

# General education at the Hong Kong Polytechnic University: A comprehensive evaluation study

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## Abstract

The present study evaluated the implementation and impact of the “general university requirements” (GUR) at The Hong Kong Polytechnic University (PolyU) using both quantitative and qualitative methods. Quantitative methods included a four-year longitudinal online survey, Collegiate Learning Assessment Plus (CLA+), and secondary analyses of student feedback data in different years. Qualitative methods included focus groups and qualitative evaluation forms involving students and teachers as well as a longitudinal case study. Results showed that students displayed positive development based on different developmental indicators of the five desired graduate attributes of PolyU in their study of the four-year program. Both students and teachers also generally showed positive perceptions of the GUR, with reference to its subject content, teaching and learning, and benefits. Several major concerns regarding the GUR were also identified.

**Keywords:** General education, higher education, Hong Kong, student development, undergraduate program

## Introduction

In a fast-changing and increasingly uncertain society, general education has become more important. General education was defined by the Association of American Colleges and Universities (AAC&U) (1) as “that part of a liberal education curriculum that is shared by all students. It provides broad exposure to multiple disciplines and forms the basis for developing essential intellectual, civic, and practical capacities.” In the 21<sup>st</sup> century and an increasingly globalized age, company structure becomes flatter and company composition becomes more international; employees have more empowering, diverse and unstable work environment and professional life, which requires them to be more flexible and diverse and to have strong social and cognitive skills such as

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communication, problem solving, critical and integrative thinking, interpersonal relationship building, and cultural awareness (2, 3). These social changes challenged higher education. General education is regarded as a crucial instrument to help students to form a foundation of knowledge and develop valuable skills such as communication, quantitative reasoning, and integrative and critical thinking to become lifelong learners and global citizens in a fast-changing and interconnected world (4). For example, in a report named *Higher education in developing countries: Peril and promise* published by World Bank-UNESCO Task Force on Higher Education and Society in Developing Countries in 2000 (5), it was stated that “a general education is an excellent form of preparation for the flexible knowledge-based careers that increasingly dominate the upper tiers of the modern labor force” (5) and it can “promote responsible citizenship, ethical behavior, educational ambition, professional development in a broad range of fields, and even global integration” (5).

Against the above backdrop, many countries have incorporated or are exploring different approaches of general education in their higher education curriculum to strengthen their students’ college learning experience. In this exploration, the models that were widely adopted or referred to were the models of general education in American higher education, in which students normally study a set of general education courses in their first and second college years and then gradually move to their specialized study in later years. Nowadays, the American modes of general education have been transplanted to the higher education systems in many countries and districts, including Japan, mainland China, Hong Kong, Taiwan and other places (6, 7).

While the “American” models were widely adopted, there were different stages in their development. In the early days, general education curriculum inherited the tradition of liberal education in some traditional famous English universities such as Oxford University and Cambridge University, which was manifested by a unified curriculum focusing on classical studies to develop lawyers, doctors and ministers for the upper class of a preindustrial society (8). Since the late nineteenth century, the curriculum was challenged by the rapid industrialization and

science development of American society and was replaced by a free elective system firstly proposed by Charles Eliot, the prior president of Harvard University, which offered students full freedom to choose subjects that fulfilled their individualized learning needs and interests (9, 10). The free elective system was then replaced by a “distributional requirement” due to the criticism that it lacked unification and integration in students’ learning (11). The distributional requirement required students to take courses from each of a broad scope of disciplines with certain freedom which could balance common requirements and students’ personalized interests (8). In recent decades, some new curricular or course models were developed to meet with challenges of current social changes, including Freshman Experience program, interdisciplinary subjects, and service learning activities (8). In a survey conducted by AAC&U in 2009 (1), 58% of AAC&U member institutions had developed First Year Experience programs in their general education curriculum preparing for their students’ first-year transition. Also, 39% institutions developed service learning program in their general education curriculum and the percentage was still increasing. These developments showed the longstanding nature of general education and the new curricular models developed in it in coping with constant social changes.

