In the 3-3-4 curriculum reform, engineering programmes are required to conform not only the Outcomes-Based Approach to Student Learning (OBASL) and the Capstone Experience required by the University of Hong Kong, but also the graduate attributes specified by the Hong Kong Institution of Engineers (HKIE). However, with further specialisation of disciplines related to civil engineering and the expansion of the professional knowledge, it is simply not possible to include all the key areas of knowledge in the taught core courses of the programme. The final year Capstone Design Project which promotes student-centred active learning is thus expected to be a viable solution to addresses these issue. It provides a platform for students to explore and take responsibility for their own learning to a higher cognitive level and at the same time covers different aspects of civil engineering and other factors.

[U12]

Explore the Ethical Questions Encountered in International Experiential Learning Programmes by Student-developed Case Studies

Elsa LAM

The University of Hong Kong

There is growing concern of the potential ethical issues encountered by students in the increasingly popular international community engagement programmes. Students under-prepared may face impact of unknown magnitude on their value systems and the community may also be harmed. The objective of this on-going project is to develop a student-developed case bank for sensitizing students on ethical engagement in a cross-cultural experiential context.

[U13]

Blending Learning for University Enhanccement @EdUHK-Stories from the Frontline

Dr. Yeung Chung LEE

Department of Science and Enviromental Studies, The Education University of Hong Kong

Student teachers who lack foundational knowledge in science always find it difficult to fully benefit from existing science-related courses in teacher education programmes. To address the problems, blended-learning modules are developed in collaboration with CUHK and HKU under the UGC T&L project entitled “Blended learning for building student-teacher’ capacity to learn and teach science-related interdisciplincary subjects”. The project aim at developing modules to add basic science knowledges to the courses, and combine advantages of e-learning and face-to-face contact to provide a self-pacing learning environment for students to construct their science knowledge.

ABSTRACTS

TALKS

T1. Three Years of Flipped Teaching Law - Methods, Results and Recommendations

Prof. David DONALD

Faculty of Law

During first terms of the 2015/16, 2016/17 and 2017/18 academic years, I taught three, 165 minute flipped sessions each week to what is now a total of 540 law students. I used lectures recorded on PowerPoint "shows" and worked through detailed tutorial problems in class. I also created three video “micro-modules” on important concepts and distributed them through Google Drive. Students' test scores for the first two years dramatically increased (the last year is still underway).

Course and Teaching Evaluations and an independent survey I conducted bind through a TA provided valuable information on how students reacted to the extra work of listening to my recorded lectures and having to stay alert to follow discussion of the tutorial question during the class meeting. Active learning was a very new and sometimes disturbing experience for many of them. My own experience has been dramatically improved, as I now know my students and can gage their abilities and improvements from week to week.

I will share my methods for teaching this course over three years, the technology used, my personal experience as a teacher comparing traditional lecture and flipped teaching, the effect on students’ performance, and their reactions (other than as shown through academic performance).

T2. Examining of the Effectiveness of Audio-visual Teaching Materials for Language Learners

Dr. Siu-lun LEE and Chi Leung CHAN

Yale-China Chinese Language Centre

This project compares different combinations and arrangements of teaching-training models, as well as different formats of presentation of the online materials and find out effective models in designing online audio-visual materials for blended classes in teaching Cantonese as second language settings. This project examines the effectiveness of a MMCD scheme 1 project (2015-2016) named "Development of audio-visual teaching materials for second language Cantonese learners". This project tests and examines various arrangements and formats of linguistic knowledge teaching and language skills training (teaching-training) based on the content and platform developed from the MMCD scheme 1 project (2015-2016). The different arrangements and formats will be tested on 3-5 experimental groups for one academic semester in order to find a model or models of teaching-training combinations will be relatively more effective in context of teaching Cantonese as a second language to international students. Experimental research methods such as pre-test and post test to test the effectiveness. Focus group discussion will also be carried out to seek qualitative data on the different models.

MMCD scheme 3: eLearning Pedagogy Research
MMCD project code: 3210815

T3. Regularization of Fundamental Chemistry Knowledge through Online Interactive Video Micro-modules

Prof. Steve TSE

Department of Chemistry

The foundation chemistry courses play a crucial role in programmes run by the various Science Departments and also in that of the General Education Foundation. However, the development of these foundation courses met new challenges with the recent implementation of the 4-year curriculum and the Hong Kong Diploma of Secondary Education (HKDSE) framework. Due to the vast differences in secondary education that students receive, it is extremely complicated to construct foundation courses that effectively prepare them all for their subsequent classes whether in the Chemistry Department or in other Departments. To resolve this issue, the Department of Chemistry aims to incorporate eLearning materials, such as micro-modules and a flipped classroom strategy, into one of the foundation courses, (i.e., Principles of Modern Chemistry; CHEM 1070). Videos from a comprehensive series of Chemistry lectures will be provided to the students online so that they can study the relevant materials at their own pace. To encourage utilization of these online resources, and assess the effectiveness of our various strategies when applied specifically to Chemistry courses, students will be tested on the eLearning materials. The knowledge learned from this project will facilitate the application of eLearning strategies to other courses in the Chemistry Department, and will provide invaluable information for courses organized by other Departments as well as other general educational activities in Hong Kong.

T4. Study Tour for High-school Students and University Science Students

Dr. Po Kin LEUNG, Prof. Ming Chung CHU, Dr. Alvin Hoi Tik LEUNG,
Shu Yan LAU and Man Hoi WONG

Department of Physics

In the last summer, we co-organized with the HK Science Museum a study tour for 20 high-school students, with 15 university Science students as group leaders. We visited several research facilities in the US, Grand Canyon, and observed the total solar eclipse. It took a whole year to prepare for and organize the trip, and we have learned a lot in the selection of students, preparation, and the tour itself.

The selection process of the high-school students was a competition of several rounds. The students had to demonstrate their basic knowledge and interest in Astronomy and Earth-System Science. The selection process of the university students (who serve as group leaders) was mainly interviews. We chose students based on their scientific knowledge, willingness to share with others, and maturity. By mixing three university students from different disciplines with four high-school students, the goal is to facilitate the learning for both groups of students. We will share in this talk about the details of the processes, and whether our plan worked out.

We also spent lots of time to plan the itinerary. We will share the underlying thinking of the design, and the difficulty that we faced. One important lesson that we have learned in the trip is the importance of including time for experience sharing. The time is essential for the students to consolidate what they have learned and experienced.

T5. Effective or Ineffective: The Application of Virtual Reality (VR) Technology in the Development of the Innovative Learning Tool for Experimental Skills Training

Dr. Florence Mei Kuen TANG[1], Prof. Yiu Wa KWAN[1], Prof. Hui ZHAO[1], Prof. Ellis FOK[1], Dr. Dewi Kenneth ROWLANDS[2], Dr. Olivia NGAN[3], Ray LEE[4] and Taylor TANG[4]

[1]School of Biomedical Sciences, [2]Laboratory Animal Services Centre,
[3]JC School of Public Health and Primary Care, Faculty of Medicine,
[4]Information Technology Service Center

Science in Biomedical Sciences Programme (JS4550) was launched since academic year 2016 by School of Biomedical Sciences, Faculty of Medicine. Biomedical research is the study of investigation of the new solutions to cure human illness. To strength the broad-based knowledge in biomedical sciences, teaching in research techniques, including animal handling, theories in electrophysiology, cell cultures, basic histology, transgenic technology and proteomic, are essential to introduce students before the laboratory induction. The use of animals in experiments is a common practice in clinical laboratory research. It, however, raise concerns related to animal welfare and ethics in animal research. This programme is consistent with worldwide ethical standards and contributes to animal welfare and the humane use of animals in effective biomedical research, i.e. it teaches the 3Rs (Replacement, Reduction and Refinement).

This proposed learning courseware has been embedded into our project which aims to develop a lively learning environment and mobile application, called “electronic techniques in practice (eTips).” Regarding the animal ethic, the experimental animals are suggested to reduce their usage number, especially for the laboratory skills practicing. The VR technology is used to create an alternative training environment. In this pilot study is to target in reducing the number of animals used and any suffering caused by students in the practical laboratory. We will further perform the courseware evaluation which is based on questionnaires and group interviews to explore whether it

- can be applied and used as an educational tool for the training the technical skills;
- can facilitate and deepen experiential experience of the new learners; and
- can make students’ awareness for the concept of 3Rs in their future research study.

T6. Teaching Health Emergency& Disaster Risk Management Using Massive Open Online Course and Face-to-Face Classrooms: Building a Global Humanitarian Response Community

Zhe HUANG, Gloria Kwong Wai CHAN and Chi Shing WONG

Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response, The Jockey Club School of Public Health and Primary Care

CCOUC research team taught health emergency and disaster risk management through a face-to-face and an online course, aiming to i) examine what factors may affect course completion among online course students; and ii) understand students' learning experience, course perceptions and outcomes in face-to-face and online format.

Data from students of online course (registration, Moodle log, evaluation and follow-up survey) and face-to-face classroom (pre-course and post-course surveys) were collected. Ethics approval was obtained from CUHK and consents sought from each participant before survey. Descriptive analysis, chi-square test and logistic regression were conducted.

This project recruited 3,457 online students from >150 countries, mostly in disaster-prone areas. The course completion rate was 20.6%. Males and students with healthcare qualifications were found more likely to complete the course, and time spent on the course was significantly associated with course completion after adjusting for gender, age and education level.

Additionally, 22 and 392 students from face-to-face classroom and online course were followed up. Although no significant difference in course achievement was observed between face-to-face classroom and online course participants, the former format was more preferred among all participants. Flexible time management and location of study were reported as two advantages of online course while more interaction and in-depth content the merits of face-to-face teaching.

This study suggests implementing multiple tools (e.g. webinars, videos and audios) and more discussion platforms could improve knowledge transfer and build up a wider study community, while face-to-face classroom and online course should be combined to create a better study environment.

T7. A Partially Flipped Class in Physics Supported by e-learning: Report of an Experiment

Prof. Kenneth YOUNG and Otto A HANNUKSELA (co-author)

Department of Physics

A postgraduate physics course was taught in a partially flipped mode. Lectures covered only the skeleton and time was freed for discussions. Students liked the pedagogy, and were willing to learn on their own. More content was covered than would otherwise have been possible. Detailed lecture notes, approximating a book, were provided; ensuring that students read the 'book' was a key element of the strategy. The course emphasized lecture notes rather than video lectures due to its Cartesian (rather than Baconian) nature.

T8. Credit Bearing Experiential Learning Course for Physics Majors

Dr. Alvin Hoi Tik LEUNG

Department of Physics

Undergraduate science classroom teaching traditionally focuses heavily on the transmission model of teaching and learning in which professors lecture and students learn passively. Such a model may work well for the transfer of technical knowledge but may be far less effective in developing students' generic skills such as communication and teamwork skills. To enhance the generic skills of physics majors, the department of physics launched a new overseas summer study tour combining hands-on total solar eclipse observation, science outreach and visits to cutting-edge scientific facilities. Apart from learning forefront scientific research, participants also experienced the importance of collaborative work throughout this trip. In particular, this programme provides a unique opportunity for participants to work in small teams and disseminate scientific knowledge to diverse target groups. This trip serves as an example on how experiential learning can complement traditional classroom learning in bringing about more positive learning outcomes for students.

T9. Implementation of Commercial-Off The Shelf Digital Game-Based Learning in Higher Education

Dr. Kai Ming KIANG and Dr. Baldwin WONG

Office of University General Education

We have adopted the commercial-off the shelf (COTS) digital game-based learning (GDBL) approach in the teaching of the two general education foundation (GEF) courses. In this gamification approach, "quality is maximized by leaving the design of game play up to game designers and the design of learning up to teachers". The game we used is called Civilization, which is a popular and acclaimed strategy video game series that allows one to make decision to build and to lead a nation to flourish in a simulated world. The game has received many awards internationally and has been used by other educators around the world as a learning tool. Based on our experience, playing the game can stimulate our students to think and integrate the various great ideas of humanities and sciences that they have learned in the two GEF courses. As there is insufficient class-time to introduce in-depth historical and social background of the classic texts, as an optional assessment, this game can allow students to learn more in their own outside class time. It also can increased students' interest in the topics and resulted in reading more, not less, of the course materials. Moreover, in general, the game helps students to gain the 21st century skills, such as problem-solving skills, initiative in learning and technology literacy. With a well-established international network, playing this game even help students to connect to other participants of the rest of the world at home. We will share the experience of implementation and some preliminary evaluation results in this presentation.

T10. Enhancing Teaching through an Interactive Course Design on KEEP

Prof. Irwin KING, Bo ZHU, Antonio CHEUNG, Eddy YET and Cathy LI

Knowledge & Education Exchange Platform (KEEP)

KEEP (Knowledge & Education Exchange Platform) is a UGC-funded project for empowering educators and learners with impactful resources and innovative technologies for lifelong education. Teachers from local universities and outside has hosted 200+ online courses on KEEP, creating an interactive and convenient environment for 12,000+ students to learn effectively.

New features are rolling out on KEEP, giving teachers more ways to engage their students in learning. The Peer Instruction tool allows students to consider alternative ideas from classmates before submitting the final answer. Flexibility in quizzes and exams, like question types and time limits, allows teachers to tailor-made learning activities and assessments for their students. The dashboard summarizes course activities and performance, guiding ways to improve course design and thus enhancing teaching effectiveness.

Users are reporting more benefits of putting their course online, including but not limited to more interactive knowledge delivery, more communication channels, better-prepared students, reduced administration costs and easier reuse of course materials. These also drive KEEP to thrive for refining our course platforms and ultimately support teachers in providing quality education.

Teachers and e-learning support units are welcomed to our parallel session for a demonstration on enhancing teaching effectiveness by employing KEEP tools. We also welcome inquiries at info@keep.edu.hk.

T11. Digest^{VR}: Turning Imagination into Reality

Dr. Ann LAU[1], Dr. Wai Kai WONG[1], Dr. Yuen Ken NG[1], Dr. Sam POON[1], Hugo CHEUNG[2], Tony WONG[2] and Janet CHAN[2]

[1]School of Biomedical Sciences, Faculty of Medicine, CUHK, [2]Contractors

A key challenge studying biomedical sciences is students need to use their imagination to relate the text-based content or 2D figures to real life situation where biochemical or physiological processes, like absorption of drugs, digestion and assimilation of food, travelling of molecules are in action within a 3D anatomical environment. The multidisciplinary nature of this subject also makes teaching and learning very challenging. An integrative and interactive approach is essential to make teaching and learning biomedical sciences motivating and interesting. The current project makes use of the fast-growing technology virtual reality (VR) on a Unity-powered platform to develop a pilot module **"Digest^{VR}"** on selected regions of the digestive system for multidisciplinary biomedical sciences teaching. Three-dimensional environment of the stomach was created and as a "map" on which teachers can furnish with information like histological structure, pharmacological and biochemical actions, physiological functions and pathological conditions in designated regions that can be holistically visualized in this **Digest^{VR}** "map". Students can operate the system under a contactless mode by using the VR cardboard together with a mobile device. Learners can have the first-person experience travelling along the digestive system with a selected mode, at the same recognizing the 3D environment and changes in anatomical structures when travelling along different regions of the digestive tract. The platform also allows teachers to easily add and edit text- or image-based auto-marking questions at designated locations of the organ's 3D environment. **Digest^{VR}** is a new generation tool with great potential to facilitate integrative learning and collaborative teaching.

T12. Hands-on Robotics Lectures

Prof. Darwin LAU and Samuel CHAN

Department of Mechanical and Automation Engineering

Traditionally, the primary method in the teaching of the fundamentals in undergraduate robotics is through lectures, where concepts, equations and examples are presented to the class. The difficulties with teaching a subject such as robotics through lectures include: (1) concepts are abstract and mathematical; (2) problems require 3-D spatial imagination while lectures slides are 2-D; and (3) content is difficult to relate with practice.

In this work, we present a new concept of hands-on robotics lectures. In this approach, lectures are taught in an interactive classroom where students, placed into small groups of 4 to 5, learn with a robot arm in front of them. The CUHK developed robot arm is also paired with an Android tablet application that is tailor-fitted to the course content. With approximately fifteen sub-pages covering a range of different, the app aims to complement the lecture content in the form of exercises or demonstrations. Students are not required to program the robot arms, but simply observe the abstract concepts and mathematical content on a physical robot.

Throughout the course, many benefits have been observed with this approach. First, a highly interactive teaching environment results, with teacher to student learning, peer learning and robot to student active self-learning. Second, students are more interested and alert as they are able to play with the robot. Third, students can gain a physical understanding of abstract concepts. Finally, the teacher can quickly observe the student's understanding. The preliminary teaching experience will be shared in this talk and poster.

T13. Using YouTube Analytics to Enhance the Video Teaching Effectiveness – A Case Study of ESSC Educational Videos

Dr. Wenzhu HOU, Dr. Tammy TAM and Dr. Andie AU-YEUNG

Earth System Science Programme

YouTube has become a major platform for educators to publish videos for blended learning. The statistics provided by YouTube, therefore, could be a useful tool to reveal students' behavior. In this study, by comparing the statistics of two series of newly produced educational videos for Earth System Science Programme, we expect to provide practical strategies to enhance the video teaching effectiveness.

Our first series of videos is aimed to showcase the key geological phenomena students would encounter during a geological field trip, and meanwhile to deliver the fundamental knowledge. The second series demonstrates the physical experiments for a better interpretation of important phenomena in atmosphere and ocean. Both series are informative. But the average durations (AD) of videos in the two series are different. The AD of videos in the first series is 2.16 minutes (1.00~3.40), however that for the second is 6.39 minutes (4.75~8.87). Among all the analytical results, we are specifically interested in the Average Percentage Viewed (APV) which could indicate the extent of information loss during the Teaching and Learning. The average APVs for the first and the second series are 66% (58%~75%) and 36% (18%~50%) respectively. Other statistics of the Audience Retention (AR) shows that the longer videos lost retention significantly in the first 20 seconds, but the ARs of shorter ones basically remain stable from beginning to end.

