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資優薈萃 Gifted Gateway

天澤資優 掌握機遇

Going Beyond Giftedness

香港資優教育學苑
The Hong Kong Academy for Gifted Education

天澤資優 掌握機遇
Going Beyond Giftedness

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天澤資優 掌握機遇
Going Beyond Giftedness

不經不覺之間，香港資優教育學苑已經成立十年了。自 2008 年投入服務以來，學苑已為超過兩萬名資優學生提供多方面的服務與支援。

除了與時並進、度身訂造的學術課程外，學苑的情意教育部及進階學習體驗部亦就學員面對重大挑戰時的社交情緒需要設計課程；至於家長方面，學苑為他們提供情意教育課程和工作坊，讓他們掌握教養資優子女的技巧。此外，我們還為老師舉辦講座、工作坊，提升他們資優教育方面的知識，結合家長、老師的力量，再加上學苑的增潤課程，希望能夠全方位支援學員的認知和情意需要，讓他們得到均衡的發展。

過去的一年，是繽紛精彩的一年。在七月份，我們舉辦十周年慶典資優教育研討會及開放日，藉以提高公眾對資優教育的認識。學苑又邀請海外著名學者，包括以色列的 Dr Rachel Zorman、美國的 Dr Jeanne Century 及澳洲的 Prof. David Christian 跟我們分享二十一世紀技能、STEM 教育及大歷史議題，拓闊了我們的視野，刺激我們思考如何培育資優學生，讓學員可以在二十一世紀振翅高飛，展現資優本色。

我們還跟其他院校，包括香港科技大學、香港城市大學、香港中文大學、美國約翰霍普金斯大學等等進行協作。本期我們透過五位資優校友的故事，讓讀者認識資優學生的成長路。展望未來十年，我們希望對香港的學制有更加直接的影響，並且成為真正步向世界，具影響力的資優教育成員。

Time flies and without our noticing it, The Hong Kong Academy for Gifted Education (HKAGE) has entered its tenth year. Since HKAGE's establishment in 2008, over 20,000 gifted students have attained various programmes and support provided by the Academy.

In addition to the tailor-made and up-to-date academic programmes, the Affective Education Division and the Advanced Learning Experiences Division of HKAGE also design programmes addressing to the affective needs of our student members when facing major challenges. As for parents, affective education programmes and workshops are provided to equip them with the skills for nurturing their gifted children. HKAGE has also delivered seminars and workshops for teachers to enhance their knowledge of gifted education. With the concerted effort of parents and teachers, as well as the enrichment programmes offered by the Academy, we aimed to provide all-round support to meet our student members' cognitive and affective needs for their balanced development.

The past year has been gorgeous. To celebrate HKAGE's 10th Anniversary, a Gifted Education Seminar and an Open Day were held in July to raise public awareness of gifted education. Renowned overseas scholars, including Dr Rachel Zorman of Israel, Dr Jeanne Century of the United States and Prof. David Christian of Australia, were invited to share on the topics of the 21st Century Skills, STEM Education and Big History, broadening our horizons and stimulating us to think about how to nurture gifted students so that they can soar high in the 21st Century with their talents fully unleashed.

We also collaborated with institutions such as The Hong Kong University of Science and Technology, City University of Hong Kong, The Chinese University of Hong Kong, Johns Hopkins University in the US, etc. during the year. In this issue of Gifted Gateway, the feature stories of five of our gifted alumni are covered to give readers a glimpse on the growth of our gifted students. Looking forward into the next decade, we hope to have more direct impact on Hong Kong's education system and become one of the truly global and influential stakeholders in gifted education.

美國 STEM 教育模式：STEM+C

STEM 由科學 (Science)、科技 (Technology)、工程 (Engineering) 及數學 (Mathematics) 四個英文單詞的首字母縮寫而成，STEM 教育並不是單指這幾門理科學科獨立運作，而是融會這些科目的知識，應用到生活層面上，培養創新精神。STEM 教育在美國辦得有聲有色，究竟其教育模式有甚麼值得香港借鏡？

政府支持 STEM 教育

近年美國積極推行 STEM 教育，期望透過 STEM 策動經濟增長及加強自身在國際舞台的競爭力。因此， 政府大力支持 STEM 教育從小學推行到大學。有來自聯邦政府、州政府及來自本土資源，予以負責教 STEM 學科老師支援。分別設立教育基金以鼓勵各州改善 STEM 教育，並加強基礎教育階段理工科教師的培訓，又推出各式各樣的社區或課外活動，以激發年青人對科學知識的興趣。在學校及社區推出各式各樣的活動及課外活動，以激發年輕人對 STEM 的興趣。美國聯邦政府和美國聯邦教育部，長久以來，提供撥款支持推廣 STEM 教育。2015 年時總統奧巴馬簽署了《STEM 教育法》，重申 STEM 教育的重要性， 2017 年特朗普就任後亦承諾採取措施促進 STEM 教育，特別是支援修讀 STEM 相關專學位的女性。

1

STEM 高中六大重要元素

根據美國芝加哥大學 STEM 教育的 Outlier Research & Evaluation (下稱 Outlier) 群組近期的一項研究顯示， 超過 20 間已融入 STEM 教育高中的負責人指出他們推行的 STEM 教育具備六項共通元素， 包括*解難為本的學習、嚴謹的學習、個人化學習、職業、技術和生活技能、學校社群和歸屬感以及社區對外連繫*。

Outlier 總監 Jeanne Century 博士認為在 STEM 課堂上，老師能夠根據學生的學習差異、生活經驗來設計課堂，因才施教，實在值得欣賞。而老師需要留意個別學生的情況，不時了解他們的進度，以期協助他們透過這項專題研習為本的學習掌握到 STEM 技能。老師需要為學生設下里程，讓他們可以成就目標，定時回顧及評估，根據學生的需要調整專題學習個案。不同學科的老師應該更多的溝通，以便老師相互協作識別及回應學生的學習需要。Century 認同這樣對老師來說實在是一項莫大的挑戰，特別是那些教大班的老師。

對外社區和教師資源

另一項促進 STEM 教育的重要元素，就是學校跟社區及商業組織建立緊密關係。 Century 指出，隨著 STEM 教育在美國的高中整合，校方鼓勵學生參與社區項目，如解決空氣污染和環境議題。此舉不僅讓學生應用所學知識，還可以讓他們知道自己可以為社區作出貢獻。Century 告訴我們，在美國許多商業組織也曾表示，他們需要更多在專上院校及大學接受過 STEM 培訓的學生加入他們的工作團隊。 一些公司已經開始與 STEM 高中進行協作，為將來的人才招聘作準備。

除了主要教育目標的六個重要元素外，為教師而設的專業發展資源對於老師，對於學校推廣 STEM 教育亦相當重要。 隨著科學技術的不斷發展，教師不容易掌握新的教育方法和教材，並把這它們帶到課堂。 因此，教師之間的溝通和相互支持非常重要。 在美國，除了為培訓師舉辦一些講習班和研討會外，還有一些網站為教師提供教學資源。 例如，BUCK 教育學院提供教師專題研習為本（PBL）和不同年級和領域的教學資源，包括如何設計 PBL，如何評估學生的進展，以及 PBL 學習框架（框架），以幫助教育工作者建立一個新的，高質量的 PBL 課程。

STEM + C 模式

另一項 Outlier 進行的研究，小學教師使用專題研習單元來教授 STEM，並把電腦科加入在內。

現時電腦科學在美國小學並不是一門常設學科，但已有網上平台為老師提供教學資源及教學課程， 鼓勵學生進行網上學習，如非牟利組織 Code.org，通過網上教學平台為全球不同年齡層的學生（包括小學及中學）提供學習機會。Code.org 已為超過 15,000 名教師提供培訓，網上平台亦吸引了不少渴望學習電腦編程的學生，當中以女性和少數族裔學生所佔的比例相當高。

上述的研究同時發現技術為基礎的科技（Skill-based Technology） 如 3D 打印機、AutoCAD、編程軟件等在學校已日漸普遍。這些科技不僅應用於課堂上，也出現在一些和 STEM 相關的課外活動中。Century 稱這些融合 STEM 教育的高中對收生門檻沒有特定要求，同學的背境和學習能力亦較為參差。學校幫助學生進入專上院校及職場作好準備。學習技術為基礎的科技對他們來說相當重要，有助他們更易覓得工作及適應工作環境。

為有特殊學習需要的學生而設的 STEM 教育

由於大部分 STEM 教育都涉及問題或專題研習為本的學習，鼓勵學生自主學習，同時亦要他們懂得如何彼此合作。不過，對於有特殊學習需要，如讀寫障礙、自閉症等的學童，該如何鼓勵他們融入 STEM 教育中呢？

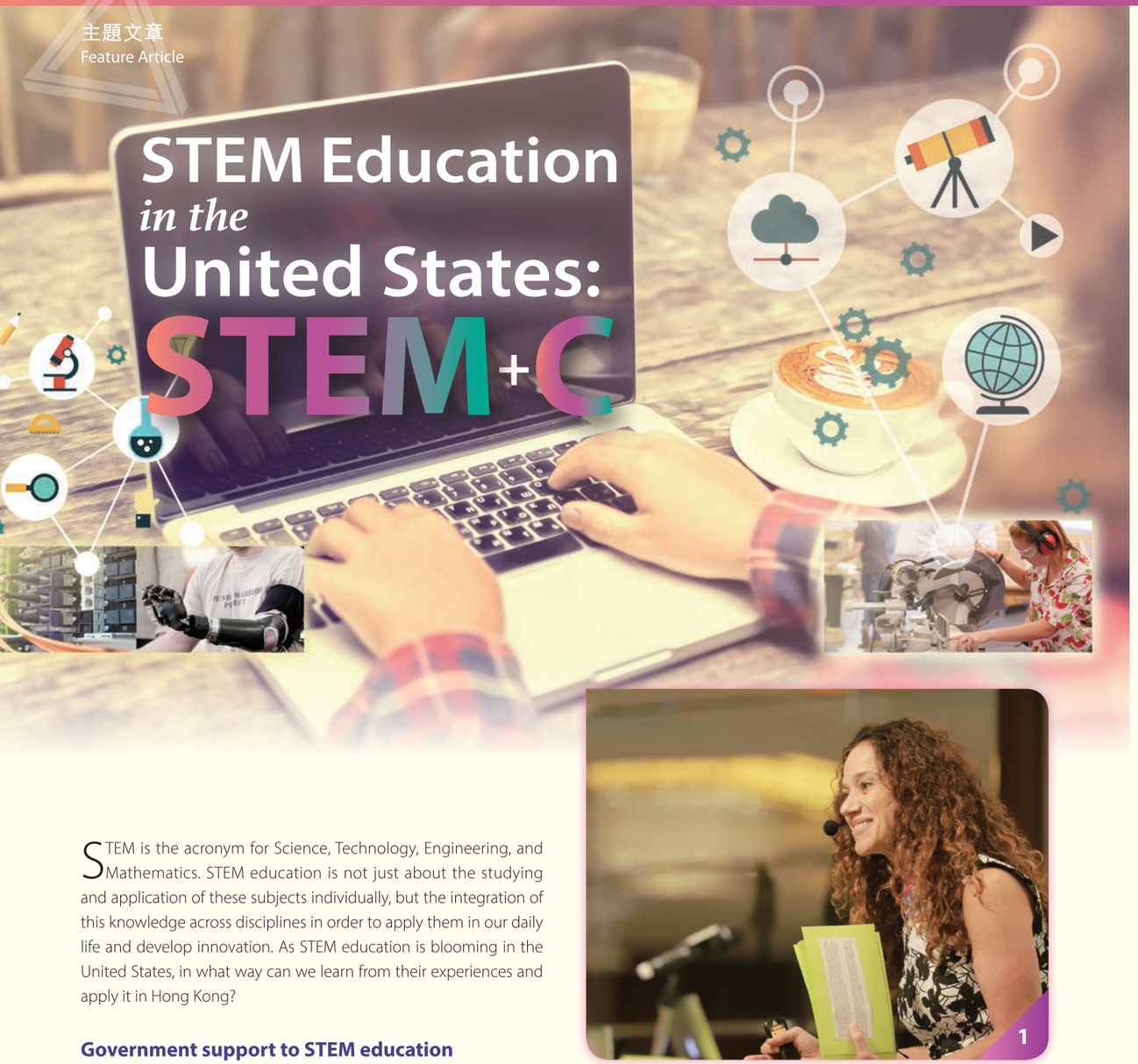
Century 指不同學生都應該有不同的學習方法，現時美國也有一些機構專為有特殊學習需要的學生提供特別科技課程，例如 Tech Kids Unlimited (TKU) 。TKU 是專為 7 至 20 歲有特殊學習需要的年青人提供技術為基礎教育的非牟利機構。

此外，Outlier 和芝加哥主要支援有特殊學習需要學生的私立中學 Wolcott 中學進行一項為期兩年的研究，探索怎樣令電腦科學更易於學習。他們發展了一門新的課程——（電腦科學原理，CSP），該課程不僅包括電腦編程，還包括所有與電腦有關的元素。研究主要為識別如何進行調較，好讓有特殊學習需要的學生學習電腦科學。

Century 指出 STEM 教育並沒有標準化模式，不同州郡都有自己導向，例如有的重點在培養合資格的 STEM 師資，有的目標在於激發對學生學習 STEM 的興趣，也有致力收窄 STEM 教育的學術差距。總括來說， 推行 STEM 教育必須靠老師互相交流經驗，而且要累積經驗，不斷檢討和調整，才能成功。

1 Jeanne Century 博士為芝加哥大學 STEM 教育中心研究及評估總監，亦是該大學的研究副教授。她一直致力於研究及評估如何為學校、老師和學生開發更全面的 STEM 教材、並為不同年齡學生的校內及校外課程進行評估。

STEM Education *in the* United States: STEM+C



STEM is the acronym for Science, Technology, Engineering, and Mathematics. STEM education is not just about the studying and application of these subjects individually, but the integration of this knowledge across disciplines in order to apply them in our daily life and develop innovation. As STEM education is blooming in the United States, in what way can we learn from their experiences and apply it in Hong Kong?