Nevertheless, the implementation of general education is always a hard task and it encounters many obstacles. Hence, constant evaluation and revision work need to be done to maintain healthy functioning and facilitate further improvement of general education programs and initiatives. In a report released by the Carnegie Foundation for the Advancement of Teaching in 1977 (12), general education in American universities was depicted as “a disaster area” and was blamed for its incoherence in programs. Challenged by these evaluation results, many universities and colleges reviewed and strengthened their general education programs in the 1980s (13). Subsequently, from the 1990s to 2000s, the priority of general education has increased, more reforms were conducted and new models such as thematic programs were developed (14). Also, more higher education institutions conducted formal review and assessment of their general education program

and even incorporated assessment as a routine practice in their program implementation (15).

With particular reference to Hong Kong, higher education in Hong Kong has experienced a comprehensive reform in the past few years, marking a shift from previous British-style to American-style undergraduate education. The previous undergraduate education in Hong Kong was based on a three-year curriculum, which emphasized highly early specialization and disciplinary concentration of students' studies (16). However, starting from the academic year of 2012-2013, all Hong Kong public universities extended their undergraduate curricula from three years to four years. At the same time, each university introduced a significant general education component in its new four-year undergraduate program which attempted to develop manpower with a broad knowledge scope, an innovative and integrated vision, positive attitudes and important generic and transferable skills to cope with the challenges of Hong Kong's construction of a globally competitive and value-added service economy in the 21st century (16, 17) and development of a civil society as a Special Administrative Region of China (18).

However, there were very few evaluation studies to systematically evaluate these reform initiatives in Hong Kong universities. This research gap needs to be filled because evaluation can tell us how well the four-year undergraduate curricula and the new general education programs in different universities function, how effective they are, and what kind of promoting and hindering factors exist in the functioning of these programs. Against this background, a comprehensive evaluation study was conducted to evaluate the new four-year curriculum and general education at The Hong Kong Polytechnic University (PolyU). In the 2012-2013 academic year, PolyU introduced a new general education structure into its new four-year curriculum framework. This general education structure is named "General University Requirements" (GUR), which includes six major components. With this comprehensive structure, the GUR aims to develop PolyU students in five desired graduate attributes, including effective communication, critical thinking, innovative problem solving, lifelong learning and ethical leadership.

### *Freshman seminar (FS)*

FS is the first component of GUR. It is a three-credit required subject offered by each faculty/school of PolyU to all its first-year students. FS aims to cultivate students' understanding of their professions and broad disciplines and to develop their entrepreneurship and self-learning ability.

### *Leadership and intrapersonal development (LIPD)*

LIPD component is intended to develop students' understanding of intrapersonal and interpersonal skills that are needed for successful and ethical leaders. The component consists of two three-credit subjects. One is "Tomorrow's Leaders" (TL), offered to all first-year students except for those in the Faculty of Business (FB). The other is "Tango! Managing Self & Leading Others" (Tango!), offered to students in FB.

### *Language and communication requirements (LCR)*

This component attempts to enhance students' communication skills in Chinese and English. The component requires students to take one Chinese and two English subjects according to their different language proficiencies.

### *Cluster area requirements (CAR)*

This component requires students to take one three-credit subject in each of four learning areas and to also meet three additional requirements: China studies requirements (CSR), English writing and reading requirements (EW/ER), and Chinese writing and reading requirements (CW/CR). The four learning areas are "human nature, relations, and development" (CAR-A), "community, organization, and globalization" (CAR-B), "history, culture, and world views" (CAR-C), and "science, technology, and environment" (CAR-D). CAR aims to expand intellectual potential and cultivate understanding of Chinese culture and Chinese and English writing skills.

### *Service learning (SL)*

Each student needs to take a three-credit SL subject that includes a significant service component. This component aims to cultivate students' sense of social responsibility, empathy, and application of professional knowledge.

### *Healthy lifestyle (HLS)*

The HLS component is non-credit-bearing, in which students are required to take a series of courses including introductory lecture, sports training, e-learning, and wrap-up lecture. The purpose of this component is to cultivate students' understanding of a healthy lifestyle and their mastery of related knowledge and skills.