Based on our reported data, we suggest that (1) short educational videos could encourage a higher viewing percentage and (2) for longer videos, an attractive beginning may effectively help to keep the audience retention.

T14. Now You See Further from Giants' Shoulders, Then?

Prof. Hua-bai LI

Department of Physics

As a teacher of a research university, I believe that my duty is not only transferring knowledge but also helping students judge their ability to do research.

Going to graduate school, their mindsets have to change very abruptly from simply swallowing correct answers in textbooks to being very skeptical while, for example, reading journal articles. Being skeptical, however, is a luxury practice they can ill afford under the heavy university curriculum.

I will report an effort to integrate the flavor of research into PHYS4430, Astrophysics. The effort includes a published lecture note that introduces students background knowledge to read review articles from journals. From the literature, students identify open questions that they feel interesting and team up for proposals to tackle the questions.

T15. Enhancing Students' Cultural Competence via Interacting Across Cultures: A Series of Online Micro-learning Modules

Dr. Yvonne LOONG

Independent Learning Centre

In view of the global higher education trend of internationalisation, and aiming specifically to support our students at the Chinese University of Hong Kong on their overseas study and exchange programmes, the Independent Learning Centre (ILC) has developed a series of online micro-learning modules titled "Interacting Across Cultures" (IAC). One of the features of the IAC is that it caters to the specific needs of students from places of high-context cultures, such as Hong Kong and China, while developing their cultural competence at the academic, linguistic, personal and cultural levels to enable them to maximise the possible benefits from their study and exchange experience which usually takes place in countries of low-context cultures, such as the United States and those in Europe. Much of the emphasis is placed on the preparation students have to do before departure. The IAC series is divided into five micro modules (Module 1: Cultural differences; Module 2: Communication styles; Module 3: Achieving goals; Module 4: Culture shock and other obstacles; and Module 5: How to make sense of the experience), each requiring around 30 minutes' completion time. The content can be accessed via interactive webpages on both desktops and mobile devices. With appealing visuals, animation graphics, interactive exercises, reflection activities as well as further independent learning resources at the end, the modules aim at engaging and supporting students from before their departure until after they have returned to Hong Kong. The presentation will introduce the IAC micro-learning modules and how it can be used to support students' curricular and co-curricular activities.

T16. Strategic Training Ground for Future Public Health Practitioners

Carol WONG and Dr. Tony YUNG

Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response, The Jockey Club School of Public Health and Primary Care

This presentation will describe how the field-based training programme of the Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC) has been well-placed to strategically facilitate capacity building activities to train up the next generation of public health researchers and field-based practitioners.

The Nepal field based training programme evolved from the Ethnic Minority Health Programme (EMHP) in China, flagship programme of CCOUC, have both provided advanced technical training and been a field action laboratory for undergraduates and postgraduates of CUHK who aspire to plan, implement and evaluate public health and disaster risk reduction programmes in rural communities of less developed countries.

Using the training of trainer programme in Nepal as the case-study, the presentation will reveal the process of knowledge transfer to the student trainees with multidisciplinary background through workshops, training manuals and online courses; meanwhile, how the CCOUC team strives to identify communities which are affected by the earthquake with different intensity and is pragmatically using its resources to target and train the future practitioners using the frontline setting.

T17. An Innovative Pedagogical e-Learning Micro-module Courseware in Preparation of Objective Structured Clinical Examination (OSCE): The Flipped Classroom in Clinical Examination

Dr. Florence Mei Kuen TANG (Project Leader)[1], Prof. Henry Lik Yuen CHAN[2], Prof. Tony Wing-Chung MAK[3], Prof. Siew Chien NG[2], Jenny FAN[4], Dr. Olivia NGAN[5], Ray LEE[6], Taylor TANG[6], Kristy FUNG[7] and Sarah WONG[7]

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[3]Department of Surgery,
[4] Clinical Skills Learning Center, Faculty of Medicine,
[5]JC School of Public Health and Primary Care, Faculty of Medicine,
[6]Information Technology Service Centre, [7]Medical Students, Faculty of Medicine

Under the MBChB medical curriculum, medical students are trained in 3-year preclinical basic sciences courses plus 3-year clinical skills courses. The Medical Year 4 students are regarded as the junior clerkships who participate in the first year of the clinical practice will receive the clinical training in Surgery and Internal Medicine. The junior clerkships will attend the Objective Structured Clinical Examination (OSCE) with every academic year end. The transition between preclinical and clinical training, however, can be challenging and stressful for students as they need to apply learned knowledge and find solutions solving clinical problems during the bedsides training. Application of knowledge is crucial in clinical curriculum. Other than book knowledge, students also need to be drilled to inspect (look), palpate (feel), percuss (tap), and auscultate (listen). The increased cohort size around 240 medical students, nevertheless, challenge in the teaching and learning of clinical curriculum. While there is a limited resource in teaching students the proper to take patient's history, physician examination, and counselling skills, students may not be confidently prepared for the OSCE.

The modern pedagogical methods – *flipped classroom and micro-modules* – are a combination learning processes of e-learning activities with the face-to-face in the class period. It can be applied to strike a balance between the clinical skills training and OSCE assessment, which can facilitate medical clerkships to grow on their clinical competencies. Therefore, the proposed new innovative micro-modules platform called The flipped classroom Clinical Examination ($_{\text{Flipped}}$ CExam) platform, would serve as an important learning courseware for medical students to gain important clinical skills essential for the success of their medical career.

The $_{\text{Flipped}}$ CExam aims to equip students with the accurate pre-clinical knowledge and essential post-clinical counselling skills for clinical examination and consultation. Clinical skills learning and teaching is a vital part in medical education. We not only develop an e-learning platform but also share the experiences to showcase Faculty teaching capacity. Students can map their learning process at the high-quality level of materials in this elearning platform.

T18. Designing Complex Micro-modules and their Impact on the College Service Learning Experience

Prof. Ann HUSS, Pauline DAY, Maytal MARK and Madison REID

Morningside College

In Term 1 (2017/18), Morningside College introduced a two-part interactive self-paced micro-module unit in the College's capstone course, GEMC3001 – Service Learning/Civic Engagement. The micro-modules were designed by the College's Junior Fellows (Teaching Assistants) and produced using Articulate® E-learning software. Production was supported by a courseware development grant.

In the first micro-module, designed to be viewed before a service learning project proposal is submitted, a student travels through the fictional town of Greenberg, stopping at charity-based, project-based and advocacy-based service organizations. During the journey, the student learns about the different types of service each organization provides and is encouraged to choose the type that best fits her/his skills and interests.

The second micro-module, which is meant to be viewed after the service learning project has been completed, helps the student think critically about the service learning experience so that s/he can confidently turn it into academic work. Students are led through a series of exercises culminating in the production of a project poster that is discussed afterward in small group meetings.

Our presentation will introduce the script-writing, design and production processes, followed by a preliminary review of the impact of these micro-modules on College Service Learning learning and teaching.

T19. Flipped Micro-Module for Professional Sports Skills Courses

LEE, C. W. D.[1], HWANG, S. S. I.[2] , JIN, Y.[3] , YUNG, L. K. A.[3] , LEE, M. F. R.[4] , CHEN, M. H. D.[4] , MA C. W. D.[1] , LIU K. S.[1] & TANG, T. M.[5]

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[5]Physical Education Unit, Faculty of Education

The Department of Sports Science and Physical Education (SSPE) is dedicated to electronic and flipped learning strategies, which are consistent with the University's strategic themes. Therefore, SSPE has committed to Micro-Module Courseware Development, not only in PE, sports science and health lectures, but also in professional skill courses (PSCs). In this project, eight short interactive and self-directed bilingual Micro-Modules have been developed in Swimming (Front Crawl, Breaststroke, Backstroke, Butterfly, Diving and Treading Water) and Cycling (Introduction of Bicycle and Gear Shifting); these were produced with SSPE students and course teachers on the CUHK campus. Each Micro-Module consisted of a 2–4-minute video emphasizing a particular sport's skills and assessments presented with Cantonese or English narration and descriptions and supplemented with three interactive questions to enhance the learning effectiveness of the students on the particular sport's skills. The Micro-Modules are uploaded to Blackboard for students to reference before and after class. Based on our Team's experience in Micro-Module production and application, we predict that the Micro-Module can provide further learning flexibility and serve as a reliable source of teaching materials for our students and that it can be used to evaluate their knowledge before and after class and enhance their learning progress. In addition, four more Micro-Modules on Woodball will be produced and applied in Physical Education Unit (PEU) classes in the second semester of 2017–18. The project will be closely monitored and evaluated by students, by collecting their feedback through an online survey and direct discussions during classes.

T20. Opening a New Window in the Instruction of the Humanities: The Overseas Fieldtrip App

Prof. Ian MORLEY

Department of History

A basic component of learning about society in the past is to undertake fieldtrips. Ultimately two intellectual principles are endorsed via fieldtrips in relation to knowledge production/curriculum design: discovery and construction. What is more an imperative element of studying the past/'doing History' is intellectual curiosity: successful courses that engage with the past routinely provoke intellectual yearning, i.e. a desire among students to 'go beyond the book', and in turn to marry inquisitiveness with skill development through private study. But how can a learner undertake a fieldtrip to a site given limits of time and money during the academic calendar? Or how can a learner be expected to undertake a fieldtrip if the place to be visited is considered 'dangerous'.

To help overcome such challenges an app was composed which enables students of a Philippine History course to 'visit' Manila, and see at first hand renowned heritage sites. Financed by a Courseware Development Grant the app not only helps impart a learning experience potentially far more enjoyable than the lecture/tutorial scenario, because active learning is wholly encouraged, but in addition provides students with a supplementary window in which they can obtain feedback about their learning process, and its management. The new feedback thus offers students a chance to empower themselves further as they can *learn how they learn*. The app, in this milieu, helps grant cognizance of what they know, and how they came to know it.

T21. An Introduction to the Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme (TDLEG)

Dr. Felix CHAO

Independent Learning Centre

The Micro-Modules of Reflective Journal Writing for University General Education Foundation Programme is a project funded by TDLEG 2016-2019. It is a collaboration between Independent Learning Centre (ILC) and University General Education Programme (UGE). The modules aim to teach students of the General Education Foundation (GEF) Programme a set of skills necessary for proper reflective-journal writing. The ILC has been collaborating with UGE in offering workshops for students on reflective journal writing since 2013. Each year, the workshops attract over 1000 voluntary attendances. In order to continue the good practice, to promote e-literacy and to enhance its quality by encouraging students to learn proactively and to think more critically about different subjects, a series of micro-modules is suggested. The modules involve combination of a trilingual online learning platform (responsive website) and corresponding workshops. The various aspects of reflective-journal writing—namely, its definition, its ways of analysis, the thinking process involved, the language requirements and the proper academic style--will be introduced through the online learning platform. Students will learn through guided video presentations, interactive and reflective exercises, suggested readings and writing submitted through the Platform. After students have gone through all the learning steps on the online platform, face-to-face workshops will be provided for discussion and further explanation on areas of greatest concerns. Feedback submitted by students through the online learning platform will be used by the ILC teachers to develop the content of the workshops.

T22. Communities of inquiry: Cultivating Collaborative Knowledge-building on An Undergraduate Course

Prof. Michael LOWER

Faculty of Law

The community of inquiry framework provides a template that can be used by teachers to design a teaching and learning environment emphasising a collaborative, constructivist approach to teaching and learning. Students work in small collaborative groups on research questions that they have chosen for themselves. They brainstorm, generate ideas and produce a joint response to the question. The community of inquiry approach is true to the idea of the university as a community of scholars. Students can learn to think critically and creatively and to present their ideas. They also learn to work collaboratively. Digital technologies mean that students can create blog posts, videos or podcasts to present their findings. They can cultivate digital literacies.

This presentation explains the use of the community of inquiry approach in an undergraduate law class in 2016 –1 7. Students were given the opportunity to work in small groups to produce a blog post, a podcast or a video. They could build on this work for their individual research coursework.

The students were asked to complete a survey after the end of the course. The presentation will present the findings from the survey and consider their implications for future iterations of the course and its general development. It will consider some of the challenges that can impede the creation and operation of collaborative, knowledge-building environments.

T23. A User-friendly, Cost-effective Workflow for Rapid Micro-module Production

Dr. Yuen-Keng Ng[1], Prof. Paul Bo San LAI[2], Prof. Vivian Wai Yan LUI[3] and Eddie Ka On NG[2]

[1]School of Biomedical Sciences [2]Office of Medical Education, Faculty of Medicine, [3]School of Biomedical Sciences

Even though the state-of-the art technology and support for micro-module development are available, many of the teaching staff in the Faculty of Medicine are still reluctant to develop micro-modules possibly due to their tight daily schedule, limited computer skills, and feeling of intimidation by the advanced computer technology.

To advocate the adoption of e-Learning within the faculty, we had introduced a very simple micro-module developing workflow. We hoped this can provide our teachers the practical skills for making interactive e-Learning packages in a both cost- and time-effective manner. The workflow we adopted involved the usage of "Animation" and "Hyperlink" features of Microsoft PowerPoint on making simple interactions, an easy-to-use Text-to-Speech software for narration production, and a freeware for publishing micro-modules in the CUHK Blackboard compatible (SCORM1.2) format.

In 2015-2016, we launched hand-on workshops and seminars for introducing this workflow to our teaching staff. From our experience, our production workflow was well-accepted by our teachers. The workflow enabled them to produce simple but high-quality micro-modules in front of their computers within a few hours, which totally suited for any ad-hoc creation of new micro-modules despite their busy daily schedules. Furthermore, this workflow provided our teachers an easy entry point to adopt e-Learning in their teachings and an opportunity to gain more experience for future development of more sophisticated coursewares.

T24. Micro-modules for Pharmaceutical Dispensing: A Bi-lingual Micro-Dose Delivery of Concepts Involved in Dispensing Medications

Dr. Celeste EWIG[1], Mr. Alex YUNG[2], Ms. Yan JIN[2], Mr. Matthew HUI[1], Mr. Taylor TANG[3], Dr. Isabel HWANG[4]

[1]School of Pharmacy, [2]Office of Medical Education, [3]Information and Service Technology Centre, [4]School of Biomedical Sciences

Preparing students for their future roles as healthcare professionals goes beyond materials learned in a classroom setting. It involves teaching students the fundamental knowledge required, how this knowledge is translated into concepts, and the application of these knowledge and concepts to a patient.

One common challenge encountered was the students' difficulty in connecting what was learned in class to patient care. To address this challenge, we sought to integrate information from various modes of learning. Our objective was to encourage a broader yet cohesive understanding of the materials learned and introduce students earlier to the concept of patient care.

We developed micro-modules covering various topics related to the dispensing of pharmaceutical products. Each micro-module includes: 1) the key information students needed to know, 2) demonstration videos and illustrations of this information when applicable and 3) patient cases to illustrate the clinical application of the learning outcomes. Key concepts were linked throughout each micro-module to establish correlation within the subtopics. We also collaborated with the Department of Pharmacy of the Prince of Wales Hospital to create videos enabling students to appreciate the application of these concepts in the local practice setting. To further facilitate students' understanding, bi-lingual versions of each micro-module are available for students to select their preferred learning language while strengthening their English and Chinese (Cantonese) professional language skills.

This project demonstrates bridging the gap between classroom and clinical practice with the use of an integrated eLearning environment. Doing so strengthens the learning process, provides a more sound foundation of knowledge and encourages students to start thinking like a healthcare provider early on in their career path.

T25. Flipped Classroom in Course for Preservice Mathematics Teachers: Case Sharing of Frontline Teachers Through Micro-modules

Dr. Yip-Cheung CHAN

Department of Curriculum and Instruction, Faculty of Education

Apart from pedagogical theories, experience from senior practitioners in the field is equally important for students of professional discipline such as education. In order to increase the pre-service teachers' exposure to different real cases experienced by frontline mathematics teachers, micromodules incorporated with flipped classroom teaching approaches have been trail-run in the course "Subject, Curriculum and Teaching (Major: Mathematics)" which is a one-year course offered to students of Postgraduate Diploma in Education (Primary). Each micro-module consists of a video of 15-20 minutes. In each video, a frontline primary mathematics teacher presents the theoretical concepts and/or case sharing related to a specific topic. An online quiz is accompanied with the video in which the students will need to complete after watching the video and before attending the lecture. Furthermore, there are two reflection questions at the end of each module. These questions would facilitate the class discussion of the coming lecture. At this moment, five micro-modules have been fully accomplished. They are: (1) Primary math curriculum; (2) Planning math lessons; (3) Basic techniques on math pedagogy; (4) Use of teaching aids in math pedagogy; and (5) Preparation of Teaching Practice. More micromodules will be produced later. In this oral presentation, I will share to the audiences the features of these micromodules and my experience of implementation of this teaching innovation. It is hoped that this sharing can inspire colleagues of other professional disciplines to create micro-modules for their own courses. This ongoing project is supported by Micro-Module Courseware Development Grant (2016-17).