Government support to STEM education

To enhance its economic development, the United States has recently actively promoted STEM education, in the hope of using STEM to drive economic growth and strengthen its competitiveness on the global stage. The government supports the implementation of STEM education from primary to the high school level. Some support for teachers of STEM subjects comes from the Federal government, some come from state government, and some come from local sources. A variety of activities in school as well as extracurricular activities in the community have been launched to stimulate young people's interest in STEM. The US federal government and the US Federal Department of Education have, for a long time, provided grants to support the promotion of STEM education. This work was reaffirmed when President Obama signed the STEM Education Act in 2015. Trump also promised to take measures to promote STEM education after taking office in 2017, especially for women studying for STEM related degrees.

1

The six essential elements of STEM high schools

According to a recent study by the University of Chicago's Outlier Research & Evaluation (Outlier) group at UChicago STEM Education, a study of over 20 senior high STEM schools showed that they had six elements in common: *Problem-based Learning, Rigorous Learning, Personalisation of Learning, Career, Technology and Life Skills, School Community and Belonging, and External Community*.

Dr Jeanne Century, Director of Outlier, believes that in STEM classes, it is good practice for teachers to design their lessons to account for students' learning differences, and their life experiences. Teachers should pay attention to individual students and regularly check their progress in order to help them acquire STEM skills through project-based learning. Teachers should set milestones for students to achieve these goals, review and assess regularly, and adjust the project content according to students' needs. Teachers in different disciplines should also communicate more among themselves in order to identify the students' learning needs and collaborate to address them. Century agreed that this is a challenge for teachers, particularly in large classes.

External community and teachers' resource

Another essential element is to have the schools build close relationships with the community and business organisations. Century pointed out that, with the integration of STEM education in high schools in the United States, students are encouraged to participate in community projects such as solving air problems and environmental issues. This will not only allow students to apply what they have learned, but also let them know that they can contribute to the community. According to Century, many US business organisations have said they need more students trained in STEM in colleges and universities. Some companies have already started their collaboration with STEM high schools in preparation for their talent recruitment in the future.

In addition to the six essential elements for the main educational goals, professional development resources for the teachers are also important for the schools to promote STEM education. With the growing development of science and technology, it is not easy for teachers to master both new educational methods and teaching materials and bring them to their classrooms. Therefore, communication and mutual support among teachers is very important. In the United States, in addition to some workshops and seminars for trainers, there are also websites that provide teaching resources for teachers. For example, the BUCK Institute For Education website provides teacher's project-based learning (PBL) and teaching resources for different grades and fields, including how to design a PBL, how to assess student progress, and the PBL Learning Framework (Framework) to help educators build a new, high-quality PBL programme.

STEM+C Model

In another study conducted by Outlier, elementary school teachers used project based learning units to teach STEM with the addition of computer science.

At present, computer science is not a compulsory subject in the US primary schools. However, there are online platforms which provide teachers with teaching resources and courses and encourage students to study online. For example, the non-profit organisation Code.org provides an online computer programming course for students of all ages (including primary, and secondary schools). Code.org has provided training for more than 15,000 teachers, and the online platform has attracted a lot of students who are eager to learn computer programming. Among them there is a higher proportion of female and minority group students.

Research also found that skill-based technologies such as 3D printers, AutoCAD, and programming software have become more popular in schools. These technologies are not only used in the classroom, but also in some extracurricular activities related to STEM. Century said that, since there are no specific requirements for the admission to STEM high schools, the background and learning ability of the students are quite diverse. The schools help the students prepare for college or for the workforce. Learning skill-based technology is important to help them find jobs and adapt to the working environment.

STEM for special education needs

Because some STEM education involves problem-or project-based learning, students are encouraged to learn on their own and at the same time, how to cooperate with each other. However, how can students with special education needs, such as those with dyslexia and autism, be integrated into STEM education?

Century said that different students should have different learning modes. At present, there are also some institutions in the United States that provide special technology courses for students with special needs, such as Tech Kids Unlimited (TKU). TKU is a non-profit organisation which offers technology-based education to young people aged between 7 and 20 who have special learning needs.

In addition, Outlier and Wolcott School a private school in Chicago specialising in students with special learning needs, conducted a two-year study exploring ways to make computer science more accessible for youth with learning needs. They used a new course, namely, Computer Science Principles (CSP), which teaches computer programming and other computer-related elements. The study aims to identify ways computer science can then be adjusted and adapted so the students with learning needs can learn computer science.

Century concluded that STEM education does not have a standard model - different states and counties have their own approaches. For example, some of them focus on training qualified STEM teachers; some of them aim to stimulate students' interest in learning STEM; and some also strive to narrow the academic gap in STEM education. In sum, the implementation of STEM education requires enabling teachers to have and exchange learning experiences to make their STEM programmes better. Their constant efforts to do continuous review and adjustment is what makes STEM education a success.

1 Dr Jeanne Century is Director of Research and Evaluation at UChicago STEM Education and Associate Research Professor at the University. She has been working hard to conduct research and evaluation that can improve STEM education instructional materials for schools, teachers and students, as well as in-school and out-of-school programmes for students of different ages.

提升資優學生的二十一世紀技能

作者：雷切爾．索曼博士
以色列耶路撒冷 Henrietta Szold 研究所

教育工作者和僱主認定多種技能的需要，不斷探討促進的方法，讓資優學生為愈來愈電子化的世界作好準備。本文將就以下三個問題作出討論：

1. 為什麼需要培養二十一世紀技能？
2. 二十一世紀技能包括什麼元素？
3. 怎樣為資優學生培養二十一世紀技能？

這些問題將根據以色列資優學生培訓計劃的研究文獻和教育經驗進行討論。

一）培養二十一世紀技能的需要

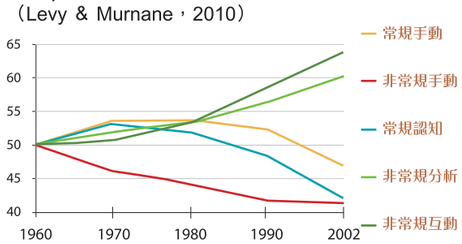
資訊革命為知識和生活帶來極速轉變。 因此，傳統技能，如閱讀、寫作和算術，不足以讓學生成為社會上具生產力的一員。 換句話說，他們要成為終身學習者，懂得把技能從一個場景轉移到另一個場景，以解決複雜的問題，並在多元團隊中施展渾身解數創新猶。

自 1960 年，經濟學家 Levy 和 Murnane（2010）開始研究美國勞動人口不同工種的要求。 這些工種包括：

- 按照「設若 - 然後 - 做」定律執行的常規手動工種，例如根據說明書上的指示裝嵌椅子。
- 非常規手動工種，需要肌肉控制和運用視覺技能，例如理髮。
- 常規認知工種，需要明確定義的規則，例如製作開銷報告。
- 非常規分析工種，需要專業知識才能，在沒有設定規則下解決問題。
- 需要複雜互動的非常規工種，以便達成共識及協作。

分析的結果在圖一顯示。

圖一）美國常規和非常規工種帶動經濟效益的量表（Levy & Murnane，2010）

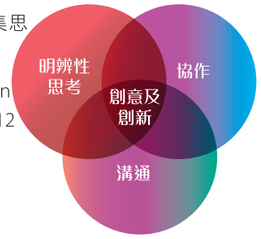


如上圖所示，對常規手動和需要認知能力之工種，以及非常規手動工種的需求減少。 反之，社會上愈來愈需要具備專家思維模式和懂得運用複雜溝通技能者，處理非常規工種者的需要與日俱增。從結果顯示，我們應該掌握的技能，不言而喻。

二）二十一世紀的必要技能

美國國家教育協會（(National Education Association, NEA）於 2010 年向教育工作者進行了有關二十一世紀關鍵技能的調查。教育工作者選了四個 C：明辨性思考能力（Critical Thinking）、溝通能力（Communication）、協作能力（Collaboration）和創造力（Creativity）。 因此，NEA 製作了一份教育工作者指引，詳細說明這些技能的元素，並提出促進這些技能的方法：

- 明辨性思考能力——利用推理、系統思考，在解決難題時作判斷和決策。 在 2010 年的一項調查中，75%的企業管理層表示，明辨性思考對員工發展至為重要。
- 溝通能力 ——以口頭、書面和非口頭方式表達思想，聆聽他人，有效地就不同目的進行溝通。 正如 Levy 和 Murnane（2010）指出，對於需要複雜溝通技巧的職位之需求正在增加。
- 協作能力——在多元的團隊中有效地運作，具責任感，能協調他人實現共同目標。
- 創造力 —— 突破傳統思維的框框，集思廣益，發展出原創性意念。



美國國家研究委員會（American National Research Council, NRC）於 2012 年提出了一些附加的技能：

生活和職業技能：

- 主動性 ——自我啟動和自我指導。
- 盡責——堅持不懈，自律和透過自我調節完成任務。

科技技能：

- 電子媒體素養 —— 能有效地運用不同類型的電子媒體，如「數碼繪圖」和「YouTube」。
- 電子信息素養 —— 識別可靠的互聯網資源，並懂得運用明辨性思維閱讀網站資訊。

美國國家研究委員會 NRC（2012）和經濟合作與發展組織（The Organisation for Economic Co-operation and Development, OECD）（Chernyshenko，Kankaraš，和 Drasgow，2018）分析了二十一世紀技能與教育，工作和健康結果關聯的研究，得出以下結果：

- 明辨性思考技能與教育、工作和健康呈正相關結果。
- 責任心與教育和工作呈正相關結果。
- 反社會行為與這些結果呈負相關關係。

三）推動二十一世紀技能的成功方案

與推動二十一世紀技能相關的成功研究及經驗為本的實踐案例包括：

將二十一世紀技能融入課程和教學

NEA（2010）建議將二十一世紀技能納入一般教學中。 相關的學習單元包括：

通過科學專題研習，來推動明辨性思維、溝通和科技技能、自發性及責任心：學生選擇一種他們感興趣的科學原理，或他們在日常生活中遇到的科學理念。 他們可以透過視聽方式，來解釋其運作方法，或建構一個真實或虛擬的模型，向不同的受眾講解和示範。

通過建造房屋的數學小組專題研習來發展二十一世紀技能：小組其中一名學生充當客戶，道出他對設計的要求，指定房間所處的位置，還有房間、窗戶和家具尺寸。 小組內向學生會分配與其興趣和強項有關係的角色，例如進行建築和設計研究，設計合乎比例的模型及繪製平面圖，利用電腦程式呈現建議的設計。 學生交替參與個人和小組任務，這有助避免社交壓力，扼殺他們的創造力。 小組準備比例圖，或實際或虛擬的房屋模型，透過模型詳述這些設計如何滿足客戶的需要。

推動深層次學習

美國國家研究委員會 (NRC)（2012）將更深層次的學習定義為「一個人將某一個環境中學到的知識和技能轉移到另一個新環境的過程。 許多時候，涉及學習跟其他人的互動。（第 3 頁）」促進深層次學習的研究為本的教學包括：

- 容讓多元方法表達概念和任務，例如圖表的運用。
- 運用方程式和模擬運作過程。
- 鼓勵他們闡述和提出問題向他人解釋文本或提出由文本衍生的問題。
- 提供具有挑戰性的任務，同時提供指導和回饋，讓他們從錯誤和成功中汲取教訓，吸收經驗。
- 提供知名人士如何應對各種挑戰的案例作為參考。
- 為學生提供與生活和興趣有聯連的題目，藉以提高學生的學習動機。
- 持續監控進度，提供回饋讓學生調整學習策略。