In order to evaluate the implementation and effectiveness of the GUR, a five-year evaluation research was conducted. The research attempted to answer two basic evaluation questions: a) What are the changes in the students in their undergraduate study, particularly with reference to the five desired graduate attributes of PolyU?; and b) What are the views of the students and the teachers on the GUR, especially with reference to the content, teaching, implementation, and effects? In order to investigate these questions, different evaluation components were incorporated into the research, including:

- a. A four-year longitudinal online survey to track the development of students in a set of developmental indicators during their four-year study of the undergraduate curriculum and the GUR at PolyU
- b. Collegiate Learning Assessment Plus (CLA+) for assessing students' development in problem-solving, communication, and critical thinking in their study of the four-year curriculum
- c. Secondary data analyses of the Student Feedback Questionnaire (SFQ) data that was used to measure students' subjective outcome evaluation of GUR
- d. Student focus group interviews and qualitative evaluation based on evaluation

forms used to understand students' perceptions of different subjects of GUR, especially the contents, teaching methods, implementation, and effects

- e. Teacher focus group interviews and qualitative evaluation based on evaluation forms, which was used to understand the teachers' view of the GUR curriculum, with reference to the curricular idea, teaching and learning, and curricular effects
- f. Longitudinal case study used to track the long-term development of students in the study of the four-year curriculum, and
- g. Repertory grid test to study the development of students after studying the four-year curriculum and the GUR.

A summary of different evaluation mechanisms and their major findings are presented in the sections below.

### *Longitudinal online survey*

The longitudinal online survey attempted to investigate the changes of students under the new four-year undergraduate curriculum and the GUR at PolyU, with reference to the five desired graduate attributes (i.e., effective communication, critical thinking, innovative problem solving, lifelong learning, and ethical leadership). This evaluation component included three sub-studies. Sub-Study 1 investigated the changes of PolyU four-year curriculum students in a set of developmental indicators in the four academic years from 2012-2013 to 2015-2016. Sub-Study 2 compared the performance of PolyU four-year curriculum students (Experimental Group) with those of PolyU three-year curriculum students (Control Group 1) in the 2014-2015 academic year (i.e., Year 3 students in the 3-year program and 4-year program). Sub-Study 3 compared the performance of Experimental Group with those of four-year curriculum students in a comparable local university (Control Group 2) in the 2014-2015 academic year (i.e., Year 3 students in the 4-year program). Below is a summary of the three sub-studies.

***Sub-study 1***

In the 2012-2013 academic year, 677 out of a random stratified sample of 1,000 first-year students enrolled in the new four-year curriculum of PolyU responded to an online questionnaire of GUR longitudinal online survey (Wave 1). These students were further invited to complete the same questionnaire yearly in the following three academic years, i.e., 2013-2014 (Wave 2), 2014-2015 (Wave 3), and 2015-2016 (Wave 4) academic years. Of the 677 students initially invited, 434 had completed all four waves of questionnaire.

The survey questionnaire was comprised of four validated instruments, including Chinese Interpersonal Reactivity Index (C-IRI), Chinese Positive Youth Development Scale (CPYDS), Index of Learning Style (ILS), and National Survey of Student Engagement (NSSE). The C-IRI comprises three subscales, including Personal Distress, Fantasy and Empathy, to measure empathy in Chinese people (19). The CPYDS measures positive characteristics in Chinese adolescents (20). A shortened version of CPYDS was adopted in the present longitudinal survey, which comprised 14 subscales including Cognitive Competence, Emotional Competence, Behavioral Competence, Problem Solving, Social Competence, Critical Thinking, Self-Determination, Self-Efficacy, Resilience, Moral Competence, Ethical Leadership, Self-Leadership, Life Satisfaction, and Lifelong Learning. The ILS measures students' individual learning preferences in terms of four dimensions: Active versus Reflective, Sensing versus Intuitive, Verbal versus Visual, and Global versus Sequential (21). The NSSE measures students' engagement in learning and other university experiences, which consists of 11 subscales including Collaborative Learning, Reflective and Integrative Learning, Student Faculty Interaction, Higher Order Learning, Effective Teaching Practice, Quantitative Reasoning, Discuss with Diverse Other, Learning Strategies, High Impact Practice, Quality of Interaction, and Supportive Environment.

Repeated measures ANOVAs and Bonferroni post hoc tests were performed to compare the performance of the participants in indices of desired graduate attributes tested by survey instruments in the four academic years from 2012-2013 to 2015-2016. Results showed the participants' increased ratings on

the majority of indicators in their junior and senior years than in their freshman and sophomore years including problem solving, collaborative learning, discuss with diverse other, higher order learning, reflective and integrative learning, and quantitative reasoning; the participants' ratings in the academic years of 2014-2015 and 2015-2016 were significantly higher than those in 2012-2013 and 2013-2014. The participants' rating of critical thinking in the academic year of 2015-2016 was also higher than those in the academic years of 2012-2013 and 2013-2014. Their ratings of ethical leadership, self-leadership and lifelong learning were also significantly higher in the academic year of 2015-2016 than in 2013-2014. Their rating of learning strategies in 2015-2016 was higher than in 2013-2014, and their rating in 2014-2015 was also higher than those in 2012-2013 and 2013-2014. The participants' ratings of social competence remained stable over the four academic years, and their empathy scores decreased in the academic year of 2013-2014 when compared to those in the 2012-2013. The findings for the changes in the students over time have been published (22).