T26. ***SMART Assessment 2.0: Unfolding Student Expectations and the Approaches Adopted for Academic Performance***

Dr. Paula HODGSON[1], B SK HUI[1], C SY TANG[1], Prof. Ching Chyi LEE[2], Prof. Vivian LEE[3], Prof. Michael LOWER[4], Dr Sally WAN[5], Prof. Kristof CROLLA[6], Prof. Amos TAI[7,]
Prof. Wei-li ZHAO[5],
Dr. Frankie Kwan Kit WONG [8], Dr. Yvonne LOONG[9], Dr. Wing Hung WONG [10],
Dr. Kenneth Ming LI[10], Dr. Kai Ming KIANG [10], Dr. William Ka LAU[2], Dr. Jenny Jie TIAN[11],
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[10]Office of General Education, [11] School of Hotel and Tourism Management, [12]School of Biomedical Science

The SMART assessment project was started in 2015, and meetings were held with teaching staff on assessment design and the perceived impact on student learning. With funding support from TDLEG 2016–19, an extended component was built in as a second phase of investigation. The focus was on student approaches to university study with respect to university curricula. The total number of students interviewed was 47, and their academic backgrounds included business, law, architecture, medicine, pharmacy, hotel/tourism management, education, global studies, religious studies, sociology, psychology and university general education. Two students were from Year 1, 14 from Year 2, eight from Year 3 and 15 from the final year; eight interviewees were studying for a master's degree. Factors affecting student approaches to university study include year (freshman versus final year), intake (Joint University Programmes Admissions System and senior year), professional preparation, individual aspirations, readiness to take risks, and students taking the initiative beyond the curriculum. By enabling a conducive learning environment, university educators play significant roles not only in establishing knowledge. More importantly, to facilitate the building of student competence, educators need to design how knowledge is structured so that students can combine hunches and personal interests with opportunities to discover, test, reflect, reassess and redesign.

T27. Teaching Cultural Diversity and Intercultural Capacity through Experiential Learning and University-Agency Collaborative Teaching

Kar Choi CHAN[1], Helina YUK[2] and Noel LEUNG[3]

[1]Department of Social Work
[2]Former Director, SKH Lady MacLehose Centre – the co-teaching partner
[3]Unit-in-charge, Services for Ethnic Minorities, SKH Lady MacLehose Centre – the co-teaching partner

Globalization has made major metropolitans, such as Hong Kong, more ethnically diverse. The course titled "Intercultural Intelligence - Meeting the Challenges of a Culturally Diverse Society" aims at preparing undergraduate students for their future social or occupational roles in an increasingly diverse but interconnected globalized world, by developing their intercultural knowledge and capacity, through theoretical and conceptual exploration, experiential learning, cultural-based interpersonal assessment as well as reflective self-evaluation.

The uniqueness of this Social Work elective & University General Education (UGE) course is its emphasis on the integration of innovative thinking with experiential learning. The course is probably the first of its kind by having a well-established social service agency – SKH Lady MacLehose Centre- also a service leader in working with ethnic minority groups as a formal teaching partner in the pedagogical design. The social service agency is responsible for providing practical field knowledge and outside-campus experiential learning activities for students in areas relating to ethnic diversity and cross-cultural ability. Apart from site visits, guided community tours, and interviews with clients and stakeholders, students are required to work with mentors who are service staff from the co-teaching agency, in small group projects to study a particular issue or challenge faced by local ethnic minority groups, and to come up with innovative, feasible and culturally-relevant solutions or action plans in addressing the identified issue.
This presentation will highlight feedback and evaluation from both students and the co-teaching partner. Impact and challenges of this form of collaborative teaching will also be discussed.

T28. The Use of Social Media Platforms in the Classroom

Prof. Sandra MARCO COLINO

Faculty of Law

Students love social media. Incorporating the use of social media in teaching can greatly enhance their learning experience. Not only can the learning process be more fun and engaging, but feeding students valuable information through a channel which they are fond of and which they use regularly has been proven to encourage them to access and eventually retain that information. The use of social media also has external benefits. By posting useful information publicly, this tool can also help to showcase and disseminate the work carried out in academic institutions, and can be used to raise their international profile and reputation. However, to have internal and external value, the use of social media must be rational, carefully thought out and adequately tailored to meet the specific requirements of the field being taught. In this presentation, I will explain how I use social media in legal education. I will do so by sharing the experience I have gathered over 12 years, explaining the various ways in which I have integrated social media into the classroom and covering the "dos and dont's" of the use of such platforms in education.

T29. E-learning Software for Proof-type Problems

Dr. Leung Fu CHEUNG

Department of Mathematics

In university mathematics education, one key learning difficulty lies in acquiring the "language" of writing mathematical proofs. To tackle this problem, many books on "writing proofs" have been published in recent decades. In our project, we strive to automatize this kind of learning. Our idea is to make use of the open source software WeBWork to do it.

At present the WeBWork question bank has a rich collection of multiple-choice as well as fill-in-the-blanks problems, but lacks functionality to check the validity of a short written proof. In our project, we provide a way to do this by extensively modifying the capability of WeBWork essay-type answer box. As an example, our software program can "simulate" the grading of a student's proof of questions such as: If n is odd, m is even, then n + m is odd. More abstract questions can also be handled.

This is our first attempt to simulate an automatic answer checker, which involves computer's understanding of mixed language code (i.e. codes involving mathematical symbols and human language).

T30. An Integrated Experiential Learning and Alumni Engagement Co-Curriculum

Dr Jie TIAN, Gentiana CHEUNG and Dr. Jacqueline WONG

[1]*School of* Hotel and Tourism Management
[2]*Department of Decision Sciences and Managerial Economics*

This project aims to create a structured co-curriculum that facilitates students' experiential learning and alumni's engagement in teaching & learning (T&L) at the School of Hotel and Tourism Management (SHTM or the School). The co-curriculum includes three independent and correlated modules linked to different major required courses (or T&L programs), featuring different learning activities, and targeting different student cohorts. The three modules adopt the same structure but can be implemented along separate timelines systematically and regularly.

Each module involves a contest that requires students to design, plan, and implement a learning activity. Module 1 features a study tour design contest mainly targeting Year-1 students (as participants). Module 2 features a cross-cultural learning event contest mainly targeting Year-2 students. Module 3 features an alumni interview video contest mainly targeting Year-3 and Year-4 students. In each module, students need to form teams and submit proposals. The winning team then needs to implement their plan in the real world.
All modules are structured to connect real-world learning activities with the SHTM Intranet (Microsoft SharePoint site.) Intranet serves as a secure online platform for the School, current students, and alumni to launch learning events, submit proposals, share information, collaborate on team tasks, collect feedback, and store deliverable outputs in various formats (text, image, audio, and video).

PAPERS

PAPER

T7 (FULL)

A partially flipped class in physics supported by e-learning: Report of an experiment

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August 2017

Abstract

A postgraduate course in physics was taught in a partially flipped mode, with lectures covering only the skeleton. Time was freed for discussions. Students liked the pedagogy, and were willing to learn on their own. More content was covered than would otherwise have been possible. Detailed lecture notes, approximating a book, were provided; ensuring that students read the 'book' was a key element of the strategy. The course emphasized lecture notes rather than video-taped lectures due to its Cartesian (rather than Baconian) nature.

1. Introduction

This note reports on an experiment to adopt a partially flipped class supported by e-learning, in a postgraduate course in physics, in the academic year 2016–17. The course PHYS5420 *Classical Electrodynamics* was taught by the first author with the second author as teaching assistant.

1.1 Flipped classroom

The **flipped classroom** has been defined in many ways, for example:

> The flipped classroom … employs asynchronous video lectures and practice problems as homework, and active, group-based problem solving activities in the classroom. [1]

Another characterization is given as follows

> [Flipped Classroom] moves direct-instruction lectures outside the classroom (usually via online videos) and reserves the in-class time for higher-order student-centred learning activities. [2]

This flipped classroom strategy was adopted *partially*: Lectures were not video recorded. The skeleton lectures emphasized key ideas only and students had to learn details on their own. Time was released for class discussions; discussion also took place on the e-learning platform.

In this regard, the pedagogy is better characterized as **blended learning**:

> … blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences. There is considerable intuitive appeal to the concept of integrating the strengths of synchronous (face-to-face) and asynchronous (text-based Internet) learning activities. [3]

1.2 Nature of the course and of the enrolment

Elective rather than required

Traditionally, a rigorous postgraduate course on classical electrodynamics (ED), at the level of Jackson [4], was required in many graduate schools for doctoral candidates in physics. Such requirements have now been eroded, even in the best universities, in part because advanced ED (and likewise advanced quantum mechanics and statistical mechanics) is no longer thought to be necessary for students in many sub-specialties, nor indeed feasible given the uneven student ability. At CUHK, this course is offered as an elective.

Subject content

The subject content in this course also departs from the cannon defined by a textbook such as Jackson [4]: there is less emphasis on mathematical techniques, boundary value problems and special functions. Instead, attention is given to modern and conceptual topics, with ED seen not just in its own right but also as a gateway towards field theory, the gauge principle and the standard model. Topological ideas are introduced. Given the increasing importance of computers, a brief introduction is given to numerical methods in electrostatics, including finite differencing, minimal principles, flow and relaxation methods.

Enrolment

To allow fruitful class discussion, the enrolment was limited to about 20, and the class composition was mixed (Table 1).

Programme	Number
PhD	7
MPhil	7
MSc	4
BSc	1
Total	**19**

Table 1. Class composition[1]

There were many auditing students: about 4 (including 2 from other institutions) who attended regularly and perhaps another 4 who attended from time to time.

Prior preparation

The prior preparation was uneven. A few doctoral students had taken advanced ED previously. Some MPhil/ MSc students had taken only one term course in electricity and magnetism beyond general physics, whereas for those who did their undergraduate degrees at CUHK, two courses would be the norm. Two students did not major in physics

[1] One of the PhD students was from another institution, enrolled under an inter-institutional arrangement for the sharing of postgraduate courses.

as undergraduates (one in mathematics, one in sports science with a minor in physics). Thus, it was important to cater for learning at different individual paces.

2. Course design

2.1 Pedagogy

The pedagogy is explained in the *Course Outline* distributed at the beginning of the term:

> The first consideration in the course design is the intention to adopt a version of the flipped classroom, or more accurately a hybrid model. Each topic will be treated in three steps.
>
> A. A brief lecture will be given, emphasizing the concepts.
> B. Students then learn on their own, including all the technical details.
> C. The next class will be used for discussions, as well as questions and answers.

2.2 Lecture Notes

To support self-learning (i.e., step B as described above), detailed *Lecture Notes* were written. Readily available textbooks were not used, for reasons that were explained in the *Preface* to these notes.

> In physics, and especially in a subject such as electrodynamics, details are important. …
>
> But … students will find it hard to learn the details properly unless they have access to a book, or a good set of lecture notes, that closely follows the choice of material, the order, and even the notational conventions (not to mention, in the case of electrodynamics, the units and metric) adopted for the lectures. Far too often students nowadays (and not just in this subject) simply do not go to the textbook or references, and rely instead on the presentation slides, which are necessarily sketchy.
>
> If the reference material is to so closely shadow the lectures, and the lectures are constrained by the time available … in its coverage of topics, then it is unfortunately true that none of the excellent textbooks available would be suitable. It is simply not realistic to use Jackson, for example, for a one-term course. This is the reason why this set of notes came to be written.

The full preface to the *Lecture Notes* can be found here.[2]

We believe (and this is supported by the survey presented below) that the course would not have been successful without this set of *Lecture Notes*. These were not in point form, but were written in the style of a textbook. A sample Chapter can be found here.[3] A flipped learning mode need not involve video-recorded lectures: studying the printed

[2] https://www.dropbox.com/s/cvrjxkyxstd6rjx/Chap00b-S-161109.pdf?dl=0
[3] https://www.dropbox.com/s/gd3czvch2181ys8/Chap15-S-161101.pdf?dl=0

page is more effective for learning the technical details, for example how one formula leads to another.

2.3 Platform for e-learning

Two platforms were used for e-learning. The course material (administrative circulars such as *Course Outline* and homework assignment, lecture presentation slides and the pdf files of the *Lecture Notes*) was posted both on Blackboard and on a SharePoint site accessed through the CUHK Office 365 (O365) system. The latter in addition contained the following

- There is a *Discussion Forum*, in which students could pose and answer questions.
- For each Chapter, there was a survey, labelled as a *Learning Journal*, to assess where students may have difficulties. Conscientious completion of the mandatory survey (but not the substance of the responses) counted for 10 marks in the assessment. The survey questions, the same for each Chapter, are given in Appendix A.
- The *Document Library* contained the Course Information, homework assignments, *Lecture Notes*, Q & A, Supplementary Material, test and exam papers (after the events).

Issues raised in the *Discussion Forum* or through the *Learning Journals* which required more lengthy responses were dealt with in the Q & A section of the *Document Library*. Students tended to post questions late at night the evening before class, and these had to be handled early the next morning, in order to identify the questions for class discussion, and if necessary to adjust the pace of teaching. A sample Q & A file (one out of 19 in the whole course) is in Appendix B.

There was a reason for using two electronic platforms. Blackboard is the default Learning Management System (LMS) at CUHK, but O365 (and SharePoint therein) is recently offered as an alternative, with one supposed advantage (as hinted at by the brand name) being its ubiquitous availability through a variety of platforms including mobile devices. One question we sought to answer was: Would full migration to O365 be desirable?

3. Evaluation

3.1 Attendance and participation

Class attendance was good in the first half of the term (in part because participation in discussion counts for 10 marks), but tapered off towards the end of the term. The students (but alas those present) suggested the main reason as fatigue — not so much with this course as fatigue in general as the term progressed and work piled up. A few of the weaker students had difficulties with the last few Chapters. The availability of the *Lecture Notes* also provided perverse incentive to skip class.

3.2 Course and teaching evaluation

The standard course and teaching evaluation (CTE) was extremely positive (Appendix C). Mean adjusted[4] scores on selected question are as follow: Presentation is clear 6.00; Teacher was

[4] Adjusted in the usual way for CTE.

enthusiastic 6.00; Class participation encouraged 6.00; Recommended reading useful 6.00; Satisfied with course 6.00; Satisfied with teacher 6.00.

But only 40% were present on the day of CTE. So, the conclusion can only be that the course was very positive *for those who persevered to the end*.

3.3 Survey on pedagogy

Instrument

A specially designed Survey on Pedagogy was carried out (Appendix D). To focus on the pedagogy and filter out other factors, the instruction included the following:

> The questions below ask you to evaluate the ***pedagogy***; please mentally remove other factors such as the level of difficulty of content, the amount of content, the pace of teaching, your prior preparation in the subject, the quality of delivery by the teacher, etc. In other words, you should compare this course with a hypothetical one covering the same content at the same pace, with yourself having the same prior preparation, and taught by the same teacher, but in the conventional mode.

With the online survey thwarted by a software bug, the survey was eventually conducted on paper, immediately after the final examination — which ensured 100% response.

Scale

Students responded to statements on a symmetric 6-point Likert scale (L = 6, 5, 4, 3, 2, 1 for strongly agree / agree / slightly agree / slightly disagree / disagree / strongly disagree). The even scale mimicked CTE, and forced a choice since the ultimate purpose was to answer the question 'should such a pedagogy be adopted'. For easier understanding, the means were linearly mapped (Table in Appendix D) to a score S on the range of +10 to –10, so that the neutral point L = 3.5 mapped to S = 0, and degrees of agreement / disagreement are more intuitively represented as positive / negative numbers up to ±10. The salient points are here reported, with the full survey results in Appendix D and corresponding free comments in Appendix E.

Survey result

Students agreed (S = 6.0) that compared to conventional teaching, there was more time for discussion in class and moderately agreed (S = 3.6) that there was more discussion on the e-learning platform. Students liked the outline lectures for highlighting the key ideas (S = 6.7). In terms of learning on their own, students slightly agreed that they had learnt more physics (S = 2.7), had obtained better understanding (S = 2.0), had improved in the ability and inclination to learn on their own (S = 2.7), but had to spend more time on the course (S = 2.4). But it was gratifying to see agreement (S = 6.2) that more responsibility should be placed on students to learn on their own, and moderate disagreement (S = –3.6) that learning was less effective because many details were not taught in class.

Students liked the time for class discussion (S = 5.3) and moderately agreed (S = 4.0) that they had thereby clarified concepts and difficulties. They agreed (S = 6.2) that class discussion was livelier than in other courses, but only slightly agreed (S = 2.4) that they had become more willing to speak up in class. They liked the discussion on the e-learning platform (S = 5.6) and

agreed moderately ($S = 3.8$) that they had thereby clarified concepts and difficulties. They agreed ($S = 5.6$) that there were enough channels and opportunities to clarify difficulties.

The strongest statement of agreement ($S = 8.0$) was that the structured material provided (i.e., the *Lecture Notes*) was useful for self-learning.

In summary, they liked the (partially) flipped methodology ($S = 5.5$) and thought that this approach should be more widely adopted ($S = 5.1$).

On the e-learning platform, they agreed only marginally ($S = 1.8$) that SharePoint on O365 was more convenient than Blackboard — a slight advantage in favour of SharePoint, despite the greater familiarity of CUHK students with Blackboard at this time. The effect was weak, in part because students did not make much use of the mobile capability of O365, slightly disagreeing ($S = –2.7$) with the statement that 'I often access SharePoint using a mobile device'. But overall, they agreed ($S = 3.2$) that it was useful to post questions because that helped to focus the explanations in class.

4. Reflection and conclusion

4.1 Overall preference

There was a definite preference for this mode of teaching, and a partially flipped model will continue to be adopted in future offerings. Some factors made the pedagogy suitable for this particular course (e.g., the diversity in the prior preparation).

The result of the comparison between the two e-learning platforms was ambiguous: students very marginally preferred SharePoint, but there were adverse free comments about O365 and setting up the course site was more onerous.

4.2 Coverage of material

Although this was not an item covered in the survey, one pleasing success was that an ambitious amount of material was covered. Several colleagues thought that the amount of material would prove challenging (even 'excessive'); those who offered this comment included the chairman of the Department's Curriculum Committee, a former Department Chairman who had taught an earlier version of this course in the past, and a former External Examiner who had also taught ED in his own institution. The content had to include both standard core topics (e.g., radiation) and modern ideas (e.g., gauge invariance, action formalism and an introduction to covariant field theory, monopoles and the Bohm–Aharonov effect) — while at the same time the fundamentals had to be reviewed. The fundamentals, accounting for one third of the Chapters and about one quarter of class time, would not have been necessary if all students had uniformly satisfactory prior preparation.