推動成長導向

史丹福心理學家 Carol Dweck（2006）發現，人們的信念可能會引領他們的學習和生活達至成功。 因此，具有成長型思維的人相信透過與他人互動和接受挑戰，個人的能力和智力得以建立，並且在學習、工作和社交生活中取得更大成就。反之，具有固定型思維的人視能力為「靜態」，相信投放努力表示缺乏能力。結果，他們抱殘守缺，在學習和生活方面也不怎成功。 Dweck（2006）建議，通過鼓勵人們投放精力，迎接挑戰，從錯誤中汲取教訓，尋求回饋來發展成長型思維。

善用回饋

Zorman（2016）將循環成長導向回饋模型，作為學習的一部分。 學生、教師和家長合作執行以下任務：

- 學生設定他們的認知和社交情感目標。
- 學生收集數據並評估他們設定的目標之進度，從而注意到自己的強項和將面對的挑戰。
- 學生在學生 - 家長 - 教師會議上進行自我評估，著眼於為實現目標所付出的努力，及從錯誤中汲取的教訓。
- 教師和家長通過三方討論向學生作出回饋。
- 創建新目標並討論支持學生實現這些目標的方法。

從楷模身上獲得啟發

學生或許會從他們敬佩的人物之生平故事得到啟發，採納他們的態度及發展所需技能，好像如何應對挑戰和怎樣從錯誤中站起來。 著名作家 J.K. 羅琳可以作為在逆境中堅持不懈的典範。 1995 年，羅琳是一名靠綜援過活的失婚婦人。 她在不同的咖啡館寫下人生的第一部小說《哈利波特和魔法石》。

羅琳的小說曾被十二家出版商拒諸於門外。 最終，一家小型出版社給她出版，並予羅琳 1,500 英鎊作為稿酬，該出版社勸她找一份薪水更高的工作。怎料這部小說一鳴驚人，成為曉喻國際的作品。 由它引申出一系列共七部的小說，翻譯成為 65 種語言和數部電影，總計數十億美元的收入。 羅琳成為英國最富有的女士之一。 她稱，「生活中沒可能無任何失敗，除非你謹慎得像沒有活過一樣，在這種情況下，你一開始就註定會失敗」。

實施社區責任計劃

以色列資優和傑出學生部（Zorman，Nadler 和 Zeltser，出版）制定了一個推動資優學生的二十一世紀技能的框架。 該框架推動資優學生尋找本區內、地區性或全國性的需要。他們選擇特定的問題，作出行動，參與創意解難的過程，包括定義困難、透過「腦激盪」思考方式、尋找最合適的方案及機構來解決難題。

其中一個當地例子就是在雅法設計一個溜冰場，將之納入該市文娛項目的一。另一個例子是國家級項目，制定交警培訓計劃，以改善警方與公眾的互動關係，提升警方正面形象。 該計劃已納入國家警察培訓方案。

總結

如本文所示，有無數的方法在資優學生中推廣二十一世紀技能。 教育工作者需要探討這些方法的可行性，選擇最合乎學生和社區需要的方法，加以實踐。

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1 圖片取自 https://www.freepik.com/

Promoting 21st Century Skills

Among Gifted Students

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Educators and employers talk incessantly about the need to promote various skills in order to prepare gifted students for an increasingly digital world. In this article, three questions will be addressed:

1. Why is there a need to cultivate 21st century skills?
2. What are these skills comprised of?
3. How can these skills be cultivated among gifted students?

These questions will be discussed in light of research literature and educational experience gained in Israeli programmes for gifted students.

1. The need to cultivate 21st century skills

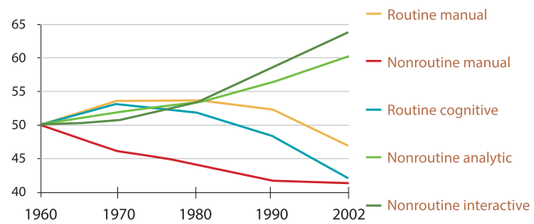
The information revolution led to extremely rapid changes in our knowledge and life. Consequently, traditional skills, such as reading, writing and arithmetic, are not enough for students to become productive members of society. Rather, they need to become lifelong learners, transferring skills from one arena to another to solve complex problems and to work in diverse teams to develop innovations.

The economists Levy and Murnane (2010) studied the demand for different tasks in the American workforce from 1960 onwards. These tasks include:

- Routine manual physical tasks, following If-Then-Do rules, such as assembling chairs according to instruction manuals.
- Non-routine manual tasks, requiring muscle control and optical skills, such as cutting hair.
- Routine cognitive tasks requiring well-defined rules, such as producing expense reports.
- Non-routine analytic tasks requiring expert knowledge to solve problems without set rules.
- Non-routine tasks requiring complex interactive communication to cooperate and produce consensus.

The results of their analysis are presented in figure 1.

Figure 1. Economy-wide measures of routine and not-routine task input in the USA (Levy & Murnane, 2010)



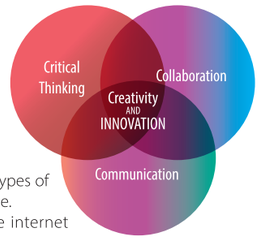
As the figure shows, demand for routine manual and cognitive tasks and non-routine manual tasks decreased. Conversely, demand for non-routine tasks requiring expert thinking and complex interactive communication increased over the years. Clearly, these results indicate the skills that people should acquire.

2. Essential 21st Century Skills

The American National Education Association (NEA) performed in 2010 a survey of educators regarding crucial 21st century skills. The educators chose the four C's: critical thinking, communication, collaboration and creativity. Consequently, the NEA produced an educators' guide, detailing the components of these skills and suggesting ways of promoting them:

- **Critical Thinking** – utilising reasoning, systems thinking, making judgments and decisions in problem solving. 75% of business executives polled in a 2010 survey stated that critical thinking is crucial to employee development.
- **Communication** - expressing ideas in oral, written and non-verbal means, listening to others, and communicating effectively for different intents. As Levy and Murnane (2010) indicated, demand for positions requiring complex communication skills are rising.
- **Collaboration** - functioning well in diverse teams, taking responsibility and making compromises to reach shared goals.
- **Creativity** - thinking outside the box, brainstorming ideas and developing original ideas.

Additional skills were suggested by the American National Research Council (NRC) in 2012:



Life and career skills:

- Initiative - self-starting and self-direction.
- Conscientiousness - persistence, grit, self-discipline and self-regulation in completing tasks.

Technological skills:

- Digital media literacy - using effectively different types of digital media, such as digital mapping and YouTube.
- Digital information literacy - identifying reliable internet sources and reading websites critically.

The NRC (2012) and The Organisation for Economic Co-operation and Development (OECD) (Chernyshenko, Kankaraš, & Drasgow, 2018) analysed research linking 21st century skills to educational, work and health outcomes and found the following results:

- Critical thinking skills have positive correlations with educational, work and health outcomes.
- Conscientiousness has positive correlations with educational and work outcomes.
- Anti-social behaviour has negative correlations with these outcomes.

3. Successful practices promoting 21st century skills

Examples of successful research and experience-based practices promoting 21st century skills include:

Integrating 21st Century Skills into Curriculum and Instruction

The NEA (2010) recommended incorporating 21st century skills into general instruction. Examples of such study units include:

Promoting critical thinking, communication and technological skills, initiative and conscientiousness via a science project: Students choose a scientific principle which interests them, or which they encounter in daily life. They explain audio-visually how it works or construct a real or virtual model to demonstrate it to various audiences.

Developing all of the 21st century skills via a mathematics team project of constructing a house: One of the students acts as a client, specifying the location and size of the rooms, windows, and furniture. Students are assigned specific roles related to their interests and strengths, such as conducting architectural and design research, creating scale models and graphics, utilising computer programmes, and presenting the proposed design. Students alternate between individual and group tasks to avoid social pressure, which may stifle creativity. The team prepares a scale drawing, or an actual or virtual model of the house, detailing how it meets client needs.

Enhancing deeper learning

The National Research Council, NRC (2012) defines deeper learning as 'a process whereby a person transfers the knowledge and skills learned in a certain context to another new context. In many cases it involves learning in interaction with other people.' (p. 3). Research-based instruction promoting deeper learning includes:

- Multiple representations of concepts and tasks, such as diagrammes, equations, and simulations.
- Encouraging elaboration, and questioning, by asking students to explain texts to others or ask questions arising from the texts.
- Presenting challenging tasks, while providing guidance and feedback to learn from mistakes and success.
- Providing case studies of how famous persons dealt with various challenges.
- Connecting topics to students' lives and interests, enhancing student motivation.
- Monitoring progress continuously, providing feedback to adjust learning strategies.

Promoting Growth Orientation

Stanford psychologist Carol Dweck (2006) found that beliefs guiding people's behaviour may lead to subsequent success in their studies and lives. Thus, people with a growth mindset believe that abilities and intelligence develop from interacting with others and with challenges, and achieve greater success in their studies, work and social life. Conversely, people with a fixed mindset view ability as static, believing that investing effort shows lack of ability. Consequently, they stick to what they know, and become less successful in their studies and life. Dweck (2006) suggests that growth mindsets may be developed by encouraging people to invest effort, welcome challenges, learn from mistakes, and seek feedback.

Utilising Feedback

Zorman (2016) designed a cyclical growth-oriented feedback model as an integral part of learning. Students, teachers and parents cooperate to perform the following tasks:

- Students devise their cognitive and social-emotional goals.
- Students gather data and assess their progress in reaching their goals, noting their strengths and challenges.
- Students present their self-assessment in a student-parent-teacher conference, emphasising their efforts to reach goals and learn from mistakes.
- Teachers and parents provide feedback to students in a three-way discussion.
- New goals are created. Ways of supporting students to reach these goals are discussed.

Learning from Models of Inspiration

Students may be inspired by life stories of people whom they admire to adopt attitudes and develop skills, such as coping with challenges and making mistakes. The famous author J.K. Rowling may serve as an example of persistence against all odds. In 1995, Rowling was an unemployed divorcee on welfare. She wrote her first novel *'Harry Potter and the Philosopher's Stone'* in various cafes.

Rowling's book was rejected by twelve publishers. Finally, a small publishing company published it, paying Rowling 1,500 pounds, and telling her to find a better paying job. The book became a world-wide phenomenon. It generated a series of seven books, translated into 65 languages and several movies, grossing billions of dollars. Rowling became one of England's richest women. She claimed, 'it is impossible to live without failing at something, unless you live so cautiously that you might as well not have lived at all, in which case you have failed by default'.

1

Implementing Community Responsibility Programmes

Israel's Division for Gifted and Outstanding students (Zorman, Nadler, & Zeltser, in press) developed a framework promoting 21st century skills among gifted students. This framework engages gifted students to map needs in their local, regional or national community. They choose a specific need and engage in a creative problem-solving process involving problem definition, brain-storming solutions, finding best-fit solutions and agencies to implement them.

An example of a local programme was designing a skate park in Haifa, becoming part of the city's recreation programme. Another example of a national programme was creating a traffic police training programme to improve police interaction with the public, fostering a more positive police image. This programme was integrated into the national police training programme.

Conclusion

As shown in this article, there are myriad ways to promote 21st century skills among gifted students. Educators need to examine these practices, choose the ones which best fit their student and community needs, and adopt them, accordingly.

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1 Photo from https://www.freepik.com/

資優學生的成長：走出寬廣人生

許多時候，資優學生的故事就定鏡在獲獎的一刻。然而，人生是漫長的，往後的路仍然需要付出努力和汗水，一步一足印的走出來。

22 歲的譚博文為數學和科學資優學生，在初中時獲學校提名成為香港資優教育學苑學員，他分別於 2013 及 2014 年代表香港參加「國際物理奧林匹克」，兩次奪得銀牌。在 2014 年的中六文憑試，博文以 3 科 5** 的優異成績，獲香港科技大學取錄，修讀國際科研課程。

回顧個人成長，博文說參加國際比賽，讓他在物理知識、創意及解難能力方面得到提升，同時亦讓他認識到本港及海外志同道合的朋友，建立起特別的人際網絡。至於中學文憑試，對他來說亦有助全方位提升其能力，包括：中文、英文和通識。其中語文能力，對於撰寫漂亮簡潔的科學報告，相當管用，絕對不容忽視！

及至進入大學，潛心研究「凝聚態物理」，博文形容整個過程，就是：從迷惘到堅持，到感到很大壓力、很沮喪，然後豁然開朗。如是者，一個又一的循環。「研究在於探索新知，沒有既定的答案，也沒有什麼指南可供參考。所以經常長時間沒有進展，停滯不前，那時難免感到沮喪。讓我支持下去的，只有個人的熱情和導師的鼓勵。」博文娓娓道來。

在大學的數年內，博文跟一位教授進行高溫超導體的實驗研究，及另一位教授研究關於拓撲超導體理論。早前，他赴麻省理工學院（MIT）進行交流，跟一位教授及其博士後研究生一起研究量子霍爾系統裡的鐵電效應和對稱性破缺。研究過程之中，博文掌握了許多前沿物理知識，在在滿足他對知識的追求。

目前，博文已獲美國賓夕法尼亞大學取錄，成為博士生。他現正展開「分數量子霍爾效應」的研究，期望在「多體物理」範疇更上一層樓。博文十分享受美國的學習生活，特別是遇到了很多對物理非常有熱情的同學和老師，啟發他對物理學其它範疇的興趣，特別是「軟物質」。其中一位教授從「軟凝聚態」的角度出發介紹統計力學，對他來說是一種嶄新的角度，大大地激發了他的思維。

文章部分內容轉載自《星島日報》

The Growth of a Gifted Student: Living Out *a Broader Perspective*

Most of the time, the story of a gifted student was frozen at the award-winning moment. However, life is such a long journey, and the road to success still requires sweat and toil, bit by bit and step by step, until a road map is seen.