***Sub-study 2 and sub-study 3***

The sub-studies 2 and 3 were added to the whole study of the longitudinal survey in the 2014-2015 academic year (i.e., Year 3 of the cohort). While Sub-study 2 involved a control group consisting of 300 students enrolled in the old three-year undergraduate curriculum of PolyU (Control Group 1), Sub-study 3 involved a control group consisting of 300 students enrolled in a new four-year curriculum in a comparable local university (Control Group 2). Results of independent samples t-tests showed that the Experimental Group performed significantly better than Control Group 1 on critical thinking, ethical leadership, collaborative learning, discuss with diverse other, higher order learning, reflective and integrative learning, learning strategies and empathy, while the two groups had no differences in their performances in problem solving, self-leadership, lifelong learning, and quantitative reasoning. The Experimental Group also performed significantly better than Control Group 2 on cognitive behavior competence, problem solving, emotional competence, cognitive competence, behavioral competence, moral competence, life satisfaction, learning strategies, and

quality of interaction. In short, the findings are consistent with the hypotheses of the study and they have been published (23, 24).

### *Collegiate learning assessment plus (CLA+)*

The second quantitative method employed in the comprehensive evaluation research of the GUR was the collegiate learning assessment Plus (CLA+). The CLA+ is a norm-referenced and standardized online test developed by the US Council for Aid to Education (CAE). It assesses the contribution of an institution to the development of its students in competencies including analysis and problem solving, writing effectiveness, writing mechanics, scientific and quantitative reasoning, critical reading and evaluation, and critique an argument (25). These competencies are basically aligned with three desired graduate attributes of PolyU, namely, problem solving, critical thinking and effective communication.

Before the start and near the end of the 2013-2014 and 2015-2016 academic years, respectively, four rounds of CLA+ tests were performed with four groups of 150 randomly selected students who studied in the PolyU four-year curriculum. Group 1 consisted of 150 first-year students who conducted the test before start of the 2013-2014 academic year. Group 2 was comprised of 150 second-year students participating in the test in Semester 2 of the 2013-2014 academic year. The 150 students were randomly selected from the participant pool of the longitudinal survey. Group 3 included 150 first-year students who completed the test before start of the 2015-2016 academic year. Group 4 comprised 150 senior-year students doing the test in Semester 2 of the 2015-2016 academic year. Among the 150 participants in group 4, 127 were participants in Group 2.

Paired samples t-test comparing performance of the 127 students who participated in both Group 2 and Group 4 showed that Group 4 scored significantly higher than Group 2 in almost all the variables of CLA+, including analyses and problem solving, writing mechanics, scientific and quantitative reasoning, critical reading and evaluation, and critique an argument except for writing effectiveness on which the two groups had no difference in performance. Secondly, independent samples t-test comparing the

performance of Group 1 and Group 4 showed that Group 4 performed significantly better than Group 1 in all CLA+ subscales, except for Writing Mechanics on which the two groups performed comparable to each other. All the results indicated students' improvements in problem solving (measured by analyses & problem solving), effective communication (measured by writing mechanics and writing effectiveness) and critical thinking (assessed by scientific & quantitative reasoning, critical reading and evaluation, and critique an argument) in senior year than in freshmen and sophomore years under their study of the PolyU four-year curriculum and the GUR. A paper reporting the findings is under preparation (26).

### *Secondary data analyses of data of student feedback questionnaires (SFQ)*

Secondary data analyses of SFQ data were conducted to investigate students' subjective views of GUR subjects in terms of subject attributes and teacher attributes. In the academic years of 2012-13, 2013-14, 2014-15 and 2015-16, 16,909, 19,242, 24,902 and 24,360 SFQ were collected, respectively, by the Educational Development Center (EDC) of PolyU, from the 24,550 (2012-2013), 41,026 (2013-2014), 45,135 (2014-2015), and 45,681 (2015-2016) students enrolled in the GUR subjects. The SFQ was a faculty/school-based questionnaire developed by EDC of PolyU to assess perceptions of students about university subjects in each semester in terms of students' learning experiences and perceived teaching of staff. The present study gathered data from six standardized items in SFQ for GUR subjects for further analyses. The six items include four items concerning students' learning experiences in GUR subjects and two items on students' views of teaching staff.