However, because technical details were not covered in class, the lectures were not hurried, and there was no complaint on the amount of material or the pace of teaching. It is fair to say that all students gained understanding of even the most advanced material, and the better students achieved mastery. *We consider the amount of material taught and learnt one of the most successful outcomes*.

There is nearly universal complaint, across all subjects and across all levels, that there is too much material and not enough time to teach.[5] Moreover, emphasis is often placed,[6] again across all levels, on learning-to-learn.[7] Given this situation, the observation reported — not often emphasized in discussions about the flipped classroom — is potentially the most important lesson that can be elicited from this experiment.

4.3 Student read 'book'

Students nowadays tend not to read textbooks seriously, if at all. They expect teachers to provide copies of presentation slides, which are necessarily sketchy and tenuous in the chain of thought linking one idea to another (each expressed by a short phrase). Revision then consists of reviewing the slides. This mode of learning is seriously defective, especially in subjects that require deep and detailed understanding (more on this in Section 4.6), but is prevalent among students these days, the situation aggravated by the cost of textbooks.

However, in this course, we have been able to make students read, indeed work through in detail, the *Lecture Notes*; these, as already emphasized, are not outlines but come close to being a textbook. *We consider making students read the 'book' another one of the successful outcomes.* The availability of such structured reading material was the most highly rated aspect found in the Pedagogy Survey ($S = 8.0$).

The positive outcome would not have been possible if the 'book' had not been followed very closely. Commercial textbooks cater to a variety of readerships, and teachers would be most unlikely to follow any one such textbook faithfully — in which case students tend not to read the book carefully. Such student attitude, though illogical and undesirable, is nevertheless a fact of life that must be reckoned with.

For this same reason, kind suggestions to turn the *Lecture Notes* into a textbook are received with some scepticism: the efficacy would be compromised if used by another teacher with inevitably different approaches and preferences.

4.4 No online lectures

Unlike most instances of courses described as 'flipped', lectures were not video-taped and posted online (though the corresponding presentation slides were). This was a considered decision, since any effect is expected to be marginal (and even the sign of the effect is debatable). If the key difference is online lectures, then the comparison in terms of learning activities would, with little exaggeration, be as follows.

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[5] At least among the more conscientious teachers who resist the easy option of shedding material.

[6] At least in theory.

[7] 'Learning-to-learn' is even one of the brand names attached to the education reform for the senior secondary school curriculum in Hong Kong, for which, incidentally, complaints of inadequate time to teach is frequently heard.

Traditional	Online lectures
Come to lecture	View lecture online
Possibly review presentation slides	Possibly review lecture video
Do not read book	Do not read book

Table 2. Replacing face-to-face lectures with online lectures.

The only advantage would be class time freed up for discussion — but even that is an illusion, since that is (more than) offset by the time needed outside of class hours to view the lectures.

4.5 Asynchronous learning

One feature of a (partially) flipped approach is asynchronous learning: students learn at their own pace and at the time of their choice. The choice of pace is important given the heterogeneous profile — but this advantage would be diluted for a typical undergraduate course. To allow students to fit their own schedules may not always be a good thing, for 'the flesh is weak' [5] and there is no reason to encourage absenteeism for morning class. But this flexibility is useful for part-time students. In this course, the second highest score was achieved by a part-time MSc student who seldom came to class because of conflicts with his job as a school teacher — and he would have ranked at the top of the class were it not for the few marks lost in the category of class participations. The provision of learning opportunity to such a student was gratifying.

4.6 Baconian and Cartesian science

There is some tendency for advocates of any pedagogical approach to argue for its advantage in tones suggesting a high degree of universality. The two passages cited in Section 1.1, for example, do not make reference to any specific subject.[8] In reflecting upon our experience, and contrasting with the experience reported in other contexts, attention should be drawn to one significant difference. For want of a better term, we adopt the convenient labels Baconian and Cartesian [6], with the warning that these could be misleading if not suitably explained and qualified, and understood as stylized limits of a continuum on which any scientific endeavour can be located.

The Baconian approach would put the primary emphasis on observations, in the extreme case without much theoretical guidance[9] and therefore apparently haphazard. The logic is inductive, the method often qualitative; the scientist delights in diversity and the particular. In contrast, the Cartesian approach emphasizes the overarching principles, in the extreme case with little regard for observations other than as mere consequences of those principles. The logic is deductive, the method typically mathematical; the scientist delights in unity, in the general, and in the abstract. To some, the abstraction comes close to the Platonic ideal in which truth and beauty become one.

Some subjects by their nature tend towards the Baconian. Within the physical sciences one can cite, for example, geology, planetary science and novel materials. Other subjects tend towards

[8] At least within these fragments.

[9] Or prejudice.

the Cartesian, for example, mechanics, electrodynamics, statistical mechanics, quantum chemistry, and of course string theory.[10] The same subject may be more Baconian in its infancy/ youth and more Cartesian in its maturity/ dotage;[11] a good example is chemistry up to Mendeleev (with analogies and classification looming large) compared with chemistry in the twenty-first century (often starting with quantum orbitals).

There is a long-standing debate about the relative merits of the two approaches, whether about practical efficacy (e.g., in drug discovery) or more fundamentally about the true purpose of science, with Cartesians dismissing science without grand principles as 'mere stamp collecting' [8] or 'squalid state physics' [9]. Setting this aside, and also setting aside the question whether undergraduate physics education, especially in many Asian universities including CUHK, is too Cartesian, it is indisputable that within the range of courses offered and/or required in physics (and in modern parlance, the corresponding range of intended learning outcomes), advanced ED is more Cartesian (*C*) than Baconian (*B*).

The nature of the subject along the *BC* continuum impacts the choice of strategy within the universe of flipped or blended pedagogies. We comment on only one dimension of this pedagogical choice: online lectures versus detailed lecture notes akin to a textbook.

A subject of a more Baconian nature would benefit from a survey of the landscape, a summary of different (possibly conflicting) observations, a debate about different interpretations (each viable in the face of the currently available data) and an exploration of possible ways forward. A lecture would be useful to provide orientation and hopefully a first level of rough understanding; we have all attended colloquia where that is precisely the intention. In these circumstances, a carefully prepared and video-taped lecture, available online, would add much pedagogical value. But a subject of a more Cartesian nature would on the other hand benefit from detailed study of the theoretical fabric, with line-by-line derivations that put a premium on rigour, and often disproportionate attention to exceptional (even esoteric) cases and small discrepancies to be resolved. In these circumstances, a formal textbook, or lecture notes that come close to it, would be important — and any strategy that causes the students to seriously work through such structured material would be positive for student learning.

4.7 Conclusion

The (partially) flipped pedagogy has been largely successful in this course, and the most important ingredient is the provision of structured text-based material that was faithfully followed. The amount of content covered (without complaint!) and getting students to read through structured material were the two most successful outcomes. The specific strategies need to be chosen with the nature of the course in mind, and the flipped classroom or blended learning should not be regarded as one single method that suits all circumstances.

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[10] Though there are complaints that string theory is 'not even wrong' [7] and therefore not a science.

[11] Baconians would choose one set of adjectives and Cartesians the other.

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9. This remark is attributed to M Gell-Mann.

Appendix A

Chapter by Chapter Survey

The course material consists of 21 Chapters, and students were asked to complete an online survey at the conclusion of each. The surveys were mandatory, in the sense that they count for 10 marks in the assessment. The questions are identical for each Chapter, and are shown below.

1. Which parts of this Chapter are already familiar, and should be covered more quickly (or skipped) in the lecture?
2. Which parts of this Chapter are novel and interesting?
3. Which parts of this Chapter are difficult, either conceptually or computationally? If possible, state what the difficulties are.
4. Which parts of this Chapter should be discussed or elaborated in class?
5. Any specific questions or comments?
6. Any errors (including trivial typographical errors) in the lecture notes?

Appendix B

A Sample Q & A Post

There were 19 posts dealing with Q & A. Here is one such post chosen at random.

Q and A | 170330 | Chapter 18

> In ch17 extension A during the derivation of the equation of motion from varying the action. In varying the interaction term, specifically the second term (below equation 3), Prof. Young seems to have assumed the tensor field h_uv to be symmetric in order to group the terms. I tried to carry out the derivation of the equation of motion without assuming the tensor field to be symmetric and I still arrived at an identical result (only with a symmetrized version of g_uv). The derivation of the equation of motion does not seem to depend on h_uv being symmetric.
> My question is as follows: why was h_uv being symmetric imposed when the equation of motion would've been identical otherwise? Is it related to any physical arguments or simply mathematical convenience?

Good question.
Start with any rank two tensor field. The symmetric and antisymmetric parts are independent, in the sense that they do not mix under Lorentz transformations. Thus you can always separate such an object into two things, a symmetric h_{uv} and an antisymmetric k_{uv}. There is no reason why they should couple with the same strength. In fact, you have just shown that the antisymmetric part decouples with this choice of action. It is a separate question how the antisymmetric part can couple. I do not think it can couple to a point particle without spin.

> Maybe the relation between CED and QED can be talked a bit in class.
> I feel QED and Quantized EM field are not the same thing and QED is difficult to be related with CED.

QED is at least two term courses by itself. But in brief:

1. Once you have CED, then you apply standard rules (basically turn conjugate momentum into operators), and that gives you QED.
2. But when you do that, you find a number of complications that need to be handled, which are of two types.
3. First, you need to handle the gauge degree of freedom. This manifests itself in a number of ways. We have encountered one: how do you invert the singular matrix \tilde{D} to obtain \tilde{G}. A related issue is that for A_0, its time-derivative does not appear in S, so there is no conjugate momentum. What do you do?
4. Secondly, you need to calculate all quantities in perturbation theory, i.e., take account of the fact that the EM field is not free, but interacts with charged particles. This leads to infinities, which can only be cured by renormalization.

> Compare the Lagrangian density used in Proca equation (17) and in gauge-fixing boson field (25), the extra term in latter one is actually caused by the non-conservation of J. I feel the result of latter is quite ugly. Why don't people just admit that J is conserved for weak-interaction?

No no. If you admit J is not conserved, then there is no (hidden) gauge symmetry, you cannot add the gauge fixing term, and the theory would not be renormalizable. That was the situation up to mid-1960s,

and people focused only on first-order weak processes, ignoring second (and higher) order corrections which are formally infinite.

As usual, it is not very difficult to follow from the 1st line to the bottom, but I simply do not know how to write down the 1st line. For example, the introduction on the hidden gauge fixing term in section (3.3).

Not surprising. If you knew how to do it (in 1963) you would have shared the Nobel Prize with Higgs. It is the result of playing with many possibilities and seeing what works and what does not. I think the Extension on tensor field theory is a good example of how you can try (in a different domain).

Any specific questions or comments?
The symmetry breaking of photon and W/Z bosons:
How their mass comes out in this mechanism?

Actually they interact with a scalar field ϕ (the Higgs field, thru something like
| (\partial_\mu –ig W_\mu) \phi |^2 [which is gauge invariant]
This leads to a term that goes as
\phi^* \phi x W_\mu W^\mu
Now if \phi has a non zero value v in vacuum, this term becomes
v^2 W_\mu W^\mu
which looks like a mass term.

This is the idea of spontaneous symmetry breaking and the Higgs mechanism.
Don't expect to understand it in one week!

What if the energy is high such that it is above the peak of the "Mexican hat"?
That is not unlike the fact that ferromagnetism (a case of spontaneous symmetry breaking) disappears above a certain critical temperature.

"For example, the Higgs phase of the electroweak theory, realized at small temperatures, may be transformed into a "symmetric" phase (it is often said that the symmetries are "restored" at high temperatures)."
Quoted from page 2 in
https://arxiv.org/pdf/hep-ph/9610247.pdf
This is just a random (not necessarily the best) paper found by searching with a few key words.

Appendix C

PHYS 5420

Course and Teaching Evaluation

Adjusted[12] mean scores

Presentation is clear	6.00
Teacher was enthusiastic	6.00
Class participation encouraged	6.00
Communication was effective	5.86
Course was interesting	5.86
Course was stimulating	6.00
Subject knowledge is enhanced	6.00
Course was well organized	5.86
Clear learning outcomes	6.00
Appropriate learning outcomes	6.00
Appropriate assessment method	6.00
Appropriate workload amount	5.86
Recommended reading useful	6.00
Content difficulty appropriate	5.86
Supported by library resources	6.00
Supported by IT resources	6.00
Satisfied with course	6.00
Satisfied with teacher	6.00

[12] Usual definition in CTE.

Appendix D

PHYS5420 Classical Electrodynamics

Survey on Pedagogy

6 May 2017

Content in black is the original survey. Content in blue is added afterwards, as part of the analysis and explanation.

Apologies that there was a bug with the online form, and it would be appreciated if all students can do (or re-do) the survey on paper, immediately after the final exam. Please fill in below and return to the separate pile (so that the survey is anonymous).

Dear students

This end-of-term survey seeks your feedback on the pedagogy adopted in this course, in order to improve teaching and learning. This survey is additional to and separate from the Course and Teaching Evaluation (CTE) conducted centrally.

The focus of the survey is the ***pedagogy*** adopted in this course, which is a (partially) flipped method, supposed to have the following features (compared with conventional pedagogy)

- lectures are only an outline
- students have to learn on their own
- structured material is provided (e.g., on e-learning platform) to help students learn on their own
- more time is freed for discussions
- discussions can also take place on the e-learning platform

The questions below ask you to evaluate the ***pedagogy***; please mentally ***remove*** other factors such as the level of difficulty of content, the amount of content, the pace of teaching, your prior preparation in the subject, the quality of delivery by the teacher, etc. In other words, you should compare this course with a hypothetical one covering the same content at the same pace, with yourself having the same prior preparation, and taught by the same teacher, *but* in the conventional mode.

Please answer 6 to 1 on the following scale

6 = strongly agree
5 = agree
4 = slightly agree
3 = slightly disagree
2 = disagree
1 = strongly disagree

Please fill in the relevant boxes to the left of each question.

The scoring on the 6-point Likert scale (*L* = 6, 5, 4, 3, 2, 1) is converted to a score *S* on a range of +10 to –10 by a linear transformation, so that the neutral point *L* = 3.5 maps to *S* = 0, and various degrees of agreement / disagreement are more intuitively represented as positive / negative numbers, with ±10 denoting full or strong agreement/ disagreement. The relationship is shown more specifically below.

	L	***S***
strongly agree	6	+10
agree	5	+6
slightly agree	4	+2
(neutral)*	3.5	0
slightly disagree	3	–2
disagree	2	–6
Strongly disagree	1	–10

Table. Relationship between Likert scale *L* (6 to 1) and the score *S*.
* The neutral point is not presented as an option in the raw scoring.

All the results reported below (leftmost column in each box) are the scores S.

Section A: Factual

Compared to conventional teaching

4.4	A1.	The lectures are more of an outline
3.8	A2.	Students have to learn more on their own
5.6	A3.	More structured material is provided (e.g., on e-learning platform) to help students learn on their own
6.0	A4.	There is more time for discussions in class
3.6	A5.	More discussions take place on the e-learning platform

Section B: Evaluation

6.7	B1.	I like the outline lectures because they highlight the key ideas
–6.2	B2.	I dislike the outline lectures because I have to work out the details by myself
2.7	B3.	In this course, I have learnt more physics on my own
2.0	B4.	I get better understanding by learning on my own
2.7	B5.	I have improved in my ability and inclination to learn on my own
6.2	B6.	I think it is good to put more responsibility on students to learn on their own
2.4	B7.	I have to spend much more time on the course because of the requirement of learning on my own

–3.6	B8. In this course I have learnt less effectively because many details are not taught in class
8.0	B9. The structured material provided (i.e., the lecture notes) is useful in my self-learning
5.3	B10. I like the time for class discussions
4.0	B11. I have clarified concepts and difficulties thorough the class discussions
2.4	B12. I have become more willing to speak up in class
6.2	B13. Class discussion is more lively than in other courses
5.6	B14. I like the discussion (including the Q&A) on the e-learning platform
3.8	B15. I have clarified concepts and difficulties through the e-learning platform
5.6	B16. There are enough channels and opportunities for me to clarify difficulties

Section C: Overall

5.5	C1. I like this (partially) flipped methodology
5.1	C2. I think this methodology should be more widely adopted

Section D: Learning Management System (LMS)

1.8	D1. I find Sharepoint on Office 365 more convenient than Blackboard
–2.7	D2. I often access Sharepoint using a mobile device
3.2	D3. I find it useful to post questions because that helps to focus the explanations in the Q&A sessions in class

Section E: Free comments

Please add any free comments about the pedagogy

(Free comments are separately shown in the net Appendix.)

Thank you.

Appendix E

Free comments in the Methodology Survey

Not every respondent provided free comments

- Overall, I learnt so much physics, interesting ideas and mathematical techniques in this course.
- However, I think I am not doing well in the exam, but I still think it is very useful for my future study.
- My background is somewhat behind other students, but I think I am hardworking. I recommend more basic ideas, situations of the physics can be posted online. This ensures students can get full understanding of the situation before getting into class.

- Questions raised on the e-learning platform are better answered in class than online, since the answer may immediately invite more questions and meaningful discussion online
- More pages of lecture notes can be written in the form of exercise problems to guide students to go through derivations themselves
- Exam questions are too much more challenging than homework. More difficult exercises should be assigned to train skills for the exam

- I think this pedagogy is good, especially for this course, since the knowledge of students vary and therefore have different expectation on the teaching outcomes
- However, in my opinion HK students are not very self-motivated. Some guided questions may be needed after lectures so that we can learn more by solving such questions (or discussion on online forum)

- The pedagogy is excellent in my opinion
- However, I feel if the material is too easy, it is quire hard top focus on the discussion, since it does not require our brain to work at their limit.
- Bringing out more abstract / difficult content helps concentration
- The best course I've ever taken is M.C. Chu PHYS3420, where he uses similar pedagogy but in much more abstract content.