Tam Pok Man, a 22-year-old gifted student of mathematics and science, was nominated by his school to become a student member of the Hong Kong Academy for Gifted Education in junior high school. In the International Physics Olympiad in 2013 and 2014, he represented Hong Kong to participate in those international competitions and was awarded silver medals twice. In 2014, when Pok Man was a S6 student and having the Hong Kong Diploma of Secondary Education Examination (HKDSE), with an excellent score of 3 subjects in 5**, Pok Man was admitted to International Research Enrichment (IRE) Programme offered by Hong Kong University of Science and Technology.

Looking back on his personal growth, Pok Man said that the international competitions were of great help to him, enabling him to upgrade his physics knowledge, and enhance his creativity and problem-solving skills. At the same time, through these competitions he also made friends with Hong Kong and overseas like-minded peers and established a special network. Regarding the public examination, it has served to enhance all aspects of his ability, including ability in Chinese, English and liberal studies. Particularly, the language skills developed have helped him in writing precise and concise scientific reports. Pok Man stressed that such kind of skills should not be played down.

When Pok Man entered the university, he devoted himself to the study of 'condensed matter physics'. Pok Man described the whole process as, from confusion to persistence, and from feeling frustrated to be enlightened. That is one cycle after another. 'The spirit of research is to explore on new knowledge, with no established answers nor a handbook for success. Most often there is no progress for a long time and it is easy to feel depressed. The only way out is to be supported by personal enthusiasm and the encouragement from mentors. ' Pok Man explained.

In the years of his undergraduate, Pok Man conducted experimental research on high-temperature superconductors and theoretical studies on topological superconductors. More recently, he went to Massachusetts Institute of Technology (MIT) to work with a professor and his postdoctoral student on the ferroelectricity and symmetry breaking in quantum Hall systems. During the research process, Pok Man has mastered more frontier physics and satisfied his zest on the pursuit of knowledge.

Currently, Pok Man has been admitted to the University of Pennsylvania and become a doctoral student. He is now conducting a study on the fractional quantum Hall effect and expects to gain a deeper understanding of 'many-body physics'. Pok Man enjoys the study life in the United States, especially by meeting many students and teachers who are very enthusiastic about physics. They have inspired his interest in other areas of physics, especially in the 'soft matter'. One professor has introduced statistical mechanics from this perspective, which is to him a total mind-blowing experience.

資優的少年系列
Gifted Youth Series

資優學生的成長「渴水」的海綿

24 歲的盧安迪 (Andy) 已是美國史丹福大學的經濟學博士生，他於 17 歲獲國際期刊刊登其論文，18 歲獲尤德爵士紀念基金獎學金入讀美國普林斯頓大學，翌年成為專欄作家。繼去年 (2017 年) 出版《自由的國度 - 普林斯頓尖子看美國》，分享他在美國留學的見聞。今年 (2018 年)，他又再出版《自由的國度 2 STEM 教育與美國》，探索 STEM 教育，如何令新一代的生活變得更精彩！

擁有如此令人豔羨成就的他，究竟是怎樣成長的？原來 Andy 幼承庭訓，自小得到雙親的悉心培育，早於高小階段已嶄露頭角，在數學、語文、視藝方面均有傑出表現。及至中二他經學校提名進入教育局的特別資優學生培育支援計劃 (即香港資優教育學苑的前身)，開啟了人生的另一扇窗，接受特別培訓代表香港參加國際數理比賽，在多屆國際數學和物理奧林匹克比賽勇奪殊榮。

Andy 曾說過，資優學生不過是一塊缺少水分的海綿，可以無止境的吸收知識。究竟 Andy 是怎樣吸收知識的呢？他回應道，「是不是無止境的吸收知識，我還不知道，但或許我吸收知識的速度比較快，能在學習過程中獲得最大益處。例如我中四那年參加國際物理奧林匹克的港隊選拔，其他同學都是較我年長兩歲的中六學生，基礎亦較我好得多，但我加倍努力，終能後來居上，成為史上首個不是中六的港隊成員。還有，唸大一時，修讀哲學課程，同學大多是三、四年級主修哲學的學生，但我竟然在全班幾十人中考獲第二名。由此可見，我的資優特質並不是純粹表現在特定的學術範疇之上，而是表現在理解能力、求知慾和學習態度上，所以能在學習不同科目時取得較快和較大的進步。」

談到成長路上最大的感悟，Andy 回應道，「人生只能活一次，所以要做自己真正喜歡的事。相信在大部分情況下，也是最大機會取得成功。」像他駕著夢想飛翔，在普林斯頓大學，除了主修數學外，也修讀了歷史、哲學、經濟學、電腦、藝術等課程。他發現「博弈論」這個數學工具，在哲學、經濟學、電腦等課程中都有出現，令他更深體會數學在自然科學和社會科學中的廣泛應用。故此，在研究院階段選擇了既要用到大量數學工具，又需要人文視野和襟懷的社會科學——經濟學。而他的夢想就是在行為經濟學中進行探索。

文章部分內容轉載自《星島日報》

The Growth of a Gifted Student: A Desperately Thirsty *Sponge*

Andy LOO, a 24-year-old Ph.D. student who is studying at Stanford University in the United States, published in an international journal at the age of 17, and was awarded a Sir Edward Youde Memorial Scholarship for Overseas Studies at 18 to attend Princeton University in the US. He became a columnist the following year. In 2017, he published his first book, *Free Country: A Princeton Student's Perspectives on America*, in which he shares his observations from studying in the US. This year (2018), he published a sequel, *Free Country 2: STEM Education and the US*, which explores how STEM education enriches the lives of the younger generation.

How did he grow up with such enviable achievements? The story goes like this: Andy was well brought up as a little boy. Since childhood, he has been well nurtured by his parents. He made a mark at an early stage with performance in mathematics, language and visual arts. And when he was in S2, he was nominated by his secondary school for the 'Support Measures for the Exceptionally Gifted Students' (the predecessor of the Hong Kong Academy for Gifted Education), which opened a new window for his life, and he received special training to represent Hong Kong in various International mathematics and science competitions. He has won many awards at the International Mathematical and Physics Olympiads.

Andy once said that a gifted student is just like a sponge that is eager to draw water to quench its thirst; in this sense, gifted students are able to absorb knowledge like bottomless holes. 'I am not sure whether my absorption of knowledge is endless, but I may absorb knowledge faster than my peers do and thereby make the most out of every learning opportunity. For example, when I was in S4, I participated in the selection of the Hong Kong team for the International Physics Olympiad. All other participants were in S6 and two years older than me. They also had a more solid foundation on the subject. Yet I redoubled my efforts and eventually became the first Hong Kong team member who was not in S6. Also, when I was a freshman in university, I took a philosophy course. Most of my classmates were third- and fourth-year philosophy majors, but I managed to rank second among the dozens of students in the class. So I think my gift is not in a particular discipline, but in my ability to comprehend ideas, my curiosity and my learning attitude, which enable me to learn different subjects more efficiently and thoroughly,' Andy responded.

Looking back on his journey of growth, Andy said, 'You can only live once, so do what you really love. I believe that in most cases, this also maximises your chances of success.' He has lived by his words: at Princeton, in addition to majoring in mathematics, he also studied history, philosophy, economics, computer science, art and other fields. He found that the mathematical tool of 'game theory' emerged in the courses in philosophy, economics, and computer science, which deepened his understanding of the broad applications of mathematics in the natural sciences and social sciences. Therefore, in graduate school, he chose to pursue economics, a subject that blends quantitative methods with humanistic visions. One of his dreams is to make a contribution to behavioural economics.

資優學生的成長：功夫小子的閃亮人生

在一次晚宴上，資優學生大哥哥葉智程 (Anson) 以功夫助慶，教人眼前一亮。原來「資優」是個多面體，「資優」不純粹在學術範疇有出色表現，部分資優學生在武術、音樂、藝術、領導才能等方面綻放異彩，他們的成就同樣令人欣喜。Anson 便是一個好例子，他勇敢、自信，願意服務社群和接受挑戰，結合才藝和創意，透過個人及義務工作回饋社會。

28 歲的 Anson 渾身是勁，完成工商管理碩士後，在因緣際會下，投身武術研習機構負責向公眾推廣武術。在工餘時間，Anson 參加多項義務工作，其中包括 2010 年應香港資優教育學苑的邀請加入義工行列，獲選為學苑校友會外務副會長。2012 年，投身輔警，於四年內兩度獲選周年訓練營最佳輔警。今年 (2018 年) 更獲香港輔助警察隊總監嘉許獎。他又出任元朗少年警訊義工，負責教授步操、跳舞和功夫班，還有他又為警隊設計及教授「滅罪正義拳」宣揚滅罪訊息。2017 年 4 月獲公民教育委員會委任為公民大使，獲授予唯一金章服務證書，及獲邀拍攝宣傳短片推廣公民意識。而他所創辦的公司，成為本港首家武術團體獲得香港傑出企業公民獎 - (義工隊組別)。

回顧個人成長路，Anson 從小就跟著媽媽做義工，漸漸體會能夠以自己的能力，幫助及啟發他人，有種說不出的成功感。在義工領域獲獎，強化他助人為樂的信念。自小跟當功夫教練的爸爸習武，透過艱苦鍛鍊，培養出堅毅不屈的個性；在拳術比賽獲獎，肯定了他在武術方面的天分。

2004 至 2005 年間，Anson 獲中學老師推薦參加「特別資優學生培育支援計劃」(香港資優教育學苑的前身)，結果他以突出的領導才能表現，獲取錄成為學員，其後參加不同大學舉辦的領導才能培訓課程，學習各種與人溝通的技巧。這些技巧對於他日後訓練青少年，甚有幫助。

憑著勇於突破自我的精神， Anson 於 2015 年應卡塔爾政府邀請出席首屆多哈中國文化節，負責中國功夫演出。2016 年，獲國際信用卡 Master Card 選為代表「最具內在美」，赴法國出席康城影展活動，並為他們拍攝宣傳片。說了那麼多，這位精力過人的資優師兄說，他希望在不同領域作出嘗試，為人生創造更多色彩。他最大的心願是希望幫助他人發揮潛能，希望更多人認識到「資優」可以來自不同範疇。

文章部分內容轉載自《星島日報》

資優的少年系列
Gifted Youth Series

The Growth of a Gifted Student:

The Brilliant Life of a Kung Fu Kid

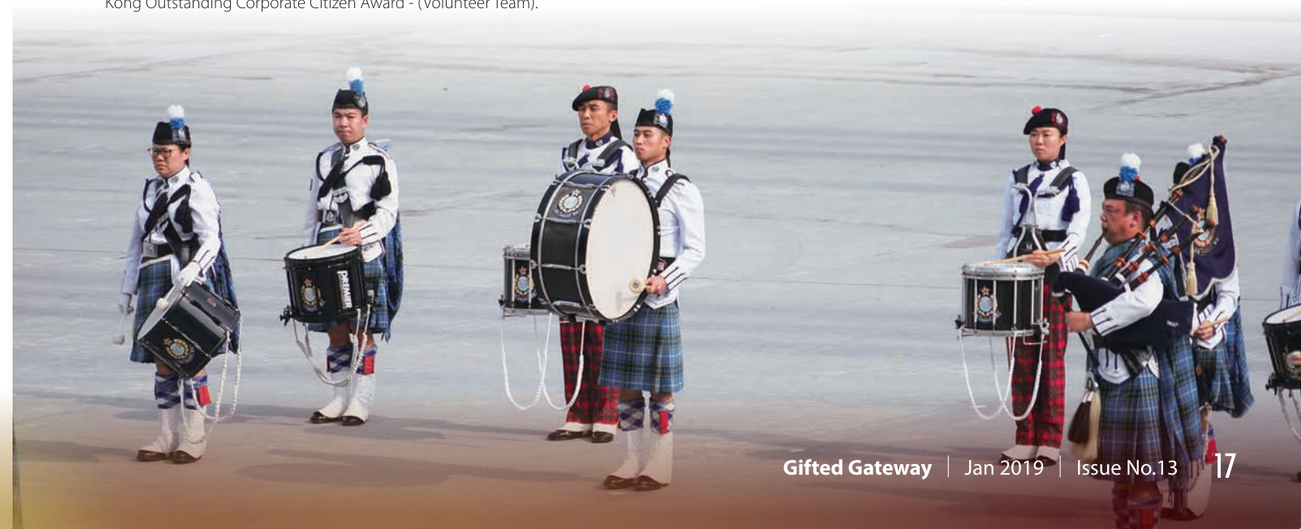
Gifted big brother Anson Yip once caught everybody's attention with his Kung Fu performance at HKAGE's Gifted Education Dinner, demonstrating the multifaceted characteristic of giftedness, which is not confined to excellent academic performances, but may also be expressed in domains like martial arts, music, art, leadership, etc. Gifted students being talented in these domains are no less enviable than their academically gifted counterparts. Anson is a very good example of this. He is courageous, confident, willing to serve the community and ready to face up to challenges. Through his career and voluntary work, he makes contributions to the society by combining his talent and creativity.