Results showed higher mean scores of students' ratings of all six SFQ items in all the four years. All the mean scores were above (or equal to) 4.00 out of a maximum of five, except for two ratings being 3.90. Results of the one-way ANOVA and post hoc comparison showed that students' ratings of almost all the items in the academic years of 2014-2015 and 2015-2016 were significantly higher than in 2012-2013 and 2013-2014. The SFQ ratings for different GUR components were also positive. For LCR-

English and LCR-Chinese components, the mean scores of all items in all the four years were above (or equal to) 4.00, except for the score of one item in LCR-Chinese being 3.90. The mean scores for CAR, LIPD and SL were all above (or equal to) 3.70. Only the mean scores for FS were slightly lower, ranging from 3.40 to 4.10. Result based on one-way ANOVA and post hoc comparisons showed that on most of the SFQ items, students' ratings in FS, LCR, and CAR components had increased in the academic year of 2015-2016 than their ratings in 2012-2013. For LIPD, students' ratings of all items in the academic year of 2014-2015 were higher than those in 2013-2014, and their ratings of some items in 2014-2015 were also higher than those in 2012-2013. Students' SFQ ratings in SL component remained stable across the four academic years. These results indicated that students' evaluation of different GUR components were generally positive in the four years. The findings are published in different journals (27-29).

#### *Student focus groups and qualitative evaluation based on evaluation form*

Student focus groups and qualitative evaluation based on evaluation form were conducted to understand students' subjective perceptions of the GUR subjects, especially their contents, teaching methods, implementation, and impacts. In each academic year, students were randomly selected from different faculties/schools to participate in focus group interviews. In the four academic years from 2012-2013 to 2015-2016, 13 (n = 62), 18 (n = 74), 8 (n = 73), and 8 (n = 70) student focus groups were conducted, respectively. In addition, in the academic years of 2013-2014 and 2014-2015, 320 and 480 randomly selected students studying in the four-year curriculum were invited to complete a qualitative evaluation form on their views of the GUR, respectively. A total of 163 evaluation forms from 2013-2014 and 332 from 2014-2015 academic years were collected from these students.

All focus groups were guided by a focus group protocol developed by the authors. The protocol consisted of several groups of questions to ask students to share their views on rationales, teaching and learning, implementation and impacts of the

GUR. The evaluation form was comprised of several open-ended questions to ask students to describe their general impressions of the GUR by using descriptors or short phrases, and to ask students about their unforgettable experiences, difficulties and personal achievements in their study of the GUR subjects. The method of thematic analyses was adopted in analyzing the qualitative data collected.

The findings suggested that students' views of different GUR components were generally positive. The data collected from the qualitative evaluation form in different years indicated students' positive impressions and feelings of different GUR subjects. Different qualitative evaluation data also suggested that students perceived different GUR subjects positively with specific reference to content, teaching, implementation, and benefits. Students positively commented on subject content of several components, such as LIPD, LCR-English and CAR. Students perceived the topics in TL and CAR subjects as interesting and attractive and they perceived the contents of CAR and LCR-English subjects as practical and applicable to their life and study. Students also liked the stratified teaching methods in LCR component and the design of CAR component that gave them freedom in selecting their interested subjects. Students had positive views of the active, interactive and experiential teaching and learning methods as well as the authentic assessment methods adopted in many GUR subjects. They perceived these methods as engaging, conducive to deep learning, and helpful to their achievement of the intended learning outcomes of different subjects. The findings are reported in a series of papers (30-33).

#### *Teacher focus groups and qualitative evaluation based on evaluation form*

In each academic year from 2012-13 to 2015-16, a sample of teachers teaching different GUR subjects were invited to participate in focus group interviews based on nomination of program leaders and key teachers. In total, 4 (n = 20) focus groups in 2012-13, 8 (n = 49) in 2013-14, 8 (n = 52) in 2014-15, and 8 (n = 50) in 2015-16 were conducted. Also, in the academic years of 2013-14 and 2014-15, 99 and 128 teachers teaching different GUR subjects were

invited to complete a qualitative evaluation form, respectively. A total of 75 forms in 2013-14 and 78 forms in 2014-2015 academic years were collected from the teachers.