- The calendar in the SharePoint could be used to post the **exact** schedule of lectures in the semester

- This pedagogy is indeed helpful and efficient
- Just sometimes after the class I'm not so motivated to spend much time on my own
- Also I should say the exercises are rather simple and trivial compared to the course material

- It would be great if SharePoint supported MathJax, making editing formulas easier

- I think it would be better if there are more time for derivations, which would help us understand those concepts and details of the lecture

- This course should require the students to have enough knowledge of EM
- Always starting from the basic ideas would make it boring to follow in the early period of the course (and then maybe the student will be less willing to pay more time on the course later)

- Q&A decreased over time, maybe because the students got busier at the end of semester

- I like this pedagogy compared to the traditional one because the class was more active and lively through discussion. It is easy to get lost in the traditional lectures as too much details are presented.
- The pedagogy highlights the key points which makes me feel more about the beauty of physics and easier to grasp the key idea.
- I think detailed calculations should be done on our own.
- All in all, I enjoy the lectures so much. Thanks for your teaching and using the “semi-flipped” pedagogy.

- Great course, very enjoyable and refreshing

- Office 365 is quite chaotic
- Students have conflicting answers but no judge to say who is right
- Ch 1 to 12 can be compressed to smaller package as they are covered in undergraduate
- I would like to have more focus on QED, QCD, standard model and other frontiers

- About the Q&A that you’re proud of: Be aware that not every student has the same question or is confused by the same point. If you are using lectures to explain raised questions, some of the students’ time is being wasted. Just answer those online s.t. whoever is concerned can read your answer.

- Skipping the mathematical steps is useful to deliver the main idea. However a wide adoption in undergraduate course might not be helpful since they might just work on their own.
- Asking questions is still a bit awkward both online and in class. The general atmosphere in CUHK still does not seem to support welcome questions, at least for the students. It seems to stand out too much by asking questions.
- The homework is suggested to focus more on the mathematics, at least partly, to compensate the pedagogy and relatively little emphasis in class. ET will help consolidate.
- Downloading all files on Office 365 is a headache. I need to download them one by one.
- Good luck.

PAPER

T7

A partially flipped class in physics supported by e-learning: Report of an experiment

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September 2017

Abstract

A postgraduate physics course was taught in a partially flipped mode. Lectures covered only the skeleton and time was freed for discussions. Students liked the pedagogy, and were willing to learn on their own. More content was covered than would otherwise have been possible. Detailed lecture notes, approximating a book, were provided; ensuring that students read the 'book' was a key element of the strategy. The course emphasized lecture notes rather than video lectures due to its Cartesian (rather than Baconian) nature.

1. Introduction

This note reports on an experiment to adopt a partially flipped class supported by e-learning, in the postgraduate physics course PHYS5420 *Classical Electrodynamics* (2016/17) taught by the first author with the second author as teaching assistant.

The flipped classroom is supposed to emphasize 'higher-order student centred activities' [1] in the classroom, while content is delivered asynchronously [2], often with video lectures. The 'integration of classroom face-to-face learning experiences with online learning experiences' is also described as blended learning [3].

The course is elective, and has evolved from its traditional counterpart by incorporating modern concepts and some numerical methods. The enrolment, capped at 20 to facilitate interactions,[1] was mixed in composition and in prior preparation, necessitating a review of some fundamentals.

1. Course design

2.1 Pedagogy

The pedagogy is explained in the *Course Outline*:

> Each topic will be treated in three steps.
>
> A. A brief lecture will be given, emphasizing the concepts.
> B. Students then learn on their own, including all the technical details.
> C. The next class will be used for discussions, as well as questions and answers.

[1] There were also ~8 auditing students.

2.2 Lecture Notes

To support self-learning (i.e., step B as described above), detailed *Lecture Notes* were written and followed closely. The rationale is explained more fully in the Preface to the *Lecture Notes* which can be found here.[2] The *Lecture Notes* were not in point form, but were written in the style of a textbook. A sample Chapter is here.[3] Flipped learning need not involve video lectures: studying the printed page is more effective for learning the technical details.

2.3 Platform for e-learning

Two platforms were used for e-learning. The course material was posted both on Blackboard and on a SharePoint site accessed through the CUHK Office 365 (O365) system. The latter in addition contained a *Discussion Forum*, a survey labelled as a *Learning Journal* for each Chapter, and the *Document Library* with Course Information, homework assignments, *Lecture Notes*, and Q & A.

3. Evaluation

3.1 Attendance and participation

Class attendance was good in the first half of the term (participation in discussion counts for 10 marks), but tapered off towards the end of the term because of fatigue — not so much with this course as fatigue in general as the term progressed and work piled up. Some weaker students had difficulties. The *Lecture Notes* also provided perverse incentive to skip class.

3.2 Course and teaching evaluation

The standard course and teaching evaluation (CTE) was extremely positive. Mean adjusted[4] scores are 6.0/6.0 on many items: Presentation is clear; Teacher was enthusiastic; Class participation encouraged; Recommended reading useful; Satisfied with course; Satisfied with teacher. But only 40% were present on the day of CTE. So, the conclusion can only be that the course was very positive *for those who persevered to the end*.

3.3 Survey on pedagogy

Instrument

A specially designed Survey on Pedagogy was carried out. To focus on the pedagogy and filter out other factors, the instruction included the following:

> The questions below ask you to evaluate the ***pedagogy***; please mentally remove other factors such as the level of difficulty of content, the amount of content, the pace of teaching, your prior preparation in the subject, the quality of delivery by the teacher, etc. In other words, you should compare this course with a hypothetical one covering the same content at the same pace, with yourself having the same prior preparation, and taught by the same teacher, but in the conventional mode.

[2] https://www.dropbox.com/s/cvrjxkyxstd6rjx/Chap00b-S-161109.pdf?dl=0
[3] https://www.dropbox.com/s/gd3czvch2181ys8/Chap15-S-161101.pdf?dl=0
[4] Adjusted in the usual way for CTE.

The paper survey immediately after the final examination drew 100% response.

Scale

The symmetric 6-point Likert scale (L = 6, 5, 4, 3, 2, 1 for strongly agree / agree / slightly agree / slightly disagree / disagree / strongly disagree) was linearly mapped to a score S on the range of +10 to –10; the neutral point L = 3.5 mapped to S = 0, and degrees of agreement / disagreement are represented as positive / negative numbers up to ±10.

Survey result

Students agreed (S = 6.0) that there was more time for discussion in class and moderately agreed (S = 3.6) that there was more discussion on the e-learning platform. Students liked the outline lectures for highlighting the key ideas (S = 6.7). Students slightly agreed that they had learnt more physics (S = 2.7), had obtained better understanding (S = 2.0), had improved in the ability and inclination to learn on their own (S = 2.7). Although they had to spend more time on the course (S = 2.4), they agreed (S = 6.2) that more responsibility should be placed on students to learn on their own, and they moderately disagreed (S = –3.6) that learning was less effective because many details were not taught in class.

Students liked the time for class discussion (S = 5.3) and moderately agreed (S = 4.0) that they had thereby clarified concepts and difficulties. They agreed (S = 6.2) that class discussion was livelier than in other courses, but only slightly agreed (S = 2.4) that they had become more willing to speak up in class. They liked the discussion on the e-learning platform (S = 5.6) and agreed moderately (S = 3.8) that they had thereby clarified concepts and difficulties. They agreed (S = 5.6) that there were enough channels and opportunities to clarify difficulties. The strongest statement of agreement (S = 8.0) was that the structured material provided (i.e., the *Lecture Notes*) was useful for self-learning.

In summary, they liked the (partially) flipped methodology (S = 5.5) and thought that this approach should be more widely adopted (S = 5.1).

They agreed only marginally (S = 1.8) that SharePoint on O365 was more convenient than Blackboard. Students did not make much use of the mobile capability of O365, slightly disagreeing (S = –2.7) that ‘I often access SharePoint using a mobile device’. But overall, they agreed (S = 3.2) that it was useful to post questions to help focus the explanations in class.

4. Reflection and conclusion

4.1 Overall preference

There was a preference for this mode of teaching, and a partially flipped model will continue to be adopted in future. Some factors made the pedagogy suitable for this course (e.g., the diversity in the prior preparation).

4.2 Coverage of material

Although not covered in the survey, one pleasing success was that an ambitious amount of material was covered. Several colleagues thought that the amount of material would be

challenging (even 'excessive').[5] The content had to include both standard core topics and modern ideas; the fundamentals also had to be reviewed because of uneven prior preparation, accounting for one third of the Chapters and about one quarter of class time.

However, because technical details were not covered in class, the lectures were not hurried, and there was no complaint on the amount of material or the pace of teaching. Evidently all students gained understanding of even the most advanced material, and the better students achieved mastery. *The amount of material taught and learnt was one of the most successful outcomes*.

There is widespread complaint, across all subjects and levels, about too much material and inadequate time to teach.[6] Moreover, emphasis is often placed,[7] again across all levels, on learning-to-learn.[8] Therefore the observation reported — seldom emphasized in discussions about the flipped classroom — is potentially the most important lesson from this experiment.

4.3 Student read 'book'

Students nowadays tend not to read textbooks, but only presentation slides, which are necessarily sketchy in the chain of thought linking one idea to another. This mode of learning is seriously defective, especially in subjects that require deep and detailed understanding (more on this below), but is prevalent among students, the situation aggravated by the cost of textbooks.

However, in this course, we have been able to make students read, indeed work through in detail, the *Lecture Notes*; these, as already emphasized, are not outlines but come close to being a textbook. *Making students read the 'book' was another successful outcome*.

The positive outcome is possible only because the 'book' was followed very closely — which would not be the case for commercial textbooks that try to cater to multiple readerships but end up being exactly suitable for none. Therefore, kind suggestions to turn the *Lecture Notes* into a textbook are received with some scepticism: the efficacy would be compromised if used by another teacher with inevitably different approaches and preferences.

4.4 No online lectures

Lectures were not video-taped and posted online (though the corresponding presentation slides were). This was a considered decision, since any effect is expected to be marginal (and even the sign of the effect is debatable), if the only change is to replace class attendance with watching a video.

[5] Those who offered this comment included the chairman of the Department's Curriculum Committee, a former Department Chairman who had taught an earlier version of this course in the past, and a former External Examiner who had also taught electrodynamics in his own institution.

[6] At least among the more conscientious teachers who resist the easy option of shedding material.

[7] At least in theory.

[8] 'Learning-to-learn' is even one of the brand names attached to the education reform for the senior secondary school curriculum in Hong Kong, for which, incidentally, complaints of inadequate time to teach is frequently heard.

4.5 Asynchronous learning

A (partially) flipped approach allows students to learn at their own pace and at the time of their choice, which is important given the heterogeneous profile, and especially for part-time students whose time is constrained by employment.

4.6 Baconian and Cartesian science

There is some tendency for advocates of any pedagogical approach to argue for its advantage in tones suggesting a degree of universality. Contrasting our experience with other contexts points to one significant difference. For want of a better term, we adopt the convenient labels Baconian and Cartesian [4], with the caveat that these should be suitably qualified, and understood as stylized limits of a continuum on which any scientific endeavour can be located.

Some subjects by their nature tend towards the Baconian, e.g., geology, planetary science and novel materials within the physical sciences. Other subjects tend towards the Cartesian, e.g., mechanics, electrodynamics, statistical mechanics, quantum chemistry, and of course string theory.[9] The same subject may be more Baconian in its infancy/ youth and more Cartesian in its maturity/ dotage;[10] e.g., chemistry up to Mendeleev (with analogies and classification looming large) compared with chemistry in the twenty-first century (often starting with quantum orbitals).

Whatever the relative merits of the two approaches and setting aside whether undergraduate physics education in many Asian universities including CUHK is too Cartesian, it is indisputable that advanced electrodynamics is more Cartesian (*C*) than Baconian (*B*). The nature of the subject along the *BC* continuum impacts the choice of strategy. We comment on only one dimension: online lectures versus detailed lecture notes akin to a textbook.

Baconian science would benefit from a survey of the landscape, a summary of different (possibly conflicting) observations, a debate about different interpretations and an exploration of possible ways forward. A lecture provides orientation and a first level of rough understanding. A carefully prepared and video-taped lecture, available online, would add much pedagogical value. But Cartesian science would benefit from detailed study of the theoretical fabric, with line-by-line derivations emphasizing rigour. A formal textbook, or lecture notes that come close to it, would be important — and any strategy that promotes serious study of such structured material would be positive for student learning.

4.7 Conclusion

The (partially) flipped pedagogy has been largely successful, and the most important ingredient is the provision of structured text-based material that was faithfully followed. The amount of content covered (without complaint!) and getting students to read through structured material were the two most successful outcomes. The specific strategies need to be chosen with the nature of the course in mind, and the flipped classroom or blended learning should not be regarded as one single method that suits all circumstances.

[9] Though there are complaints that string theory is ‘not even wrong’ [5] and therefore not a science.
[10] Baconians would choose one set of adjectives and Cartesians the other.

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A more complete version of the present paper can be found here.[11]

[11] https://www.dropbox.com/s/rf2sedn4u1d181r/ED%20Report%20Flip%20v08.pdf?dl=0.

PAPER

P1

Narrative Qualitative Assessment of Students' High-level Thinking in Dealing with Open-ended Problems

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Abstract

Students' ability to conduct objective analysis of ideas and phenomena, and ultimately to develop sensible, informed personal judgment, is a target learning outcome common to both courses of the General Education Foundation Programme, namely, *In Dialogue with Humanity* and *In Dialogue with Nature*. Assessment of such ability, however, is a challenging task partly because of the lack of a well-established rubric to evaluate the skills concerned. In the Narrative Qualitative Assessment project conducted by teachers of the two courses in 2014-17, two rubrics adapted from the Wolcott-Lynch Model were applied to assess students' high-level thinking in addressing open-ended problems. Analysis of randomly selected student term paper reveals that 80% of students is of performance pattern 0 (Confused Fact Finder) or 1 (Biased Jumper). The project has promoted joint reflection on the GEFP teaching design. Individual teachers have developed their own extended studies for incorporation into the classroom. It has also inspired us to explore an effective scheme to implement criteria for differentiating students' performance in high-level thinking.

Introduction

The General Education Foundation Programme (GEFP) comprises two compulsory courses of 3 credits, *In Dialogue with Nature* (hereafter referred to as *Nature*) and *In Dialogue with Humanity* (hereafter, *Humanity*), inviting joint reflection on the human condition through texts selected from the sciences and the humanities. It aims to develop students' (a) knowledge of major ideas that shape the world today; (b) intellectual inquisitiveness when addressing issues related to their life and society; (c) willingness and capacity to examine new and different ideas; (d) ability to engage in intensive and close reading; and (e) readiness to articulate their own ideas clearly and systematically in writing and in oral communication. The effectiveness of GEFP in attaining these learning outcomes has been regularly assessed since its launch in 2012. This is done every term through the Course and Teaching Evaluation questionnaire,

and every year through interviews of students in focus groups. The two evaluation exercises, centrally administered and taking respectively the quantitative and qualitative approaches, have shown favorable reception of the two courses. Yet, both methods are *subjective* in nature as they depend on students' recollection of their learning experience. The Narrative Qualitative Assessment (NQA) project is an attempt made by more than half of the GEF teaching team to supplement such an approach. It takes students' final term papers as *objective* evidence of their learning in the two courses, and evaluates their high-level thinking by applying two rubrics adapted from the Wolcott-Lynch Model. Below is a brief report on the steps taken,[1] some major findings, and reflections gained about the teaching design. It will end with a short description of four extended studies inspired by the project, and of thoughts on how the experience may inform development of a criterion-referenced approach to student assessment.

NQA Project at CUHK: Goals and Considerations

Narrative Qualitative Assessment (NQA; sometimes written as QNA) is a joint university project coordinated by the Association for Core Texts and Courses (ACTC),[2] the purpose of which is to develop models of qualitative assessment based on narrative, humanistic descriptions of programmes and student achievement. In response to ACTC's call for participation in its second NQA cohort, teachers of GEFP formed an NQA team with voluntary membership, and conducted a series of narrative research from 2014 to 17. The team decided to investigate students' performance in high-level thinking, seeing it as a common goal of the two *Dialogues* and of University General Education as a whole.[3] Subsequently, the goals of GEFP's NQA project were spelt out

[1] The full report was submitted to the Association of Core Texts and Courses in 2017 Fall and will be published in due course. In this report, we will present only some key features of the project.

[2] ACTC is an international association that seeks to advance liberal education in educational institutions; official website: https://www.coretexts.org/

[3] One of the stated goals of University General Education is to "develop the attitudes and skills that are conducive to *critical thinking*, self-expression and communication with the others." We subsequently decided to adopt "high-order thinking" rather than "critical thinking" as the focus of the research, considering the former as broader and inclusive of the latter. In the literature of the Wolcott-Lynch Model (particularly in the *Idea Paper #37*), various terms have been used somewhat interchangeably,

as follows:

(a) To evaluate students' in high-level thinking performance at the end of each of the two *Dialogue* courses; and

(b) To collect findings for the program's self-examination and possible improvements, including the refinement of assessment methods, teaching design, and learning outcomes.