The 28-year-old Anson powers up with unlimited energy. After completing his MBA study, he joined a martial arts institution and is now responsible for promoting martial arts to the public. Anson has been actively involved in a number of voluntary works. He was elected as Vice President of the HKAGE Alumni Association in 2010 and joined the Hong Kong Auxiliary Police Force in 2012. He was elected twice as the Best Police Constable (Auxiliary) in the Annual Training Camp within four years. This year (2018), Anson was awarded the Commanding Officer's Commendation. He also volunteered to instruct members of the Yuen Long Junior Police Call on Foot Drill, Dancing and Kung Fu, in addition to developing and teaching the 'Crime Fighting and Justice Boxing' for the Police Force to promote anti-crime messages. Anson was appointed as a Civic Ambassador by the Committee on the Promotion of Civic Education (CPCE) in April 2017 and was awarded the only one Gold Medal Service Certificate. He was invited to be present in a TV announcement for promoting civic awareness. The company he founded became the first martial arts group in Hong Kong to win the Hong Kong Outstanding Corporate Citizen Award - (Volunteer Team).

Looking back on his personal growth, Anson has been volunteering with his mother since he was a child. He gradually realised that he can help and inspire others with his own ability. There is a sense of success that is indescribable. Winning awards in volunteering, had strengthened his belief in helping others. Since childhood, he learned martial arts from his father, and has cultivated a firm and unyielding personality through hard work. He won the prize in the boxing competition and affirmed his talent in martial arts.

From 2004 to 2005, Anson was recommended by his secondary school teacher to participate in the 'Support Measures for the Exceptionally Gifted Students Scheme' (the predecessor of the Hong Kong Academy for Gifted Education). Due to his outstanding leadership skills, he was admitted as a student member of HKAGE and subsequently participated in leadership training courses offered by various universities, learning a variety of skills to communicate with others. These skills are very helpful for him to train young people in later years.

Equipped with the spirit of bravery and the willingness to have breakthrough all the time, Anson was invited by the Qatar government to attend the first Doha Chinese Culture Festival in 2015, responsible for Chinese Kung Fu performances. In 2016, the international credit card Master Card, selected him as the representative of 'the most intrinsic beauty' to attend the Cannes Film Festival in France and filmed a promotional video for them. Having said that, this energetic and talented big brother said that he hopes to try in different fields and create more colours for his life. His greatest wish is to help others to realise their potential. He hopes that more people will realise that 'giftedness' can come from various fields.



資優學生的成長：平凡中的不平凡

有些資優學生成就卓越，從遠處就看到耀眼的光芒。但有些資優學生較為內斂，遠看跟常人無異，然而相處日久，就會發現他們擁有非凡的敏覺力，能夠從較高的層次看事物；其內在驅策力，促使他們不為什麼，全力以赴追求卓越，他們優秀卻與世無爭，悠然自得，平凡中顯出不平凡。

香港資優教育學苑的校友駱美君 (Tracy) 便是其中的佼佼者， Tracy 積極參與學苑的各種活動，有時候默默地守在一隅作支援，有時候站在台上分享所思所想，更試過撰文分享成長歷程。她同時參與學苑的學術課程發展委員會，及高中同學會等義務工作。這位資優大姐姐經已大學畢業，在職場上打拼，經歷工作上甘苦起跌，體會到職場對個人的要求，不像在學階段時那麼清晰明確，職場上要周身刀，方可應付突如其來的挑戰；但回到學苑，就可以放下心理包袱付出真心，與志同道合者協作，每當看到師弟妹的成長，就有一份說不出的喜悅。

回顧成長路，溫婉的 Tracy 道出「好發問」的資優特質，她很早就發現普通的答案不能滿足她的渴求，「我常想推到更遠的位置，想知道事情的來龍去脈，包括目的、周邊事物。在掌握這些資訊後，方可確定事情的真確性，以便日後跟進，或為未來作『鋪墊』，他日或可更上一層樓。」因著「自動波」的求學精神，中學時 Tracy 連續多年在整體學科取得最高分數，同學開始冠以「一姐」的雅號。雖然就讀於學術排名普通的中學，Tracy 從來不用為升學擔心，最終獲中大取錄，取得通識教育學士學位，現時更於浸會大學修讀公司管治與合規理學碩士課程。

談到人生的路向，Tracy 謂，「自己想做什麼，固然需要自行尋索，但尚未找到方向，或條件未成熟之時，亦要懂得珍惜所有，尋找令自己享受的位置。有些事，一開始會覺得好悶、好辛苦，但總要相信好的東西在後頭，努力過後，或會得到賞識、得享成果，說不定導引至意想不到的出路。」目前，Tracy 在一家專業機構工作，朝專業之路邁進。

文章部分內容轉載自《星島日報》

資優的少年系列
Gifted Youth Series

The Growth of a Gifted Student:

The Extraordinary out of the Ordinary

Some gifted people have extraordinary achievements and their dazzling brilliance can be seen from afar. Other gifted people are more introverted and are seemingly no different from ordinary people. Their extraordinary sensitivity, which enables them to see things from a higher level, as well as their internal drive to excel, which urges them to strive for excellence with no specific reasons, is noticeable only after one has got along with them for some time. Pursuing excellence without competing with others, they are always carefree and contented with themselves. They are the extraordinary out of the ordinary.

Tracy Lok, an alumnus of the Hong Kong Academy for Gifted Education (HKAGE), is a typical example. Tracy participates actively in various activities of the Academy, sometimes quietly offering support behind the scene, and sometimes standing on stage or contributing articles to share her thoughts and experiences on her growth as a gifted student. She is currently a member of the Academic Programme Development Committee and the Senior Student Club of HKAGE. Having graduated from the university and got started on her career path, Tracy has gone through some ups and downs and realised that, unlike in the school setting, requirements in the workplace are not always explicitly stated. One has to get armed to the teeth all the time in order to overcome any unforeseeable challenges. However, when she returns to HKAGE, she can put aside all the psychological burdens and work with like-minded peers open-heartedly. It gives her indescribable joy whenever she witnesses the growth her younger peers in HKAGE.

Looking back on her own path of growth, the meek and gentle lady said one of her gifted characteristics is being inquisitive. She found at an early age that ordinary answers could not satisfy her curiosity. 'I always want to go a step further and find out more about the issue, which might include the related purposes and backgrounds. Getting hold of such information helps me verify the authenticity of the issue for future follow up or pave the way for future study at a more advanced level.' With her self-motivation, Tracy has achieved the highest overall performance score in the secondary school's final examination for many years and was addressed by her fellow students as 'Miss Number One' since then. Although the academic ranking of her secondary school was not extremely outstanding, Tracy has never worried about her future study. After finishing her secondary school study, she was admitted to the Chinese University of Hong Kong and obtained a bachelor's degree in education (liberal studies). She is currently pursuing a master's degree in corporate governance and compliance at the Hong Kong Baptist University.

When it comes to the journey of life, Tracy said, 'One's own destination is to be set by himself or herself. However, if the direction is not yet clear, or things are not yet ready, one should still cherish what he or she has already got and learn how to enjoy the situation. Sometimes it might be quite boring or tiring to start up something. But we need to have faith that hard work will be followed by good things, and efforts paid will be appreciated and rewarded eventually. A new way out might even be opened up unexpectedly.' Currently, Tracy is working in a professional organisation, marching forward on the pathway to the profession.

資優學生的成長：究竟星有幾高？

究竟典型的資優學生是何模樣？答案是他們在某個範疇鋒芒畢露，對於感興趣的事物，鍥而不捨的進行探索，他們精力過人，勇於嘗試，但不一定是十項全能。

二十六歲的曾嘉鏵屬於數學、科學範疇的資優學生，他喜歡接觸大自然，內心深處彷彿內置了導航系統，引領他探索宇宙奧秘，走上科研之路，目前他是荷蘭國家亞原子物理研究所 Dutch National Institute for Subatomic Physics (Nikhef) 的博士生和研究員，致力研究「重力波」(Gravitational Wave)。

自小學起嘉鏵已展現數學天分，及至高中階段對物理、化學、數學情有獨鍾，成績名列前茅，中五至中七連續三年考獲第一名。中六那年，原先提名他成為香港資優教育學苑學員的老師忘記了提名，次年 2011 年才想起再度提名他。是次嘉鏵通過測試，並獲選代表學苑參加台灣吳建雄科學營，與朱經武教授、吳俊輝教授等科學家近距離接觸，又於南投的溪頭用望遠鏡觀星，遙看無涯宇宙，樂透了。

同年嘉鏵高級程度會考語文成績雖然稍遜，但憑著卓越的物理、化學、數學的 A 級成績，獲香港中文大學物理系取錄，後來更獲助學金完成碩士課程。因緣際會之下，嘉鏵被派赴歐洲核子研究組織 (CERN) 進行研究，正當他在叩學術之門，考慮該赴美國還是歐洲進修時，得到中大的一位教授的幫助和鼓勵，獲 Nikhef 取錄，成為了該研究所的博士生。

嘉鏵表示研究「重力波」的最大的樂趣是可以涉足未有人探索過的領域，例如：蟲洞 (Wormhole) 、奇特星 (Exotic star)，透過另一個渠道探索宇宙（相對於光），甚至觀測更遠古的宇宙。但嘉鏵亦經歷多重寂寞，離鄉別井的滋味、沒有前人的經驗可供參考，只有幾位專家可以透過電郵去發問。研究的事物，有時連教授或上司也不懂，或者說連自己也不懂！研究的艱辛過程，讓嘉鏵明白自己的渺小和有限！

因著在 Nikhef 的特殊身份，嘉鏵於當中進行連線，讓參加「2018 物理學習之旅」的中大本科生及學苑學員，有機會參觀 Nikhef，與研究員交流。這位大哥哥鼓勵師弟妹多些見識、多做一些未做過的東西，慢慢吸收知識，持開放態度，尋找人生方向。

資優的少年系列
Gifted Youth Series

The Growth of a Gifted Student: How High are the *Stars*?

How do typical gifted students look like? The answers might be they perform exceedingly well in a certain aspect. Or they unceasingly explore things they are interested in. Or they have plenty of energy and are bold to attempt new things. But surely not that they are good at each and everything.

Twenty-six-year-old Tsang Ka Wa is gifted in mathematics and science. He likes to get in touch with nature. A seemingly built-in navigation system deep in his heart has led him to explore the wonders of the universe and embark on a journey of scientific research. He is currently a PhD student and researcher working on gravitational waves in the Dutch National Institute for Subatomic Physics (Nikhef).

Ka Wa's talent in mathematics has been recognised since he was a primary student. He then developed a special passion for physics and chemistry, besides mathematics. Ka Wa was among the best students in his senior secondary years and has been ranked first for three consecutive years when studying in S5 to S7. When Ka Wa was in S6, a teacher intended to nominate him to join the Hong Kong Academy for Gifted Education (HKAGE) but forgot to proceed with the nomination procedures. Ka Wa was nominated to HKAGE one year later, i.e. in 2011, by the same teacher who finally remembered to proceed with the nomination. Ka Wa passed the screening test and was selected as a representative of HKAGE to join the Wu Chien Shiung Science Camp in Taiwan. During the camp, Ka Wa was given the opportunity to interact closely with scientists like Prof. Paul Ching Wu Chu and Prof. Proty Jiun Huei Wu, and to observe the stars in the boundless universe with a telescope in Xitou, Nantou. It gave Ka Wa great pleasure to join the camp.

In the same year, despite his less-satisfying achievement in language subjects, Ka Wa was admitted to the Department of Physics of the Chinese University of Hong Kong (CUHK) with his outstanding Class A results in physics, chemistry and mathematics in the Hong Kong Advanced Level Examination. Ka Wa was later awarded an assistantship to support his study in a master's degree programme. As opportunity knocked, Ka Wa was sent to the European Organisation for Nuclear Research (CERN) for research. While he was considering whether to further his study in the United States or in Europe, Ka Wa was admitted to Nikhef as a doctoral student with the

support and encouragement from a professor at CUHK.