All teacher focus groups were guided by a focus group protocol developed by the authors. The protocol included five groups of questions to ask teachers to share their views of different aspects of the GUR subjects they taught, including rationale, impacts on students, workable and unworkable subject components, and challenges to teaching. Teacher evaluation form included questions asking about teachers' general impression of the GUR subjects they taught, their perceived benefits of GUR, and the challenges in their teaching. Thematic analyses were used to analyze teacher focus group data and teacher evaluation form data.

Results showed that the teachers' views of the GUR were also generally positive. Teachers teaching different GUR subjects had positive impressions about the subjects they taught, which was evidenced by high percentage of positive descriptors given by teachers in different GUR components in different academic years. Teachers in different GUR components positively perceived different aspects of the subjects they taught, including the general rationale, teaching methods, and impacts on students. Some teachers, particularly those teaching CAR subjects, displayed a deeper understanding of the rationale of the GUR and general education and gave highly positive support to GUR subjects. Many teachers perceived the active and interactive teaching and learning methods in their subjects as welcomed by students and engaged students in learning. The teachers also perceived a basic alignment of their subjects with their intended learning outcomes. Challenges were also noted, including teaching big classes in some GUR subjects and teaching FS subjects in some faculties composed by more diversified disciplines. The related findings are published in different papers (34-37).

### *Longitudinal case study*

In the academic year of 2012-2013, 57 students participating in the student focus groups and additional 14 first-year students enrolled in the four-

year curriculum of PolyU were invited to participate in a four-year longitudinal case study to follow up the personal growth of these students under study of the new curriculum and the GUR. In the academic year of 2013-2014, 42 active student cases were retained and the 29 inactive cases were removed from the study. The 42 cases were then followed up in the following three academic years from 2013-2014 to 2015-2016. At the end of each academic year, each student was invited to attend an individual interview to understand their personal growth and views of the four-year curriculum and the GUR in that year. The numbers of students who participated in interviews in each academic year were 71 in 2012-2013 (including the 14 newly recruited students participating in the individual interviews and the 57 focus group students), 31 in 2013-2014, 20 in 2014-2015, and 23 in 2015-2016. All the individual interviews were guided by an interview protocol developed by the research team. The data of 2014-2015 and 2015-2016 were still in analyses. The results of 2012-2013 and 2013-2014 have been published (38, 39).

### *Repertory grid test*

To assess the change in the undergraduate students with reference to the desired graduate attributes, a repertory grid test was adopted. In the second semester of the 2015-2016 academic year, a random stratified sample of 100 fourth year students from the GUR longitudinal online survey cohort completed the repertory grid test. Basically, students perceived themselves as developing in a positive direction based on different indicators of self-identity. The findings provide support for the claim that GUR was able to promote positive development in the undergraduate students over time. The analyses of data and paper writing are under way.

## **Discussion and conclusion**

This paper presented a five-year longitudinal and multi-method evaluation study on the implementation and impact of a new general education program entitled General University Requirements (GUR) in the new four-year undergraduate curriculum at The



Hong Kong Polytechnic University (PolyU). Basically, whether students had changed in their study and how different stakeholders looked at the program were examined.

For the four-year longitudinal online survey (which also included a quasi-experimental design involving two control groups in one academic year, i.e., 2014-2015), results indicated that the students had improved in almost all the five attributes. Besides, the CLA+ was used in the present study to assess students' changes in problem solving, written communication, and critical thinking abilities after their study in the four-year curriculum and the GUR. The results also indicated students' significant improvements in these attributes.

These quantitative findings are further supported by the qualitative evaluation findings. In student and teacher focus groups, both students and teachers pointed out that the GUR structure facilitated students' holistic development. The qualitative data also suggested that good subject design, such as attractiveness and practicality of subject topics, and the design of teaching approaches to better deliver the topics and facilitate students' learning determined how well students could be benefited by the GUR subjects. This was in line with the literature suggesting that a good subject design, such as those could promote transferability and practicality of knowledge (40), together with active teaching and learning methods, such as collaborative learning and experiential learning, could increase student satisfaction with the general education subjects and could facilitate goal-achievement of different general education programs (41, 42).