With these goals in mind, the team began to look for an analytical tool, but several challenges immediately arose. First of all, we need a clear definition of what high-level thinking means, and a well developed rubric for assessing the related thinking skills. Both are difficult to come by, and it is not easy for the teachers to agree on the set of skills concerned for evaluating students' performance. Second, even if an agreement is reached on the set of skills to assess, we cannot be sure how far a single term paper may reflect a student's high-level thinking? Would the term-paper question itself, in terms of its nature and of the way it is presented, set a limit on the student's performance? Suppose, for instance, the question mainly requires the student to conduct a task equivalent to a literature review—i.e., to identify and explain key concepts and arguments in the designated texts (which may itself be challenging)—, the student may have little room to demonstrate such "high-level" skills as critical argumentation. Third, a well developed assessment rubric for narrative assessment can both help and hurt. Its sophistication may offer clear guidance for ranking students' writings while also conducive to agreement among teachers, yet it may also conceal the individuality of each piece of writing. On the other hand, a simple rubric may offer more room for teachers' remarks on various features found in individual writings, including their strengths and weaknesses, but generalization of diverse observations can be difficult.

Assessment Model Adopted

The Wolcott-Lynch Model, consisting in a set of "Steps for Better Thinking," had

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including "high-order thinking," "better thinking," and "cognitive complexity." We are aware further distinction between these terms need to be made, but given the brevity of this report, the subject will not be taken up here. In this paper, we single out "high-order thinking" as the subject of enquiry, but we also adopt the other two terms in various parts of the paper where needs arises, and in accordance with the Wolcott-Lynch rubric for high-level thinking on solving open-ended problems.

been used by one of the participating universities in the First NQA Cohort of ACTC,[4] and found effective by the Adjudicating Panel for the General Education Best Essay Award in 2015. Further research showed that the assessment model is theoretically grounded in several developmental models in cognitive psychology, including King and Kitchener's (1994) reflective judgment theory of cognitive development and Fischer's (1980) dynamic skill theory. It looks into students' thinking and classifies their performance into different levels (or patterns), according to the reasoning strategies employed when addressing open-ended problems, and to the sets of assumptions about knowledge that underlie those strategies. The Model offers a wide range of assessment tools, from a crude rubric to a sophisticated one, from features of various thinking patterns to scaffolding questions to help students move to the next cognitive level. Considering the above, the NQA team decided to adopt the Model as an analytical tool for assessing students' performance in their GEFP term papers. The crude rubric was used in the first round of study, while the more sophisticated one, only discovered and tested subsequently, was adopted in the second round.

Sampling, Steps, and Findings

With the assessment rubric chosen, the team decided to use the final term paper submitted at the end of the two *Dialogues* as evidence of students' high-level thinking performance. The papers were randomly sampled, and each assessed by teachers in pairs (1 from *Humanity*, 1 from *Nature*). The two teachers assessed the paper separately using a rubric adapted from the Wolcott-Lynch Model, ranking the high-level thinking

[4] It was from the interim report of Lynchburg University that the NQA team at CUHK learnt about the Wolcott-Lynch Model. Lynchburg's interim report reads, "As part of the Senior Symposium and the associated Lynchburg College Symposium Readings (LCSR) program, faculty are trained in the use of the Wolcott-Lynch model for evaluating critical or higher order thinking. This is a developmental model of higher order thinking which posits that thinking skills develop over time and that a general level of higher order thinking skill can be determined and promoted through examination of written work. The scale for the Wolcott-Lynch model runs from zero to four, with zero being the most basic type of thinking in which there is always a correct answer to any problem or question, and four being highly functional strategic thinking that balances diverse views and understanding of issues to construct knowledge and draw well supported conclusions. For undergraduate students such as those examined in this project, a goal of level two thinking upon graduation is a significant achievement. Level two thinkers understand issues and problems in a balanced fashion and control their individual biases in an attempt to reach sound conclusions based upon evidence."

demonstrated and producing a narrative on the reasoning strategies and other observations. A first and second rounds of assessment were conducted, each round with a different rubric adapted from the Wolcott-Lynch Model. Work on the NQA project can be seen as having gone through five stages, which is summarized in the following table.

Stage	**1** TRIAL run	**2** FIRST Round	**3** CORE Group	**4** SECOND round	**5** EXTENDED studies
Time period	late 2014 – early 2015	mid 2015 – late 2015	early 2016 – mid 2016	late 2016 – early 2017	mid 2016 onwards
Task	Rank cognitive levels 0-4 + Produce narrative	Rank cognitive steps 0-4 + Produce narrative	Conduct literature review + Test performance patterns rubric	Identify performance patterns + Produce narrative	
No. of participating teachers	10 (5 pairs)	17 (8 pairs/groups)	7	15 (7 pairs/groups)	4
No. of papers assessed	40 (randomly selected) (each pair: 4 FH+4FN)	48+48 (randomly selected) (each pair: 3 FH+3FN)	6 (selected from the first round; each to re-assess same 6 papers showing great rating discrepancies in previous round)	30 (randomly selected)	
No. of returns	40	55	42	30	
Rubric adapted from	Figure 2, Idea Paper #37 †	Figure 3, Idea Paper #37 †	*Handbook* (A-5)#	*Handbook* (A-5)#	*Handbook* (A4, A5, A6)#

* FH: In Dialogue with Humanity; FN: In Dialogue with Nature

† Cindy L. Lyncn and Susan K. Wolcott, "Helping Your Students Develop Critical Thinking Skills" (Kansas: The IDEA Center Manhattan, 2001), *Idea Paper #37*; website: https://www.radford.edu/content/dam/departments/administrative/QEP/LessonIdeas/Critical20ThinkingActivities.pdf

#A4, A5, and A6 are page numbers of tables included in the Appendices to Susan Wolcott's *College Faculty Handbook: Steps for Better Thinking* (2006).

Below are brief descriptions of the steps taken in various stages and observations and findings gained in the process.

Stages 1-2: From piloting to setting the benchmark

In these early stages, we used an assessment form adapted from Figure 2 of Wolcott and Lynch's "Steps for Better Thinking Skill Patterns,"[5] with a scale of thinking complexity numbered 0 to 4. Each point denotes a skill pattern corresponding to an overall approach to an open-ended problem[6] and the common weaknesses. Subsequently, we turned to Figure 3 of the same paper and turned it into a form (Appendix A), using the cognitive-task descriptions as prompts for teachers' narratives on students' cognitive complexity displayed in the term papers. In addition to ranking the student's cognitive level, the teacher had to write a few lines explaining the ranking and describing the student's performance of the cognitive tasks. At times, the two teachers in a pair could not reach a compromise on the ranking. This might have to do with different interpretations of the cognitive task in question—for instance, what it means "to establish a detached, balanced view of evidence and information" in the student paper. Nevertheless, exchanges and even disputes between the two teachers turned out to be a valuable outcome of the study. They enhanced understanding of the other teacher's course as well as reflection on one's own expectations on student performance.

Originally, a major goal of this project was to assess students' progress by comparing their thinking performance at the end of the first *Dialogue* course with that at the end of the second *Dialogue* course. That was why the first round of the study took two steps: the 48 students whose papers were assessed at the end of 2014-15 Term 2 (when they completed their first *Dialogue* course), were followed in 2015-16 Term 2 by having their papers for their second *Dialogue* course assessed. After comparing results of the two assessments (with 55 returns), we found it impractical to track students' cognitive progress from one *Dialogue* course to the other. Most of them

[5] Cindy L. Lynch and Susan K. Wolcott, "Helping Your Students Develop Critical Thinking Skills" (Kansas: The IDEA Center Manhattan, 2001), Idea Paper #37; website: https://www.radford.edu/content/dam/departments/administrative/QEP/LessonIdeas/Critical20ThinkingActivities.pdf

[6] The overall problem approaches are: 0 - to find a single, "correct" answer; 1 -to stack up evidence and information to support conclusion; 2 - to establish a detached, objective view of evidence and information from different points of view; 3 – to come to a well-founded conclusion based on objective comparison of various alternatives; 4 – to construct knowledge, to move toward better conclusion or greater confidence in conclusions as the problem is addressed over time.

received a ranking of 0 or 1 in both papers, showing little or no progress. This accorded with the results of research conducted by Wolcott and Lynch on undergraduates in the USA, showing a general tendency to remain in the lower cognitive level throughout their first and second years of study. In fact, they found that progress from one cognitive level to the next takes as many as two years, and that an average undergraduate only reached level 2 at graduation. The agreement of our findings with those of Woclott-Lynch is worth reporting as it implies that undergraduates' ability in addressing open-ended problems are likely to be the same even under different education systems.

Stages 3-4: Data gathering and analysis

Having had experience in connecting students' performance in writings with their thinking patterns, we decided to choose a more sophisticated rubric of the Wolcott-Lynch Model (Appendix B: Performance Patterns Rubric), from a later publication by Susan Wolcott, *Steps for Better Thinking Faculty Handbook*.[7] This rubric conceptualizes student thinking into five performance patterns, with very telling names:

- ***Confused Fact Finders*** tend to engage in open-ended question as if the goal is to find the single "correct" answer.
- ***Biased Jumpers*** proceed as if the goal is to simply stack up evidence in supporting their conclusions.
- ***Perpetual Analysers*** seek to establish an unbiased, balanced view of evidence and information from different point of view, but is deterred from prioritization and making a conclusion.
- ***Pragmatic Performers*** are committed to producing well-founded conclusions based on objective consideration of priorities across viable alternatives.
- ***Strategic Re-visioners*** build upon the well-founded conclusions made initially, but also seek to move toward better conclusions more confidently over time with additional information.

Each thinking performance pattern refers to a different composition of performances in the four thinking steps, as follows:

[7] Susan K. Wolcott, *College Faculty Handbook: Steps for Better Thinking—A Classroom Model for Teaching, Learning, And Assessing Higher-order Thinking Skills* (Bellevue, Washington: WolcottLynch Associates, 2006 <http://www.wolcottlynch.com/>), p. A-5.

Table 1: List of Thinking Steps and Thinking Components

Thinking Step	Thinking Component
Step 1: ***Identify***	A (Identify and use relevant information)
	B (Articulate uncertainties)
Step 2: ***Explore***	C (Integrate multiple perspectives and clarify assumptions)
	D (Qualitatively interpret information and create a meaningful organization)
Step 3: ***Prioritize***	E (Use guideline or principles to judge objectivity across options)
	F (Implement and communicate conclusions for the setting and audience)
Step 4: ***Envision***	G (Acknowledge and monitor solution and limitation through next steps

This "Performance Patterns Rubric" was tested on 6 term papers from the first round of study, which had shown great discrepancies in rating between the two teachers in the pair. The test showed that the rubric was more effective in reducing rating discrepancies between teachers. In the second round of the study, we applied the "Performance Patterns Rubric" to 30 term papers from Term 2, 2015-16. Some significant findings in this round are highlighted below.

Table 2, below, shows the overall thinking approach adopted. It can be seen that over 80% of the papers analyzed shows the approaches of Confused Fact Finder (20.8%) and Biased Jumper (62.5%). In other words, their overall approach (H) to open-ended problems was "to find the single, 'correct' solution" (H0) in the rubric; see Appendix B) or "to stack up evidence and information to support own conclusion" (H1). Only around 15% of students were classified as Perpetual Analyser or Pragmatic Performer, whose approach was "to establish an unbiased, balanced view of evidence and information from different points of view" (H2), or "to come to a well-founded conclusion based on objective consideration of priorities across viable alternatives" (H3). None was classified as Strategic Revisioner, who proceeds as if the goal is to strategically construct knowledge, to move toward better conclusions or greater confidence in conclusions as the problem is addressed over time (H4).

Table 2: Distribution of overall thinking approach adopted

	Confused Fact Finder	Biased Jumper	Perpetual Analyzer	Pragmatic Performer	Strategic Revisioner	Total	Not Applicable
Frequency	10	30	6	2	0	48	12
Valid Percentage	20.8	62.5	12.5	4.2	0.0	100.0	

Next let us look at students' performance in each thinking component. In the "Performance Patterns Rubric" (Appendix B), each thinking component is represented, from top to bottom, by the letter A, B, C, D, E, F or G. Going from left to right, each thinking component is assigned a score of 0-5 to correspond to the Performance Patterns, from the least complex "Confused Fact Finder" on the one end, and "Pragmatic Re-visioner" on the other end. Table 3 below shows students' mean score on each thinking component. The mean score for most of the components is more or less equal to 0.90 or 1.00, but that for the two components B and G is only around 0.65. This means students were relatively weak at articulating uncertainties (B), and acknowledging and monitoring solution and limitations through next steps (G).

Table 3: Students' Mean Score on Each Thinking Component

		Thinking Component						
		A	B	C	D	E	F	G
N	Valid	52	43	48	47	49	38	41
	Missing	8	17	12	13	11	22	19
Mean (Max = 4)†		1.02	.65	.87	.90	.89	.98	.66

†The score represents assessment of students' performance pattern, 0: *Confused Fact Finders*, 1: *Biased Jumpers*, 2: *Perpetual Analysers*, 3: *Pragmatic Performers*, and 4: *Strategic Re-visioners*, in the particular thinking component A-G. (See Table 1)

The analysis suggests that most students performed adequately in identification of relevant information (Step 1 skills: Identify). They were capable of using limited information, primarily evidence and information supporting their own conclusions. They were also capable of identifying at least one reason for significant and enduring uncertainties (B1). However, most students performed weakly in Step 2 (Explore), 3 (Prioritize) and 4 (Envision) skills. Students managed to acknowledge more than one

potential approach or viewpoints, but failed to acknowledge their own biases in reasoning. They either tended to portray perspectives dichotomously as right or wrong, good or bad, or they would interpret information rather superficially as supporting or not supporting a point of view, and tended to ignore information that disagreed with their position. Most students provided little evaluation of alternatives, offered only partially reasoned conclusions and failed to address sufficient information or motivation for readers to adequately understand alternatives and complexity.

Finally, a correlation analysis was conducted to examine if correlation can be established between students' academic performance (represented by their course grade points), and their performance pattern in high-level thinking. The findings invite us to explore a feasible scheme to implement criteria for differentiating students' academic performance. We will come back to this later.

More Findings: Narratives that Emerged After

Many interesting narratives emerged in meetings of the whole team after paired assessments of student papers in the two rounds, and they, too, can be seen as valuable findings of the research, particularly in relation to the second goal of the research: self-examination of the programme and, by extension, of the teachers. We will report one such finding here.

While the ranking exercise could be controversial within the pair, it did help us to realize the difference in expectation among teachers. In one such case of discrepancy arisen during the first round of study, a *Nature* teacher ranked a paper as Foundation while the Humanity teacher ranked it as Step 2 (applying the earlier rubric, Appendix A). The former argued that the student had not even got the fundamental concepts correct, while the latter really appreciated the imagination shown by the student. This led us to ask ourselves: what kind of students is closest to our hearts? A colleague saw it as a case of *the bespectacled kid* versus *the worldly kid*. The bespectacled kid is not very smart, but is diligent and does what the teacher says. S/he makes no mistake in paraphrasing texts (Foundation), lays out both sides of the argument as required (Step 1), and easily lands on Step 1. *The worldly kid* had no patience for serious reading of the text, but can think outside the box and surprise the teacher. S/he has style and imagination, and can boldly frame an argument, make connections, and draw conclusions. The disagreement of ranking was sorted out between the teachers, which

was actually an example to show the value of the NQA project, where teachers of the two teams get to understand the other side better.

Application of the Wolcott-Lynch Model to GEFP: Limitations and Reflections

We would conclude that the Wolcott-Lynch assessment rubric has been effectively adopted to assess students' thinking performance patterns in the two *Dialogue* courses. However, the research team still encountered several difficulties when applying the rubric to specific essay designs. Our conclusions come in three points.

First, the rubric intends to assess thinking by partly taking account of students' ability to implement and communicate conclusions for the open-ended questions they are addressing (thinking components F and G). However, the issues and readings covered in GEFP address questions of significance that define lasting beliefs and values in human civilization. These are difficult questions that may not be solved at ease by students. The primary aim of the two courses, therefore, is not to ask students to solve the problem by implementing solution (refer to the learning outcomes of GEFP). Since the courses do not seek to ask students to solve the problem, but rather to address different lasting ideas and beliefs with critical evaluation, the thinking component F (Implement and communicate conclusions for the setting and audience) and G (Acknowledge and monitor solution and limitation through next steps) are probably less applicable in the two courses. In the study, more than 30% of the teachers intentionally left the two components (F and G) blank when assessing the term papers with the rubric.

Second, the rubric did not differentiate the majority of student papers effectively as most students clustered at the lowest two categories of the rubric. Over 80% of students fell into the classification of Confused Fact-finder and Biased Jumper. These students proceed as if the goal is to find the single, "correct" solution, or as if the goal is to stack up evidence and information to support own conclusion. While the rubric is useful in putting students into distinct categories, it fails to provide insight on the subtle differences between students falling in the same categories. It shall be noted that the distribution of students' thinking performance pattern is consistent with education

literatures.[8] A more detailed rubric with stronger differentiation power when employed in the setting of first or second year of higher education would be useful in shedding light on our students' cognitive development.

Third, the rubric does not adequately address the level of difficulties of different types of knowledge, but rather reduce mastery of knowledge into a relatively low level of thinking (Step 1A: Identify and use relevant information). The syllabus of the *Dialogue* courses include prominent thinkers and theorists, presenting complex problems and sophisticated systems of thought. A sufficient understanding of the factual, conceptual, and procedural knowledge of each system of thought already requires a very high level of thinking complexity. In other words, the knowledge dimension of the rubric does not sufficiently capture the difficulty and complexity of different types of knowledge covered in the courses.