Ka Wa tells us that the exploration of the unexplored areas of the universe, such as wormholes and exotic stars, and the observation of the ancient universe, from an alternative aspect other than light, gives him the greatest pleasure in studying gravitational waves. However, Ka Wa also experiences much loneliness during the study. He has to leave his home country and work in a foreign place. There are no predecessors working on the subject and hence no references are available. He can only approach a few experts for consultation by email. Sometimes the subject being studied are totally unknown to the professors in the Institute, or to Ka Wa's supervisors, or even to Ka Wa himself! The hardship Ka Wa experiences during the study reminds him of his insignificance and limitations.

With his special role in the Institute, Ka Wa has helped with the arrangement for CHUK and HKAGE students to visit Nikhef and its researchers under the 'Physics Study Tour 2018'. As an alumnus of both CUHK and HKAGE, Ka Wa encourages the young visitors to broaden up their horizons, to participate in things that are fresh to them, and to keep an open mind while building up their knowledge in order to work out their own direction of life.

學苑十周年慶典
HKAGE's 10th Anniversary Ceremony

自從 2008 年成立至今，香港資優教育學苑已經步入第十個年頭，為了慶祝這個特別日子，我們已於 2018 年 7 月份舉辦了資優教育研討會及開放日，讓公眾有機會認識資優教育理念。現在讓我們重溫精彩片段！

Founded in 2008, the Hong Kong Academy for Gifted Education has entered its tenth year. To celebrate this very special occasion, a gifted education symposium and an open day were held in July 2018 to provide the public with a chance to understand the underlining philosophy of gifted education. Let us relive some of the most memorable episodes now!

資優教育研討會及晚宴 *Gifted Education Symposium and Dinner*

美國芝加哥大學 STEM 教育中心 Outlier 研究及評估總監 Jeanne Century 博士。
Dr Jeanne Century from UChicago STEM Education, University of Chicago, USA.

資優教育研討會啟動禮。
Kick-off ceremony of the Gifted Education Symposium.

學員 Ava 和 Douglas 在晚宴上表演。
Our student members Ava and Douglas performed at the Gifted Education Dinner.

丹麥奧胡斯大學物理與天文學系 Jacob Friis Sherson (MSO) 特任教授。
Prof. (MSO) Jacob Friis Sherson, from Department of Physics and Astronomy, Aarhus University, Denmark.

學苑十周年慶祝活動之資優晚宴。
The Gifted Education Dinner held in celebration of HKAGE's 10th Anniversary.

開放日 *Open Day*

著名香港單車運動員黃蘊瑤女士分享她的奮鬥歷程，勉勵資優學員勇於接受挑戰，發揮潛能。
The renowned Hong Kong cyclist Ms Wong Wan Yiu, Jamie, shared her road to success and encouraged gifted students embracing challenges to unleash their full potential.

眾嘉賓為開放日進行啟動禮。
The Open Day kick-off ceremony was launched by the officiating guests

家長與孩子對趣味性的互動活動甚感興趣。
Parents and their children enjoyed the fun-filled and interactive activities.

林永和醫生為資優教育座談會的其中一位分享嘉賓。
Dr Lam Wing Wo shared at one of the gifted education seminars.

「像科學家一樣思考系列」遊戲，深受孩子歡迎。
The 'Think Like a Scientist' games were very popular among children.

城市大學情意教育支援先導計劃

CityU Affective Education Support Pilot Programmes

情意教育支援先導計劃是由香港城市大學（城大）與香港資優教育學苑（學苑）協作的計劃。 學苑致力於培養資優學生，不僅在學術方面予以造就，更希望通過琳琳總總的優質課程和學習機會，培養學員的情意發展。 情意教育部率先為在城大課程註冊的學苑學員（其中一些有特殊教育需要（SEN））提供情意教育支援。 這個協作計劃（Talents, Aspiration & Excellence Programme ,TAE）是一個培養資優學生的人才的計劃。 學苑的情意教育團隊把符合資優學生情意需要的元素滲透入城大的學術課程內。

在城大舉辦的 TAE 簡介會中，學苑向家長、學生、教師和教職員介紹了計劃背後的理念。城大前協理學務副校長（大學策略）暨城大社會及行為科學系心理學教授何敏賢介紹此課程的特點。

香港資優教育學苑院長吳大琪教授介紹學苑的工作，學苑情意教育部課程經理冼可琳女士向城大教職員及其他持份者分享情意教育的重要性以及情意教育元素滲透入城大課程的構思。

指定的情意教育支援計劃包括許多情意教育元素在內，這些元素滲透入一系列的學術課程。在 2017-18 學術課程內，在上課期間或課後提供度身訂造的情意教育環節，每次專注於一個獨特的主題，每節約為 15 至 30 分鐘。情意教育支援的課程包括：1）3D 模型展示數學之美；2）定格動畫入門；3）英語裡面有什麼？ 4）日營：太陽能； 5）數學與遊戲； 6）投資交易工作坊。

情意教育支援計劃採用的干預策略與資優學生的知識和人格屬性相關，滿足他們的情意教育需要。 情意教育團隊開發了各種與不同課程內容匹配的情意教育教案。 內容包括自我理解、自我欣賞、溝通，團隊合作、個人價值、創造力和道德教育。 學習活動的模式包括：簡報演示文稿、互動活動、電影欣賞、案例研究、小組討論、辯論和課堂中的自我反思作業。 我們收到城大教職員，學生及其家長正面的回饋。

為了提高對情意教育的認識，冼可琳女士及吳啟賢先生已於去年十二月在「2018 年學習與教學博覽會」 - SEN 劇院分享是次先導計劃（2017/18）提供情意教育支援的經驗，題目是「為資優學生提供情意教育支援的跨機構合作經驗分享」。 在此分享會中，介紹了新的跨院校模式 TAE 計劃，並分享從這個先導計劃中獲得的經驗，以便不同持份者能夠理解情意教育的重要性。 情意教育的實踐和優秀作品可以傳播給更廣泛的受眾，並會進一步探索跟教育工作者，專業人士和行業部門的潛在合作機會。

The pilot scheme is a collaborative initiative between City University of Hong Kong (CityU) and the Hong Kong Academy for Gifted Education (HKAGE). HKAGE is committed to nurturing gifted students not only in the academic aspect, but also in their affective development through a wide range of quality programmes and learning opportunities. The Affective Education Division (AED) takes a leading role in providing affective education (AE) support to HKAGE student members (some of them with special educational needs (SEN)) enrolled in CityU courses. This collaborative Talents, Aspiration & Excellence Programme (TAE) is a programme for nurturing talents of gifted students. The AE Team of HKAGE aims to infuse AE components meeting the affective needs of gifted students into the academic curriculum of the CityU courses.

A programme briefing has been held at CityU for parents, students, and instructors and faculty staff to brief them on the rationale and philosophy behind the programme. Prof. Samuel Ho, former Associate Provost (Institutional Initiatives), Office of the Provost, Professor of Psychology, Department of Social and Behavioural Sciences of CityU, gave the programme introduction. Prof. TK Ng, Executive Director of HKAGE, introduced the work of the Academy and Ms Tiffany Sin, Programme Manager of AED, HKAGE, shared with faculty staff of CityU and other stakeholders the importance of AE and the idea of infusing AE components into the CityU courses.

The designated AE support programmes included a number of blended AE components which were infused into a range of academic programmes. An individual AE session, focusing on a distinguished topic and lasting for about 15-30 minutes, was delivered before, during or after the academic courses. The AE-supported courses in 2017-18 included: 1) 3D Model for Revealing the Beauty of Mathematics; 2) Introduction to Stop Motion Animation; 3) What's inside English? 4) Day Camp: Solar Power; 5) Mathematics and Games; and 6) Trading Workshop.

The intervention strategies adopted in the AE-supported programmes appropriately related to the intellectual and personality attributes of gifted students and could meet their AE needs. Various AE packages matching with different course content were developed by the AE Team. These included self-understanding, self-appreciation, communication, teamwork & collaboration, personal value, creativity and moral education. The mode of delivery and learning activities included content-specific PowerPoint presentations, interactive activities, film appreciation, case studies, group discussion, debate and self-reflective assignments embedded in class. Positive feedbacks were received from CityU faculty staff, students and their parents.

To raise the awareness of affective education, experiences of providing the AE support in this pilot scheme (2017/18) were also shared by Ms Tiffany SIN and Mr Nelson NG from AED of HKAGE in the Learning and Teaching Expo 2018 - SEN Theatre in December last year, under the topic of 'Experience Sharing on Cross-Institutional Collaboration for the Provision of Affective Education Support for Gifted Students'. In this sharing session, the TAE programme with the new model of cross-institutional collaboration were introduced and the experiences gained from the pilot scheme were shared so that different stakeholders could understand the importance of AE. The practices and good works of AE were disseminated to the wider audience and potential collaboration opportunities with educators, professionals and industry sectors will be further explored.

賽馬會「知情達意育優才」計劃

Jockey Club 'Gifted In Bloom – Harmony in Heart & Mind' Programme

由香港賽馬會慈善信託基金贊助，香港資優教育學苑推出為期三年的標誌性項目 - 賽馬會「知情達意育優才」計劃 - 為資優學生、家長和老師提供各種必要的支援 。 在這個項目中，我們跟學術課程發展部合作，提供更佳的情意教育計劃和服務。在「生命教育」的主題下，把新的情意教育元素，滲透人文學科、數學和科學領域的學術課程之中。

新的學術課程將致力於為資優學生創造嶄新的學習體驗，使他們學會欣賞，感受，探索，理解和反思不同形式和層面的生活。 我們希望學生能夠在壓得喘不過氣的社會中，找到安心立命的位置，在信息的汪洋中確定個人目標，運用同理心推己及人，並為人類社會帶來積極的影響。

香港資優教育學苑將會推出三個情意教育元素滲透的學術課程，分別在香港文學、英國文學及應用哲學方面。通過了解作家如何感受，感知和描繪世界和人類，學生將能夠閱讀一系列嚴肅的文學作品，捕捉文學的本質，並且運用個人化的創意語言傳達人文科學訊息。通過應用哲學的學習，學生有機會分析不同政治制度的優劣，評估從古代中國、希臘到現代共和國，人類社會的核心價值觀如何改變，並思考在人類歷史上曾否出現過理想的人類社會。

我們仍在計劃今年春季和夏季推出的項目 - 香港歷史系列 - 從新石器時代到現代，透過閱讀不同年代的地圖，到社區進行實地考察和透過口述歷史進行研究。我們預計會記錄大量故事，以便更好地了解渺小的個人如何在戰時、殖民時代和後殖民時代的巨變中，生存、受苦，在苦難中熬過。生命科學系列 - 涵蓋遺傳編碼和生物化學工程，我們希望讓學生在生物倫理、生命的起源、人類的進化、人類未來等方面的爭議旅程中，思考生命是否具有其內在的價值和命運，或一切也只是一個連貫的巧合。在跨學科學習領域，我們正在製作一個以聲音認識香港的課程，通過聲音散步、聲音分析，進行聲音歷奇，重新發現我們如何聽到聲音和信息的弦外之音，並通過其聲音的特徵和不同的聲音重新詮釋香港。我們希望你會參與這些即將推出的新項目。

Sponsored by the Hong Kong Jockey Club Charities Trust, the Hong Kong Academy for Gifted Education has launched its signature 3-year project – 'Gifted in Bloom – Harmony in Heart & Mind' – to provide all kinds of necessary supports to gifted students, parents and teachers. In this project, we aimed to provide better affective education programmes and services, and with the collaboration with the Academic Programme Development Division, new affective elements infused academic programme in humanities, mathematics and sciences learning areas will be designed under the theme of 'life education'.

The new academic programmes will place a stronger touch on creating new learning experiences in its content for gifted students, to enable students to appreciate, to feel, to explore, to understand, and reflect different forms and dimensions of life. We hope that students can locate themselves in the overwhelming society, identify their goals in the ocean of information, to care about other people's needs just as to themselves with the empathetical understanding, and to bring positive influences to human society.

There will be 3 affective elements infused academic programmes in Hong Kong Literature, English Literature and Applied Philosophy. By understanding how writers feel, sense and depict the world and human beings, students will be able to read series of serious literature, to capture the essence of literature, and write creatively to show us how far students can reach to humanity in their own words. By learning applied philosophy, students will get a chance to analysis the pros and cons of different political systems, to evaluate how the core values of human society have changed through ancient China, Greek to modern republican countries, and think about if the ultimate form of ideal human society even exists.