Regarding the question of how different stakeholders viewed the GUR, four methods were used, including Student Feedback Questionnaires (SFQ), student focus group and qualitative evaluation, teacher focus group and qualitative evaluation, and longitudinal case study. The SFQ results suggested that students had positive experiences of GUR subjects in terms of different aspects, and had positive evaluation of teaching staff. Particularly, for LCR component, students had highly positive evaluation and the evaluation had also increased over the four academic years. This observation was supported by the student and teacher focus group and qualitative evaluation findings. There are several explanations for

this result. First, the LCR component was mainly designed to train students' English and Chinese writing and expression skills, particularly that the English LCR subjects trained students a lot in basic referencing and paper-writing skills and these skills could be directly applied by students in their study of other academic subjects involving essays-writing tasks. Secondly, in LCR component (particularly the English LCR subjects), many subjects adopted a pedagogy that combined small-class teaching with workshop style instruction, which highly promoted student interaction with their teachers and enhanced student satisfaction with the subjects. The positive results of small-class and workshop style teaching were also supported by the existing literature (43, 44). Thirdly, in English LCR, many subject teachers had overseas education experience and some were foreigners. These teachers' teaching styles might be more open, democratic and more welcomed by the students.

Besides, SFQ results suggested students' highly positive evaluation of teaching staff of LIPD component. There are two explanations for this. Firstly, since the LIPD component (particularly the TL subject) required teachers to show care, self-disclosure and assistance to their students, and stressed highly the teacher-student relationship, some teachers who could do this would receive high appreciation and recognition from their students. This was supported by the findings from student and teacher focus groups in the present study. Secondly, although the content of LIPD subjects, such as the content of TL subject, included many theories and concepts, excellent teachers who could better integrate these theories with appropriate teaching approaches and with their personal experiences could promote a deeper learning in students and increase students' satisfaction. This was supported by the previous studies on TL subjects (45, 46).

Nevertheless, this evaluation study highlighted some issues in the implementation of the GUR and in general education programs. One problem was teaching large class general education subjects. Nowadays, due to the restriction of university resources and classroom settings, large class teaching has become a trend. Therefore, how to implement effective teaching in big class, particularly how better integrate traditional lecturing method and active

teaching methods in large classes to promote students' learning has become a critical issue faced by many general education programs, including the GUR. Extant literature suggested that to add some active teaching methods such as in-class group discussion, short class presentation, poster sharing, and out of class reading tasks in traditional lecturing could effectively promote students' learning (47, 48). Particularly, a study conducted by Morgan, Whorton and Gunsalus (49) even revealed that a combination of traditional lecture method with group discussion resulted in better learning effects of students than totally using cooperative and active learning methods. These studies indicated a great potential to better design and utilize big class teaching to promote students' effective learning and provided directions for the further refinements of some GUR subjects.

Another problem was the challenge in teaching interdisciplinary subjects. This was manifested by both student and teachers' concern about FS subject implementation in the present study. One deeper reason for this was overspecialization of and strong boundary between knowledge disciplines in modern society, which made it harder and harder for teachers in one discipline to understand the interconnections of their discipline with other disciplines. Without qualified teachers, the implementation of interdisciplinary subjects was in vain. Studies suggested that more student-centered teaching and learning approaches, such as problem-based learning, enquiry-based learning, and learning communities, could help to facilitate student learning and engagement in interdisciplinary subjects (50, 51). This was also supported by the findings of this study that some FS subjects adopting more active learning approaches such as hands-on workshops led to much better learning effects of students.

Two limitations of the present study should be noted. Firstly, some learning effects, particularly some long-term impacts or influence of the GUR, may not be identified in a short period. Therefore, it would be better to also investigate students' development and perceptions of the impact of GUR after their graduation. Secondly, although students and teachers are two important groups of stakeholders of the GUR, university administrators and policymakers were also important stakeholders of the GUR and their views should also be investigated. Despite of these

limitations, the present study provides a comprehensive picture about the implementation and impact of the GUR at PolyU, which contributes to the existing literature on evaluation of general education.

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## Ethical compliance

The authors have stated all possible conflicts of interest within this work. The authors have stated all sources of funding for this work. If this work involved human participants, informed consent was received from each individual. If this work involved human participants, it was conducted in accordance with the 1964 Declaration of Helsinki. If this work involved experiments with humans or animals, it was conducted in accordance with the related institutions' research ethics guidelines.

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