Extended Studies

Based on teachers' assessment in the second round of the study, a correlation analysis was conducted to examine if students' actual academic performance (represented by their course grade points) was correlated to their particular thinking component (A – G in Table 1). Table 4 shows that students' grade point has small to moderate correlation with most thinking components, and small correlation with their overall performance in high-level thinking. [9]

Table 4: Correlation between Students' Mean Score on Each Thinking Component and Course Grade-point

		A	B	C	D	E	F	G	Overall Thinking Approach	Course Grade Point
Course Grade Point	Pearson Correlation (r)[1]	.060	.179	.360	.382*	.350	.386	.170	.182	1

[8] Susan K. Wolcott, *College Faculty Handbook: Steps for Better Thinking—A Classroom Model for Teaching, Learning, And Assessing Higher-order Thinking Skills* (Bellevue, Washington: WolcottLynch Associates, 2006 <http://www.wolcottlynch.com/>).

[9] A question inevitably arises: Apart from the ability to think critically or to demonstrate high-level thinking, what other abilities does the GEFP call for?

	Sig. (2-tailed)	.751	.353	.051	.045	.063	.076	.386	.336	
	N	30	29	30	28	29	22	28	30	30

[1] According to Cohen (1988), when r = 0.1-0.3 (small correlation), 0.3-0.5 (moderate correlation), 0.5-1 (large correlation)

* Correlation is significant at the 0.05 level (2-tailed).

It is believed that the assessment results produced by teachers teaching the same course as the student essays would represent a more precise representation of students thinking performance. It is because the teachers are more familiar with the course content, pedagogy, teaching activities and examples that might be possibly appear in student essays. They are more familiar with the assessment criterion of the courses. It invoked us to carry another correlation analysis of counting only student essays that were marked by teachers teaching the same courses, i.e., only *Nature* essays that were marked by *Nature* teachers and *Humanity* essays that were marked by *Humanity* teachers was conducted. Table 5 shows that more thinking components were found to be positively and moderately correlated to student's grade points when only counting student essays that were marked by teachers of the same courses in this correlation analysis. Thinking components that were found in medium correlation with the grade point are thinking components C (Integrate multiple perspectives and clarify assumptions), D (Qualitatively interpret information and create a meaningful organization) and E (Use guideline or principles to judge objectivity across options). More importantly, the overall thinking approach was found to be in medium correlation with the course grade point.

Table 5: Correlation between Students' Mean Score on Each Thinking Component and Course Grade-point (Counting only Essays Marked by Teachers Teaching the Same Courses)

		A	B	C	D	E	F	G	Overall Thinking Approach	Course Grade Point
Course Grade Point	Pearson Correlation (r)[1]	.098	.319	.425*	.463*	.401*	.388	.254	.389*	1

	Sig. (2-tailed)	.599	.129	.022	.012	.031	.067	.231	.041	
	N	31	24	29	29	29	23	24	28	36

[1] According to Cohen (1988), when r = 0.1-0.3 (small correlation), 0.3-0.5 (moderate correlation), 0.5-1 (large correlation)

* Correlation is significant at the 0.05 level (2-tailed).

The difference of the two correlation analysis can be attributed to the identity of the marker, i.e., whether the term paper was marked by a teacher from the same course that the paper was submitted for. It is believed that the precise assessment of performance in cognitive skills like evaluation, interpretation and clarification has to be grounded on the assessment of the content adopted. Further empirical evidence shows that the GEFP teacher tends to rate a term paper submitted to the other Dialogue course higher than a teacher of that course. This provides further support to the argument.

The correlation analysis also confirms that the measurement of Wolcott-Lynch assessment rubric is consistent with the existing assessment scheme employed in the two courses. Students' thinking performance has been reliably taken account by the assessment scheme of the course. In other words, whether students are *Confused Fact Finders* or *Biased Jumpers,* their performance in different thinking components have been reflected by their performance in the existing assessment framework of the course, in different extent.

Concluding Remarks: Impacts and Vision

All in all, the NQA study has brought to the participating teachers new understanding that may inform our teaching. For instance, it helps us better understand students' cognitive development so that question design can be improved to accord with the cognitive stage students are in. Hitting at the right level is important—if a question is below students' cognitive capacity, students may lose interest, but if it goes way beyond their cognitive capacity, students may feel frustrated and give up altogether. A recent encounter of a colleague may be worth quoting here.

The story goes that one day a student in her class said to her, "I really don't know what we're doing in the class. I am afraid."

"What are you afraid of?" the teacher asked.

"The open discussion."

"What's wrong with open discussion?"

"I am afraid of facing different perspectives," the student said, "I just want to settle down." Fortunately, the teacher had been involved in the NQA project. She knows the *Handbook* well, and she was able to comfort the students by saying, "You feel disenchanted when there's more than one 'answer,' and none stands out as the superior one. That's just because of the cognitive stage you're in. If you feel some pressure or insecurity, it is normal. Moving beyond this stage takes a long time, but you will. So no worries."

Individual members of the core research group have started transferring understanding and reflections gained from the NQA research to their teaching. Inspired by Wolcott-Lynch's idea of "scaffolding questions" that help students progress to the next level of cognitive complexity,[10] Pang Kam-moon designed an extended learning activity for a selected reading (*Silent Spring*) in *Nature*, which invited students to answer questions targeting level-one and level-two skills. Wu Jun asked students to assess their own performance patterns using the Wolcott-Lynch division of thinking patterns at the beginning of the course, the results of which were compared to her assessment of students' written works applying the same thinking-patterns division at mid-point and end of the term. A preliminary study has been carried out in Term 1, 2016-17. Gao Xin tried a similar exercise with her groups in Term 1, 2016-17 at entry and exit points of *Humanity*, showing a change in students' perception of their thinking strategy before and after completing the course. Beginning with the perplexities expressed about the term "uncertainties" in the Wolcott-Lynch rubrics, Yeung Yang proposed that "uncertainties" could be a desirable learning outcome of GEFP, and focused specifically on the use of questioning and self-questioning in her classroom. Findings of these extended studies will be reported elsewhere.

Wolcott-Lynch pointed out that most college students only acquire Step 2 by the time of graduation. The progression to the next stage may take as many as 3 years. Looking ahead, there are a few things that the keen and bold ones may yet do:

(1) Get down to the basic and try to understand: What is a narrative? Code the

[10] Susan K. Wolcott, *College Faculty Handbook: Steps for Better Thinking—A Classroom Model for Teaching, Learning, And Assessing Higher-order Thinking Skills* (Bellevue, Washington: WolcottLynch Associates, 2006 <http://www.wolcottlynch.com/>).

teacher narratives on student papers as we would do with transcripts of focus-group interviews, and see where we may go from there.

(2) Devise our own rubrics that may (a) fine-tune the various levels of complexity within Foundation, Step 1 and Step 2, since these are the steps most students will find themselves in as undergraduates; and (b) cover skills other than cognitive complexity; e.g., imagination; innovation.

(3) Try out different question design (addressing different levels of cognitive complexity) in tutorial.

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Appendix A

Cognitive Complexity Assessment Form
(Adapted from Figure 3 in Wolcott and Lynch's *Idea Paper* [2001])

Student's Name / Title of Paper: _____

Cognitive Step Reached: Foundation / 1 / 2 / 3 / 4 (circle as appropriate)

Assessor(s):

Level of Cognitive Complexity	Assessor(s)' Comments
Foundation: Knowledge and Skills • *repeat* or *paraphrase* information from textbooks, notes, etc. • *reason* to single "correct" solution, perform computations, etc.	
Step 1: Identify the Problem, Relevant Information, and Uncertainties • *identify* problem and acknowledge reasons for enduring uncertainty and absence of single "correct" solution • *identify* relevant information and uncertainties embedded in the information (may include "stacking up" relevant reasons and evidence to support some solution or conclusion)	
Step 2: Explore Interpretations and Connections • *interpret* information o recognize and control one's own biases o articulate assumptions and reasoning associated with alternative points of view o qualitatively interpret evidence from a variety of points of view • *organize* information in meaningful ways to encompass problem complexities	
Step 3: Prioritize Alternatives and Communicate Conclusions • after thorough analysis, *develop* and *use* reasonable guidelines for prioritizing factors to consider and choose among solution options • *communicate* appropriately for a given audience and setting	
Step 4: Integrate, Monitor, and Refine Strategies for Re-addressing the Problem • *acknowledge* and *explain* limitations of endorsed solution • *integrate* skills in an on-going process for generating and using information to monitor strategies and make reasonable modifications	

Appendix B: Performance Patterns Rubric

Steps for Better Thinking SKILLS	←Less Complex Performance Patterns				More Complex Performance Patterns→
	"Confused Fact Finder" Performance Pattern 0— How performance might appear when Step 1, 2, 3, and 4 skills are weak	"Biased Jumper" Performance Pattern 1— How performance might appear when Step 1 skills are adequate, but Step 2, 3, and 4 skills are weak	"Perpetual Analyzer" Performance Pattern 2— How performance might appear when Step 1 and 2 skills are adequate, but Step 3 and 4 skills are weak	"Pragmatic Performer" Performance Pattern 3— How performance might appear when Step 1, 2, and 3 skills are adequate, but Step 4 skills are weak	"Strategic Re-Visioner" Performance Pattern 4— How performance might appear when one has strong Step 1, 2, 3, and 4 skills
Step 1: IDENTIFY A—Identify and use relevant information B—Articulate uncertainties	A0—Uses very limited information; primarily "facts," definitions, or expert opinions B0—Either denies uncertainty OR attributes uncertainty to temporary lack of information or to own lack of knowledge	A1—Uses limited information, primarily evidence and information supporting own conclusion* B1—Identifies at least one reason for significant and enduring uncertainty	A2—Uses a range of carefully evaluated, relevant information B2—Articulates complexities related to uncertainties and the relationships among different sources of uncertainty	A3—Uses a range of carefully evaluated, relevant information, including alternative criteria for judging among solutions B3—Exhibits complex awareness of relative importance of different sources of uncertainties	A4—Same as A3 PLUS includes viable strategies for GENERATING new information to address limitations B4—Exhibits complex awareness of ways to minimize uncertainties in coherent, on-going process of inquiry
Step 2: EXPLORE C—Integrate multiple perspectives and clarify assumptions D—Qualitatively interpret information and create a meaningful organization	C0—Portrays perspectives and information dichotomously, e.g., right/wrong, good/bad, smart/stupid D0—Does not acknowledge interpretation of information; uses contradictory or illogical arguments; lacks organization	C1—Acknowledges more than one potential solution, approach, or viewpoint; does not acknowledge own assumptions or biases D1—Interprets information superficially as either supporting or not supporting a point of view; ignores relevant information that disagrees with own position; fails to sufficiently break down the problem	C2—Interprets information from multiple viewpoints; identifies and evaluates assumptions; attempts to control own biases* D2—Objectively analyzes quality of information; Organizes information and concepts into viable framework for exploring realistic	C3—Evaluates information using general principles that allow comparisons across viewpoints; adequately justifies assumptions D3—Focuses analyses on the most important information based on reasonable assumptions about relative importance; organizes information using criteria that apply across different viewpoints and allow for qualitative comparisons	C4—Same as C3 PLUS argues convincingly using a complex, coherent discussion of own perspective, including strengths and limitations D4—Same as D3 PLUS systematically reinterprets evidence as new information is generated over time OR describes process that could be used to systematically reinterpret evidence
Step 3: PRIORITIZE E—Use guidelines or principles to judge objectively across the various options F—Implement and communicate conclusions for the setting and audience	E0—Fails to reason logically from evidence to conclusions; relies primary on unexamined prior beliefs, clichés, or an expert opinion F0—Creates illogical implementation plan; uses poor or inconsistent communication; does not appear to recognize existence of an audience	E1—Provides little evaluation of alternatives; offers partially reasoned conclusions; uses superficially understood evidence and information in support of beliefs F1—Fails to adequately address alternative viewpoints in implementation plans and communications; provides insufficient information or motivation for audience to adequately understand alternatives and complexity	E2—Uses evidence to reason logically within a given perspective, but unable to establish criteria that apply across alternatives to reach a well-founded conclusion OR unable to reach a conclusion in light of reasonable alternatives and/or uncertainties F2—Establishes overly complicated Implementation plans OR delays implementation process in search of additional information; provides audience with too much information (unable to adequately prioritize)	E3—Uses well-founded, overarching guidelines or principles to objectively compare and choose among alternative solutions; provides reasonable and substantive justification for assumptions and choices in light of other options* F3—Focuses on pragmatic issues in implementation plans; provides appropriate information and motivation, prioritized for the setting and audience*	E4—Articulates how a systematic process of critical inquiry was used to build solution; identifies how analysis and criteria can be refined, leading to better solutions or greater confidence over time F4—Implementation plans address current as well as long-term issues; provides appropriate information and motivation, prioritized for the setting and audience, to engage others over time
Step 4: ENVISION G—Acknowledge and monitor solution limitations through next steps H—Overall approach to the problem	G0—Does not acknowledge significant limitations beyond temporary uncertainty; next steps articulated as finding the "right" answer (often by experts) H0—Proceeds as if goal is to find the single, "correct" answer	G1—Acknowledges at least one limitation or reason for significant and enduring uncertainty; if prompted, next steps generally address gathering more information H1—Proceeds as if goal is to stack up evidence and information to support own conclusion	G2—Articulates connections among underlying contributors to limitations; articulates next steps as gathering more information and looking at problem more complexly and/or thoroughly H2—Proceeds as if goal is to establish an unbiased, balanced view of evidence and information from different points of view	G3—Adequately describes relative importance of solution limitations when compared to other viable options; next steps pragmatic with focus on efficiently GATHERING more information to address significant limitations over time H3—Proceeds as if goal is to come to a well-founded conclusion based on objective consideration of priorities	G4—Identifies limitations as in G3; as next steps, suggests viable processes for strategically GENERATING new information to aid in addressing significant limitations over time* H4—Proceeds as if goal is to strategically construct knowledge, to move toward better conclusions or greater confidence in conclusions as the problem is addressed over time*

* Shaded cells most closely related to "stair step" model. Performance descriptions to the left of a shaded cell characterize skill weaknesses. Performance descriptions to the right of a shaded cell characterize skill strengths. (This document can be downloaded under "Educator Resources" at www.WolcottLynch.com.)

PAPER

P2

NQA-inspired Study on Students' Perspectives in Controversial Science Issues

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The Narrative Qualitative Assessment (NQA) project aims to explore students' high-level thinking on open-ended problems and revealed that 80% of students is of performance pattern 0 (Confused Fact Finder) or 1 (Biased Jumper) according to the Wolcott-Lynch Model. This inspired me to implement a study on how students respond to a science-related controversial issue. Preliminary findings show that students are week in identifying an uncertainty in an open-ended problem and that their performance could be enhanced or maximized by peer collaborations and by inquiring students appropriate scaffolding questions.

The common core programme, General Education Foundation Programme (GEFP), comprises of two seminar-based and core-text courses— *In Dialogue with Nature* (hereafter *Nature*) and *In Dialogue with Humanity* (hereafter *Humanity*) — at The Chinese University of Hong Kong. The two courses are designed to invite students to explore the world of science and knowledge, and reflect on ideal society and good life. Students' ability to think critically with in-depth cognitive complexity does help them reflect on their life, society, and as well as humans' place in nature. In the Narrative Qualitive Assessment (NQA) project, the research team explored students' high-level thinking by assessing student writings such as reflective journals and term papers. Explicitly, the goals of the project is (a) to evaluate students' in high-level thinking performance at the end of each of the two *Dialogue* courses; and (b) to collect findings for the program's self-examination and possible improvements, including the refinement of assessment methods, teaching design, and learning outcomes.

The full report of the NQA project was submitted to the Association for Core Texts

and Courses (ACTC) for publication.[1] In summary of the action steps, the Wolcott-Lynch Model were applied to assess students' high-level thinking in addressing open-ended problems, and four rounds of analysis were conducted since 2014 Fall, with the first two as pilots to set the benchmark and the last two as data gathering for the final analysis. The Model offers a wide range of assessment tools, from a crude rubric to a sophisticated one. The crude rubric was used in the first two rounds of study so as to familiarize teachers to the Model and allow them more rooms to jot down any significance of individual student writing. Having had experience in connecting students' performance in writings with their thinking patterns, the research team decided to choose a more sophisticated rubric of the Wolcott-Lynch Model (Appendix A: Performance Patterns Rubric), from a later publication by Susan Wolcott, *Steps for Better Thinking Faculty Handbook*.[2]

Students' performance patterns in cognitive complexity had already emerged in earlier investigations. More than 80% of the students demonstrated performance pattern "0" (associated with the "confused fact finder") or "1" (associated with the "biased jumper"). These patterns symbolized students tended to look for a single, correct answer even when facing an open-ended problem, or stack up evidence and information to support a preferred conclusion. In addition, the investigation indicates that students were weak at articulating uncertainties, they failed to acknowledge their own biases in reasoning.[3]

Some insightful questions arises from the above findings: How well does a students' writing reflect his/her high-level thinking or critical thinking? Is a student aware of his/her weakness? What are students' attitudes towards a controversial issue? How to maximize or enhance student preformation in better thinking? These inspired me to conduct a survey in 2016 Fall Term. Features of the Performance Patterns Rubric

[1] ACTC is an international association that seeks to advance liberal education in educational institutions; official website: https://www.coretexts.org/

[2] Susan K. Wolcott, *College Faculty Handbook: Steps for Better Thinking—A Classroom Model for Teaching, Learning, And Assessing Higher-order Thinking Skills* (Bellevue, Washington: WolcottLynch Associates, 2006 <http://www.wolcottlynch.com/>), p. A-5.

[3] CHIU Julie, et al., "Narrative Qualitative Assessment of Students' High-Level Thinking on Open-ended Problems".

were introduced to 50 students from various disciplines, and then they rated themselves a performance pattern. Students in general over-rated their cognitive complexity, some placing themselves at performance patterns "2" ("perpetual analyzer") or "3" (pragmatic performer) while their writings reflected a lower rating. Later, in a focus group interview students expressed that they would consider knowledge rather rudimentary in problem-solving skills. Yet, the content of the two *Dialogues* deal with prominent theorist and scholars. In-depth understanding of the content calls for very high level of thinking complexity. The discrepancy between students' performance and own perception reflect students' common weaknesses such as in making inference from intricate information or evaluating relevant information. More importantly, teachers evaluated students' performance based on evidences; students evaluates themselves by collection of their experiences and own perceptions. Both used the same rubric. This conveys a message that students' self-perceptions on own performance might not truly reflect the real situation. Objective evidences are always necessary.