We're still planning for upcoming programmes in spring and summer, the Hong Kong history series – to discover 'Hong Kong' in the Neolithic period to modern days, from reading maps in different ages to carry out field trips and oral history research with communities, it's expected that load of stories will be recorded to allow us to gain a better understanding to how tiny individual faced, suffered and survived the big changes in war, colonial and post-colonial era. Life science series – covering genetic coding and biochemical engineering, we hope to bring students to a controversial journey in bioethics, the origins of life, the evolution, the future of humanity, and to think about if life has its intrinsic value and destiny or it's just a coherent of coincident. In multi-disciplinary learning area, we're working on a 'soundscaping' Hong Kong programme, through the sound walk, sound analysis, we will try to conduct a sound adventure, to re-discover how we hear and listen to sounds and messages behind, and to re-interpret Hong Kong through its feature and mixture of sounds. We hope that you will be with us in all those upcoming new programmes.

科研遊學 2018
Physics Study Tour 2018

作者：中文大學物理系朱明中教授、
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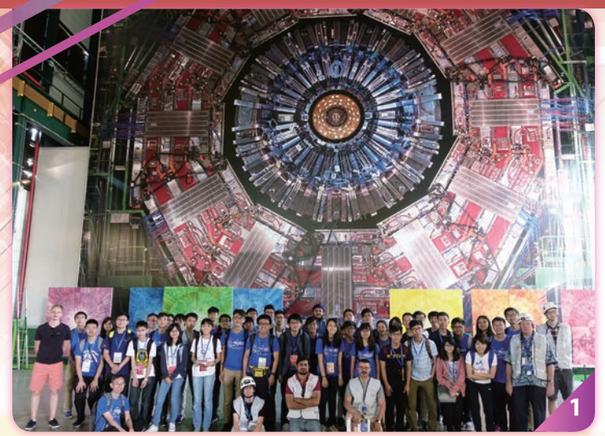


科學研究與傳統課堂學習大為不同，為了讓同學感受科研的趣味，我們特別設計了是次的科研遊學體驗之旅，讓同學親臨國際前沿科研設施，與科研人員直接交流，體驗國際合作科研項目的氛圍。我們把同學分成小組，要求每組的四位中大物理系本科生和兩位香港資優教育學苑中學學員合作進行兩個工作課題 - 宇宙射線測量實驗及科研項目的報導，務求令他們動腦動手又動口，相互協作，自主研習參觀項目的背景資料。

我們於七月十九日凌晨出發，首站荷蘭。七月二十日到達荷蘭亞原子物理研究所 (Nikhef)。在校友曾嘉鏵的悉心安排下，參觀了 Virgo 重力波及 KM3Net 高能中微子兩個大型研究計劃的實驗室，獲益良多。當晚我們和在荷蘭深造及工作的校友共膳。在異國聚首，不亦樂乎。七月二十一日，我們到達意大利比薩，翌日參觀了伽里略博物館，二十三日早上探訪了 Virgo 重力波天文台。由於在 Nikhef 已學到一些重力波探測器的避震方法，此行更易吸收其他部件的介紹。

我們於七月二十三日晚上到達瑞士日內瓦，到歐洲核子物理組織體驗了兩天半，除了參觀大型強子撞擊器 (Large Hadron Collider, LHC) 的兩個最大實驗：超環面儀器 (A Toroidal LHC Apparatus, ATLAS) 及緊湊緲子線圈 (Compact Muon Solenoid, CMS) 外，亦有不少時間與當地科研人員交流。我們還去了伯恩 (Bern) 探訪了愛因斯坦故居及博物館。

這次科研遊學，雖然行程緊密，每天都很累，卻帶回很多美好的回憶，以及寶貴的友誼。

Scientific research is very different from traditional classroom activities. In order to expose students to the excitement and stimulation of scientific research, we designed a study tour as an experiential learning opportunity for participants. We visited leading international research facilities and interacted directly with frontline researchers, so that students could experience the atmosphere of international research collaborations. Participants were also asked to conduct group projects, a cosmic ray measurement experiment and a science reporting project. Each group comprised 4 undergraduate students from CUHK Physics Department and 2 secondary school students from HKAGE. They had to work together to design and carry out their experiments, and to learn actively about the scientific facilities we visited.

We flew to Amsterdam on July 19 and visited the Netherlands Institute of Atomic Physics (Nikhef) on July 20. Mr Tsang Ka Wa, an alumnus of both CUHK Physics and HKAGE, arranged for us to visit the research laboratories of the Virgo gravitational-wave detector and the KM3NeT project for detecting high-energy neutrinos from outer space. The visit was an eye-opening experience for us. That night we had dinner with alumni who studied and worked in the Netherlands. It was a great pleasure to get together with them and learn about their research and lives in the Netherlands. On July 21, we arrived in Pisa, Italy, and visited Museo Galileo the next day. On July 23, we visited the Virgo Gravitational-wave Observatory near Pisa. Since we had already learned about some of the suspension methods for gravitational-wave detectors at Nikhef, it was easier for us to follow the working principles of other components.

We arrived in Geneva, Switzerland in the evening of July 23, and we spent two and a half days at the European Nuclear Physics Organisation. Apart from visiting the two largest experiments at the Large Hadron Collider (LHC), A Toroidal LHC Apparatus (ATLAS) and Compact Muon Solenoid (CMS), we still had plenty of time to interact with researchers working there, including members of the Hong Kong ATLAS team. We also went to Bern to visit the Einstein Museum.

Despite the tight schedule of this tour, we all enjoyed the rich and fruitful experience. We will treasure the beautiful memories and precious friendship.

1. 大型強子撞擊器 (LHC) 的緊湊緲子線圈 (CMS) 實驗。
   The Compact Muon Solenoid (CMS) experiment of the Large Hadron Collider (LHC).
2. Nikhef 內 Virgo 重力波探測器的部件示範。
   Demonstration of the components of the Virgo gravitational-wave detector at Nikhef.

趣味盎然的人文科學項目
Humanities Programmes

作者：Till Kraemer
Title: 互文教社董事總經理

Author: Till Kraemer
Title: General Manager and Director, Inter Cultural Education

從2018年初春至夏末，香港資優教育學苑（學苑）學員有機會參加人文科學和領導才能課題的跨學科學習課程。 此系列的學習共有四個課程及四場專題講座，內容涵蓋與二十一世紀全球化政策以至社會企業家精神等課題，包括世界歷史、社會與科技的互動關係，個人與國民身份、全球化下的倫理與道德哲學。這顯然是一個相當宏大的教育目標，但隨著一直以來各自獨立的學科出現重疊的部分越來越多，今天年輕一代需要處理全球化與道德矛盾的議題。因此領導才能的培訓是不可能從社會科學或科技的學習經歷中分割出來的。

在首個課程裡，學生探索「大歷史」，了解人類社會及科技演進的關係，釐清電腦革命，特別是人工智能和機器學習方面的現在與未來的發展。 在第二個課程，學員在心理學和博弈論的相關基礎下，深入了解組織和分裂人類社會的元素，民族和公民身份的形成，政治和國際關係的出現。 最後，學生進行調查並報告有關全球化的觀點，評論世界是否「平坦」（Thomas Friedman）或是否會出現「文明衝突」（Samuel Huntington）。

在第三個課程中，學生需要深入研究道德西方哲學，特別是二十世紀的思想家的學說。 在無數的辯論中，他們討論道德的基礎，社群主義與世界主義及後現代主義等學說。 在最後的第四個課程中，一個長達 36 小時的智力馬拉松引導學生通過探討國際政策，全球健康狀況和各類統計資料，非政府組織和私營企業的世界，裝備有關企業和商業技能及社會創新設計思維的基本知識。三個不同的學生團隊提出了別出心裁的構思，例如通過流動電話應用程式追蹤貨品的到期日以減少浪費食物的情況。 我們很榮幸有機會邀請到聯合國開發計劃署的客座評委（United Nations Development Programme, UNDP）參與評估學生的構思，並啟發參與課程的學員以更全面的角度去進行思考。

這四門課程將大約 100 頁的工作紙和補充參考資料，彙編成一系列小冊子以配合課程。透過輕鬆的指導模式，互文教社（Inter Cultural Education, ICE）的培訓師及來自不同國家和地區的客席導師，協力拓闊學生的國際視野和讓他們接觸世界事物。 此外，四個主題講座（每個可接待 100 名學苑學員）亦產生輔助作用，讓學員能接觸如非洲地區內的地域差異課題，美國的宗教和政治議題，及世界各地的教育和多元文化等議題，使整個學習經歷更豐富。

我們衷心希望能夠在人文科學下提升全球教育的領導力，使今天的資優學生能夠為瞬息萬變的世界作好準備。

From early spring to late summer 2018, HKAGE students had the opportunity to be engaged in cross-disciplinary learning on humanities and leadership topics. A series of four courses and four thematic talks covered areas of world history, the interaction between society and technology over time, identities and nationalities, ethics and moral philosophy in a globalised world, all the way to global policies and social entrepreneurship for the 21st century. This is clearly an ambitious educational goal, but those traditionally separate academic disciplines overlap increasingly, and today's young generation will need to deal with an intersection of global issues and moral dilemmas. Leadership cannot be separate any longer from social science or technology.

In the first course, students explored Big History, human societies as well as technology over time, to make sense of the present and future development of the Computer Revolution, especially Artificial Intelligence and Machine Learning. The second course gave insights into the organisation and fracturing of human societies, the formation of national and civic identities, the emergence of politics and international relations, both with the help of psychology and game theory. In the end, students investigated and presented viewpoints about globalisation and whether the world is 'flat' (Thomas Friedman) or whether there will be a 'clash of civilisations' (Samuel Huntington).

During the third course, students had to dive deeply into moral Western philosophy, especially of 20th century thinkers. In countless debates, they fought over ideas on moral grounding, communitarianism and cosmopolitanism as well as postmodernism. The fourth and final course, a 36-hour intellectual marathon, guided students through the world of international policy, global health and statistics, NGOs and private enterprises, to eventually be equipped with basic entrepreneurial and business skills and design thinking for social innovation. Three different student teams came up with ingenious ideas, such as a mobile app to reduce food waste by tracking expiry dates of grocery purchases – and we were lucky and honoured to have had the opportunity to invite a guest judge from the United Nations Development Programme (UNDP) to evaluate student ideas and inspire the course participants to think globally.

The four courses were supplemented by around 100 pages of worksheets and reference material, compiled into a series of booklets to accompany the courses. A casual instruction style by trainers from ICE (Inter Cultural Education) and guests from various countries and continents helped to give global exposure and international perspectives to students. Moreover, the four thematic talks (each with a capacity of 100 HKAGE students) complemented the learning, touching important but somewhat niche topics such as regional differences in Africa, religion and politics in the US, education from around the world and multicultural backpacking.

We sincerely hope that we can continue to advance global education with leadership in the humanities, so that gifted students of today can prepare for the rapidly changing world of tomorrow.

大歷史：現代的源起故事

我們是誰？ 我們來自何方？ 為什麼我們會在這裡？ 在整個人類歷史中，人類試圖通過不同的鏡頭去探索及回應這些重大問題。 有人認為我們是被具有神聖目的的高等生物創造，有人認為生命是一個持續的進化過程，透過有力的科學實驗和原理已驗證了這一點。 不同類型的源起故事塑造我們對世界的認知，詮釋不一樣的過去、現在和未來。

過去二百年，普羅大眾經已廣泛接受科學。而科學正正是推動我們進入二十一世紀，創造出超乎想像的奇蹟。 但科學這部驅策複雜社會的機器，也有可能毀掉我們的社會。 人為氣候變化正在迅速改變著我們生活的星球。

現代的源起故事

幸好還有希望解開謎團。 我們積累了應對未來挑戰的知識。 通過許多不同學科的知識，我們可以創造文明，在下一個世紀及以後蓬勃發展起來的文明。

大歷史或可為我們存在的困境提供答案。 通過提供一個現代的源起故事，可以讓我們整合校正來自不同知識庫的資料，讓我們向更高的目標邁進。 從這個意義上來說，大歷史是一個框架，用以凝聚結合科學、經濟和政治知識，讓所有人可以朝著共同目標努力。

「大歷史透過物理學、天文學和生物學，還有社會科學包括經濟、歷史和政治，向大家闡述宇宙從大爆炸到現今復雜社會的故事，」大歷史項目創始人 David Christian 教授說。「大歷史為我們生活的世界提供了更深層次的背景。」

這種導向對於學術界愈來愈迫切，亦愈來愈割裂。 舉例來說，科學家和歷史學家在完全不同的範例上運作，他們在觀點和方法論上的分歧，造成學科之間的斷裂。「要知道，這是關乎彼此尊重和學術領域之間相互學習的學問。」他說。

由 Bill Gates 資助的「大歷史」項目，旨在培養各年齡層的學生跨學科追尋知識的精神。 通過從各個學術領域攝取知識，建構宏觀的世界視野，凝聚屬於我們的故事。 麥覺理大學的大歷史研究所已於 2018 年 11 月發布一個大歷史在線教學大綱，涵蓋這個故事（人類歷史的故事）。