In addition, students' performance patterns in cognitive complexity are reaffirmed in a study on how students respond to a science-related controversial issue. In the first part of the study, students read a selected excerpt from Rachel Carson's *Silent Spring*. "Earth's Green Mantle" is about the adverse effects on the environment of the indiscriminate use of pesticides, including the web of life, toxicity and carcinogenicity of 2,4-Dichlorophenoxyacetic acid and related compounds, and the success of biological control.[4] Then, a survey on students' attitudes towards artificial pesticides or herbicides in the 1950s was conducted. Most students approved of the accusation of the chemical industry of spreading disinformation and public officials of accepting industry claims unquestioningly. In the next week, the students read another articles or piece of news in the 1950s, which criticized *Silent Spring* by, for example, pointing out the logical flaws or one-sided arguments. Then, another survey was conducted. A significant percentage of participating students changed their mind and queried the correctness of the arguments in *Silent Spring* or the impartial attitudes of Carson. Moreover, they failed to identify any additional uncertainty underlying in the articles. Seemingly, albeit aware of the imperfection of authoritativeness, students tended to agree about the viewpoints of renowned figures such as Rachel Carson or alter their

[4] Rachel Carson, *Silent Spring* (New York: Mariner Books, 2002), pp. 63-83.

attitudes towards controversial questions easily. This provides independent evidence that students performed as the "confused fact finder" or "biased jumper". This echoes the early assessment of students' cognitive complexity in the NQA project that students were relatively weak at articulating uncertainties.[5]

King and Kitchener points out that critical thinking skills do not develop automatically as students grow older or are exposed to information or course content.[6] Wolcott remarks that students are unlikely to develop desired critical thinking skills if educational efforts are aimed at skills that are either too simplistic or too complex. She further suggests some learning activities to scaffold students to the next level of performance. [7] (See Appendix B). Apparently, maximization or enhancement of their cognitive complexity was then the next issue in concern. *Silent Spring* advocates the success of biological control on eradication of weeds over chemical control. Consider, for example, the following discussion topic:

> Rachel Carson said, "Biological control has achieved some of its most spectacular successes."[8] However, biological control does lead to some adverse effects, such as nuisance caused by Macaque monkeys in Kam Shan Country Parks. Describe the pros and cons of biological control and chemical control. Then, prioritize the pros and cons and develop an effective plan for addressing which (biological control or chemical control) is better.

The first half promotes the performance patterns "2" as it requires students to evaluate a range of relevant information from the internet and analyze quality of information objectively, while the second half further encourages students to develop guidelines with reasonable justification to choose solutions for various circumstances, i.e., the

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[5] CHIU Julie, et al., "Narrative Qualitative Assessment of Students' High-Level Thinking on Open-ended Problems".

[6] King, P.M. and Kitchener, K. S., *Developing reflective judgement: Understanding and promoting intellectual growth and critical thinking in adolescents and adults* (San Francisco: Jossey-Bass, 1994).

[7] Susan K. Wolcott, *College Faculty Handbook: Steps for Better Thinking—A Classroom Model for Teaching, Learning, And Assessing Higher-order Thinking Skills* (Bellevue, Washington: WolcottLynch Associates, 2006 <http://www.wolcottlynch.com/>), p.3-2.

[8] Rachel Carson, *Silent Spring* (New York: Mariner Books, 2002), p.81.

performance patterns "3". Of course, not all students were able to handle those questions well. Yet, it has been found that how questions are designed, for oral discussions or written assignments, is crucial for maximizing students' cognitive performance.

Another tryout was to investigate the effects of collaborative learning on students' performance. It starts with a discussion question as follows:

> The International Whaling Commission (IWC) urges Japan to stop killing whale for scientific researches.[9] What is the justification for that we (as a society) care about the loss of whale?

Students were required to look up the internet to find articles or news that took different positions. Then, they worked together to identify which reading provided stronger support and which concealed sources of uncertainties. This exercise not only touched upon science and values, but also helped students learn to acknowledge the stronger argument no matter if its position the students would agree and, in addition, to exhibit awareness of relative importance of uncertainties. It is worthy of noticing that students in peer collaborative learning activities generally showed better performance than when working on their own alone. These intervention studies will be reported in details elsewhere.

The NQA project has provided us a chance to have better understanding of our students, especially in their development of cognitive complexity. Appropriate designs of learning activities could maximize students' performance and in the long run optimize students' growth in better thinking; peer collaborative learning promotes students better thinking skills. Furthermore, the project also invited us to revisit the learning outcomes of the core-text programme and offers teachers from the two courses a chance to work together.

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[9] "Japan must stop killing whale science" (WWF: 26 May 2015), website: http://wwf.panda.org/wwf_news/?247351/Japan-must-stop-killing-whale-science.

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Appendix B: Learning Activities to Scaffold the Next Level of Performance

Performance Pattern 0 Confused Fact-Finder	Performance Pattern 1 Biased Jumper	Performance Pattern 2 Perpetual Analyzer	Performance Pattern 3 Pragmatic Performer	Performance Pattern 4 Strategic Re-Visioner
Scaffold 0 to 1 Work on Step 1 Skills: • Identify and describe uncertainties • Read about conflicting opinions • identify open-ended problems (i.e., those having no single "correct" solution) • List available information and identify which information is relevant for a given problem • List own opinion/thesis and use evidence/arguments to support it	Scaffold 1 to 2 Work on Step 2 Skills: • Identify and attempt to control for own biases • Identify stronger/weaker response to an open-ended problem • Identify and analyze for alternatives: pros/cons, advantages/disadvantages, strengths/weaknesses • Discuss strengths and weaknesses of evidence • Identify and analyze assumptions • Explore different viewpoints/perspectives • Compare and contrast theories/perspectives • Organize information into meaningful categories	Scaffold 2 to 3 Work on Step 3 Skills: • Identify most important issues, risks, or evidence • Justify selection of assumptions • Prioritize and clarify values used to judge across alternatives • Establish plan for communication/implementation/action that adequately address concerns/needs of others	Scaffold 3 to 4 Work on Step 4 Skills: • Prioritize and address solution limitations • Systematically reinterpret information over time • Develop viable strategies for generating new knowledge • Engage in life-long learning

Appendix A: Performance Patterns Rubric

Steps for Better Thinking SKILLS	←Less Complex Performance Patterns				More Complex Performance Patterns→
	"Confused Fact Finder" Performance Pattern 0— How performance might appear when Step 1, 2, 3, and 4 skills are weak	"Biased Jumper" Performance Pattern 1— How performance might appear when Step 1 skills are adequate, but Step 2, 3, and 4 skills are weak	"Perpetual Analyzer" Performance Pattern 2— How performance might appear when Step 1 and 2 skills are adequate, but Step 3 and 4 skills are weak	"Pragmatic Performer" Performance Pattern 3— How performance might appear when Step 1, 2, and 3 skills are adequate, but Step 4 skills are weak	"Strategic Re-Visioner" Performance Pattern 4— How performance might appear when one has strong Step 1, 2, 3, and 4 skills
Step 1: IDENTIFY A—Identify and use relevant information B—Articulate uncertainties	A0—Uses very limited information; primarily "facts," definitions, or expert opinions B0—Either denies uncertainty OR attributes uncertainty to temporary lack of information or to own lack of knowledge	A1—Uses limited information, primarily evidence and information supporting own conclusion* B1—Identifies at least one reason for significant and enduring uncertainty	A2—Uses a range of carefully evaluated, relevant information B2—Articulates complexities related to uncertainties and the relationships among different sources of uncertainty	A3—Uses a range of carefully evaluated, relevant information, including alternative criteria for judging among solutions B3—Exhibits complex awareness of relative importance of different sources of uncertainties	A4—Same as A3 PLUS includes viable strategies for GENERATING new information to address limitations B4—Exhibits complex awareness of ways to minimize uncertainties in coherent, on-going process of inquiry
Step 2: EXPLORE C—Integrate multiple perspectives and clarify assumptions D—Qualitatively interpret information and create a meaningful organization	C0—Portrays perspectives and information dichotomously, e.g., right/wrong, good/bad, smart/stupid D0—Does not acknowledge interpretation of information; uses contradictory or illogical arguments; lacks organization	C1—Acknowledges more than one potential solution, approach, or viewpoint; does not acknowledge own assumptions or biases D1—Interprets information superficially as either supporting or not supporting a point of view; ignores relevant information that disagrees with own position; fails to sufficiently break down the problem	C2—Interprets information from multiple viewpoints; identifies and evaluates assumptions; attempts to control own biases* D2—Objectively analyzes quality of information; Organizes information and concepts into viable framework for exploring realistic	C3—Evaluates information using general principles that allow comparisons across viewpoints; adequately justifies assumptions D3—Focuses analyses on the most important information based on reasonable assumptions about relative importance; organizes information using criteria that apply across different viewpoints and allow for qualitative comparisons	C4—Same as C3 PLUS argues convincingly using a complex, coherent discussion of own perspective, including strengths and limitations D4—Same as D3 PLUS systematically reinterprets evidence as new information is generated over time OR describes process that could be used to systematically reinterpret evidence
Step 3: PRIORITIZE E—Use guidelines or principles to judge objectively across the various options F—Implement and communicate conclusions for the setting and audience	E0—Fails to reason logically from evidence to conclusions; relies primary on unexamined prior beliefs, clichés, or an expert opinion F0—Creates illogical implementation plan; uses poor or inconsistent communication; does not appear to recognize existence of an audience	E1—Provides little evaluation of alternatives; offers partially reasoned conclusions; uses superficially understood evidence and information in support of beliefs F1—Fails to adequately address alternative viewpoints in implementation plans and communications; provides insufficient information or motivation for audience to adequately understand alternatives and complexity	E2—Uses evidence to reason logically within a given perspective, but unable to establish criteria that apply across alternatives to reach a well-founded conclusion OR unable to reach a conclusion in light of reasonable alternatives and/or uncertainties F2—Establishes overly complicated Implementation plans OR delays implementation process in search of additional information; provides audience with too much information (unable to adequately prioritize)	E3—Uses well-founded, overarching guidelines or principles to objectively compare and choose among alternative solutions; provides reasonable and substantive justification for assumptions and choices in light of other options* F3—Focuses on pragmatic issues in implementation plans; provides appropriate information and motivation, prioritized for the setting and audience*	E4—Articulates how a systematic process of critical inquiry was used to build solution; identifies how analysis and criteria can be refined, leading to better solutions or greater confidence over time F4—Implementation plans address current as well as long-term issues; provides appropriate information and motivation, prioritized for the setting and audience, to engage others over time
Step 4: ENVISION G—Acknowledge and monitor solution limitations through next steps H—Overall approach to the problem	G0—Does not acknowledge significant limitations beyond temporary uncertainty; next steps articulated as finding the "right" answer (often by experts) H0—Proceeds as if goal is to find the single, "correct" answer	G1—Acknowledges at least one limitation or reason for significant and enduring uncertainty; if prompted, next steps generally address gathering more information H1—Proceeds as if goal is to stack up evidence and information to support own conclusion	G2—Articulates connections among underlying contributors to limitations; articulates next steps as gathering more information and looking at problem more complexly and/or thoroughly H2—Proceeds as if goal is to establish an unbiased, balanced view of evidence and information from different points of view	G3—Adequately describes relative importance of solution limitations when compared to other viable options; next steps pragmatic with focus on efficiently GATHERING more information to address significant limitations over time H3—Proceeds as if goal is to come to a well-founded conclusion based on objective consideration of priorities	G4—Identifies limitations as in G3; as next steps, suggests viable processes for strategically GENERATING new information to aid in addressing significant limitations over time* H4—Proceeds as if goal is to strategically construct knowledge, to move toward better conclusions or greater confidence in conclusions as the problem is addressed over time*

* Shaded cells most closely related to "stair step" model. Performance descriptions to the left of a shaded cell characterize skill weaknesses. Performance descriptions to the right of a shaded cell characterize skill strengths. (This document can be downloaded under "Educator Resources" at www.WolcottLynch.com.)


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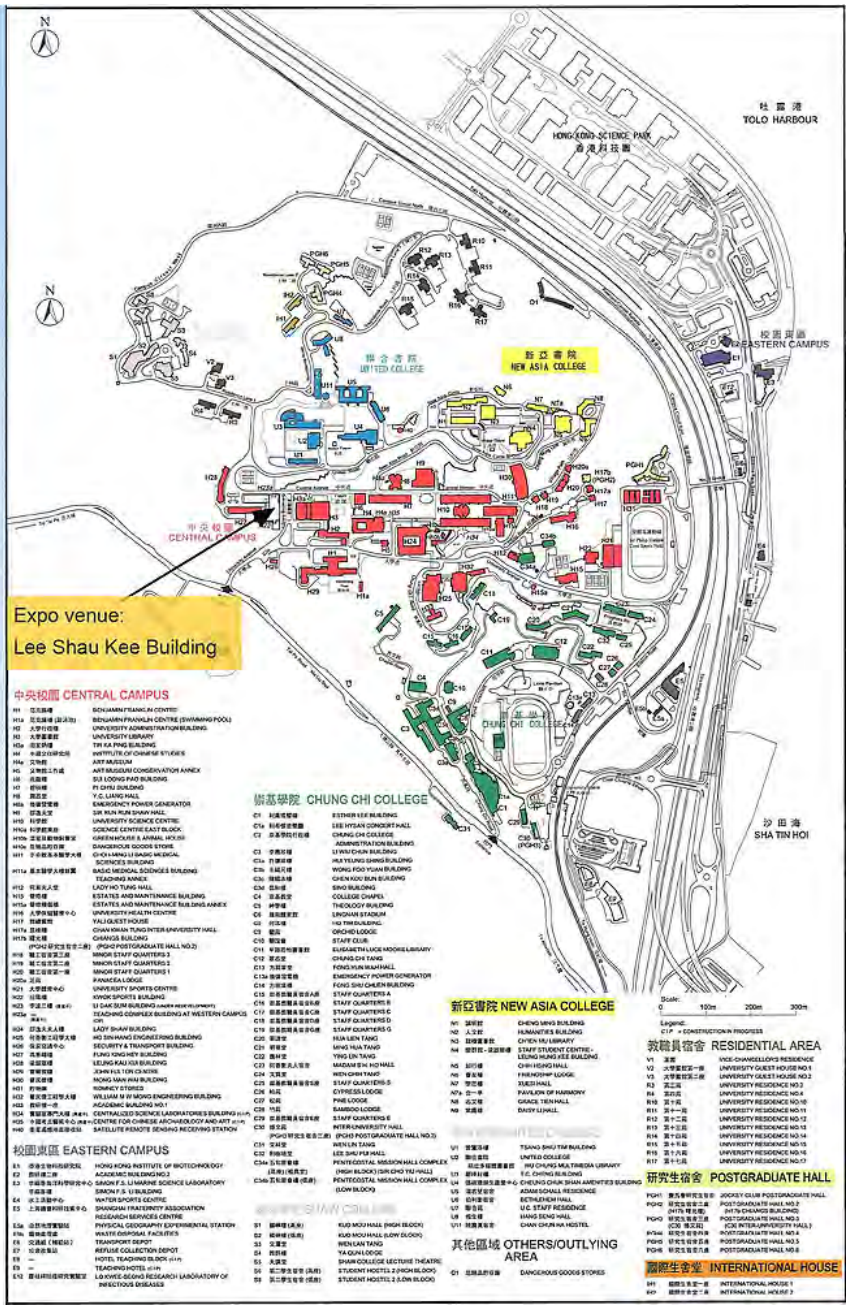

FLOOR PLANS

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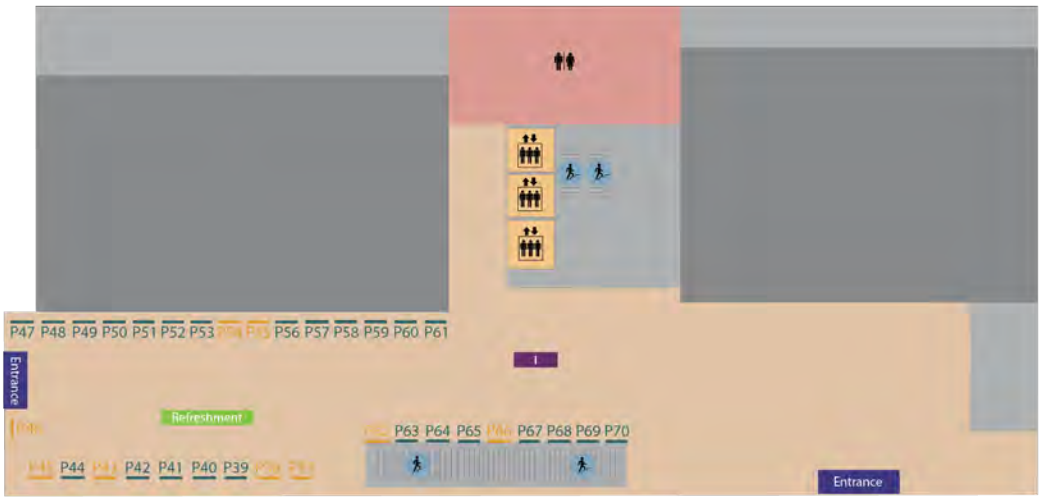

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2/F

P Poster
P Poster with Talk
U Poster from Sister University
Refreshment
Entrance
R Registration Counter
I Information Counter
Stairs
Lift
Washrooms

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