「『大歷史』項目把不同的學術科目聯繫起來，為現代源起故事提綱挈領。」俄羅斯和蘇聯歷史學家 David Christian 教授說，「現代源起故事可以透過數學和科學知識來解釋我們生活的世界，成為社會和經濟發展的理論基礎。」

David Christian 教授認為，我們目前的教育體系鼓勵學生成為某個領域的專家，管他屬於科學、社會科學、藝術還是人文科學。 但他反駁，就是因為這樣，學生失去從眾多學科吸收知識，成為博大思想家的動力，而「大歷史」旨在超越知識專門化，促進跨學科學習導向。

「學科就像一個容器， 盛載著優秀的研究，然而不同學科之間也存在許多頂級問題，值得思考、探索。」他說。

在香港，青年被鼓勵成為特定領域的優秀學生：數學、科學、英語、漢語，經濟學等等。學生成功與否，透過標準化的測試來評核技能和知識，結果一目了然。但是，人們較少將心力投放在教學生如何把從一個領域吸取到的知識轉化到另一門學問之上，跳出框框，思考更高層次的事物。

從山頂鳥瞰世界

「許多學生也安於在自己的學科，但也有許多學生需要透過更大的框架去理解事物。 而這些學生往往不能適應現代教育體系。」David Christian 教授解釋道，「我們在『大歷史』教學中觀察到，在更廣闊的框架下，較多學生的潛質展現出來，表現出他們資優的一面。」

大歷史對我們如何教育香港未來的一代有著重大的影響。 我們的教育體系旨在讓新一代從以前的知識中學習，以創造更美好的未來。 除了確保學生成為專家之外，大歷史還試圖幫助這些專家，於更廣泛的知識庫攝取養分。 通過創意的搭配練習，大歷史旨在了解如何把不同形式的知識融合的脈絡。

「從山頂的角度鳥瞰所有現代知識，雖然難免會錯失許多細節，但卻可以綜覽全景。作為老師的可以幫助學生調校思考角度，從山頂的角度往下看。」 他解釋道。

「可持續發展，是一個極佳例子，讓我們看到各個領域的專家，利用彼此知識，取長補短。」他補充說。這是 David Christian 教授最近出版的《源起故事：萬物的大歷史》的核心主題。從宇宙的簡史開始，結合我們對宇宙的現代知識與生命如何在我們的星球上進化，源起故事揭示了「人類世」正在改變這個星球的命運。

David Christian 教授解釋說，此時，我們的物種正在接管地球，我們對大氣層，生物圈，冰凍圈等造成巨大的影響。

「向人類進行教育，對於塑造地球的未來至關重要。大歷史不僅僅是關乎教育，而是關於教育怎樣幫助學生把遇見的『點』連結起來，看見一幅更大的圖畫。」

Big History: A Modern Origin Story

Who are we? Where do we come from? And why are we here?

Throughout human history, people have sought to answer these big questions through different lenses. Some have argued that we were created by higher beings with a divine purpose, others say that life is a continuous process of evolution and have developed robust scientific experiments and principles to prove this. Different types of origin stories have shaped our understanding of the world and led to varying interpretations of our past, present and future.

Over the last 200 years, science has become widely if not universally accepted. It has propelled us into the 21st century, creating marvels that often exceed the imagination. But the machines which power our complex societies, also threaten to ruin them. Man-made climate change is rapidly changing the planet we live on.

A modern origin story

But there is hope. We have accumulated our knowledge to cope with future challenges. By drawing on the many different academic disciplines, we can create civilisations that thrive into the next century and beyond.

Big History may be the answer to some of our existential dilemmas. By offering a modern origin story, Big History can align the many pools of knowledge to pursue a higher purpose. In that sense, Big History is a framework for uniting our scientific, economic and political knowledge in a cohesive manner so that all people can work towards a common goal.

'Big History tells us the story of the universe from the Big Bang to today's complex, modern societies by drawing on the sciences such as physics, astronomy and biology, and the social sciences including economics, history and political science,' said Prof. David Christian, founder of the Big History Project. 'Big History provides a deeper context about the world we live in.'

This sort of approach is imperative for the academic world, which has become increasingly compartmentalised. For example, scientists and historians operate on entirely different paradigms, and their varying perspectives and methodologies have created a disconnect between the disciplines. 'It's about respecting and learning from other disciplines,' he said.

Funded by Bill Gates, the Big History Project is on a mission to foster an interdisciplinary approach to knowledge that can be nurtured in students of all ages. It offers a wider view of the world by drawing on many disciplines to organise them into one cohesive narrative. The Big History Institute at Macquarie University has released an alternative online syllabus in big history in November 2018 that covers this narrative

'The Big History Project seeks to connect the many academic disciplines into an overarching narrative, one that can serve as a modern-day origin story,' said Prof. Christian, a historian of Russian and the Soviet Union by training. 'A modern-day origin story can use our mathematical and scientific knowledge to explain the world we live in, it can become the theoretical underpinning of our approach to social and economic development.'

Prof. Christian believes that our current education system encourages students to become experts within a field, whether it is the sciences, social sciences, arts or humanities. But he argues that there is less incentive for students to also become broad thinkers who can draw on knowledge from many disciplines. Big History aims to go beyond the specialisation of knowledge and to foster an interdisciplinary approach to learning.

'The disciplines are like a container. So much good research is being done within disciplines, but there are many good questions which lie in between the disciplines,' he said.

In Hong Kong, youth are encouraged to become better students in very specific fields: Math, Science, English, Chinese, Economics, etc. Students' success is easily measured in standardised tests which reward a specific set of skills and knowledge. But less attention is afforded to teaching students how to draw the learnings from one class in another, to think bigger.

Seeing things from mountain top

'There are many learners who are comfortable within their disciplines, but there are also many learners who need a bigger framework to understand things. These learners often don't cope very well with the modern education system,' explained Prof. Christian. 'What we've seen in teaching Big History, is that quite a lot of students are starting to look like gifted students because they are seeing the broader framework.'

Big History can have enormous implications for how we educate future generations in Hong Kong. Our education system should be designed to allow new generations to learn from previous knowledge to create a better future. Beyond ensuring that learners become experts, Big History tries to help experts draw on a wider pool of knowledge. By serving as a creative mapping exercise, Big History seeks to understand how different forms of knowledge all fit together.

'It is possible to look at all modern knowledge as if from the top of a mountain, you miss a lot of the detail of course, but you can put it all together, you can help students take a view from the mountain top,' he explained.

'Sustainability is an excellent example of where experts in various fields can draw on each other's knowledge,' he added. This is a core theme of Prof. Christian's recently published, '*Origin Story: A Big History of Everything*'. Starting with a brief history of the universe and combining our modern knowledge of the universe with how life appeared and has evolved on our planet, Origin Story unveils how the Anthropocene is changing the planet.

At this moment, our species is taking over management of planet earth, we have immense impact on the atmosphere, biosphere, cryosphere and so on, explained Prof. Christian.

'Educating humans broadly is critical to shaping the future of planet earth. Big History is not just about education, but about an education that can help students connect the dots.

1. Prof. David Christian presents his emerging concept of 'Big History'.

全新提名計劃 New Nomination Scheme

（適用於 中小學學校提名 及 中小學學生自身提名
Applicable to Secondary and Primary School Nominations and Self Nominations for Secondary and Primary Students）

香港資優教育學苑（下稱學苑）致力確保 10 至 18 歲的資優學生獲得合適的學習和發展機會。學苑已制定全新的學生提名計劃，並已於 2018/19 學年開始實施。全新提名計劃中最主要的新安排是有意成為學苑學員的資優學生必須報讀香港資優教育學苑網上甄選學習課程，並以合格成績完成該課程，始可提交提名，申請成為學苑學員。此外，獲取錄學員須完成指定課程的要求，以延續其正式學員資格。

由 2019/20 學年開始，每年學苑將安排一次可於該學年內完成的提名程序。有關詳情，請參閱以下網頁：https://www.hkage.org.hk/b5/students/student-membership

The mission of The Hong Kong Academy for Gifted Education (HKAGE) is to secure appropriate learning and development opportunities for gifted students aged 10 to 18. HKAGE has developed a new student nomination scheme which has been implemented starting school year 2018/19. The major new element in the new nomination scheme is that gifted students interested in being members of HKAGE are required to apply and pass the HKAGE Online Learning Programmes for Screening before they can submit their nominations to be student members of HKAGE. Moreover, admitted student members are required to meet a set of programme completion requirements to sustain their full membership.

From school year 2019/20 onwards, one nomination will be arranged to be completed within a school year annually. For details please visit the following website:

https://www.hkage.org.hk/en/students/student-membership

2019/20 提名計劃時間表（暫定）
Nomination Scheme Timeline 2019/20 (Tentative)

第一階段 - 香港資優教育學苑網上甄選學習課程
Stage 1 - HKAGE Online Learning Programmes for Screening

步驟一 簡介會 - 提名計劃安排

Step 1 Briefing Sessions — Arrangements under the Nomination Scheme

2019 年 9 月 Sep 2019

步驟二 報讀香港資優教育學苑網上甄選學習課程

Step 2 Apply for HKAGE Online Learning Programmes for Screening

2019 年 9 月至 10 月 Sep to Oct 2019

步驟三 以合格成績完成香港資優教育學苑網上甄選學習課程，方可獲取提名資格

Step 3 Complete HKAGE Online Learning Programmes for Screening with a Pass to be Entitled for Nomination as a Student Member

2019 年 11 月至 2020 年 1 月 Nov 2019 to Jan 2020

第二階段 - 提名 Stage 2 - Nomination

步驟一 簡介會 - 提名安排及網上提名平台操作

Step 1 Briefing Sessions — Nomination Arrangements and Online Nomination Platform Operations

2020 年 2 月 Feb 2020

步驟二 透過網上提名平台遞交提名資料進行甄選

Step 2 Submit Nomination Profile for Screening through the Online Nomination Platform

2020 年 2 月至 3 月 Feb to Mar 2020

步驟三 透過網上提名平台查閱提名結果及註冊成為學員

Step 3 Check Nomination Result and Register as a Student Member through the Online Nomination Platform

2020 年 6 月 Jun 2020

就性格優勢對生活滿意度的影響關係利用粗糙集理論（RST）進行初步分析

導言

香港資優教育學苑致力於推動學員的全人發展。在學術培訓外，學苑對學員的情意發展也非常關注。道德能力是情意發展的基要元素。在「參考書目」[1] 的學術文章中，建議道德能力可以透過良好品格來檢視，並倡導研究普遍公認的性格優勢來探討青少年道德能力。該項研究名為「行動價值觀」（VIA）性格優勢分類，特別關注有助促進人類理想發展的品格。該項研究確定了良好品格由那些特質組成，然後設計工具來進行測量。研究結果開發了 VIA 青年調查問卷，這是一份個人自行匯報的調查問卷，當中的 96 個問題項目，包含 24 個性格優勢，分為六大類品格美德（見表一）。

表一：「行動價值觀」（VIA）性格優勢青年問卷當中的六大類品格美德

智慧	勇氣	人性	正義	節制	超越
創造力	勇敢	仁慈	公平	寬恕	欣賞美善與卓越表現（德行）
好奇心	誠實	愛	領導力	謙虛	感恩
判斷力	毅力	社交智商	團隊合作	審慎	希望
熱愛學習	熱情			自律	幽默
洞察力					靈性

註釋：在「參考書目」[2] 的學術文章中，VIA 分類確定了六大類品格美德下的 24 項性格優勢。

為了評估資優學員的情意發展情況，我們在 2018 年中期向中小學學員進行 VIA 電子問卷調查。 此外，調查還附加九個關於生活滿意度的問題。

數據收集方法

我們向學苑的小學及中學學員發出 8,597 份電郵，邀請他們參加這項研究。 最後，成功數點了 964 份回覆，回覆率達 11.2%。 表二分別顯示了目標群組和調查回應者的性別、年級和學習範疇分佈情況。編製相關「效果量」（effect size）即 Cohen's w 的值，以判斷目標群組和樣本分佈是否相互一致。因它們相應的「效果量」均小於 0.3， 所以目標群組和樣本數據之間在性別、年級和學習範疇分佈方面可以說沒有顯著差異。

表二： 目標群組和回應者的人口特徵

人口特徵	目標群組		回應者		效果量
	n	%	n	%	w
性別*					
男性	4,832	56.5	503	52.2	
女性	3,724	43.5	461	47.8	0.087
年級					
高小	3,016	35.1	464	48.1	
初中	2,896	33.7	216	22.4	
高中	2,685	31.2	284	29.5	0.296
在學苑的學習範疇					
數學及科學	4,748	55.2	531	55.1	
人文學科及領導能力	3,090	35.9	318	33.0	
多元範疇	759	8.8	115	11.9	0.115
人數	8,597	100.0	964	100.0	

* 在性別方面中有些微數據缺失

如上所述，本研究中的測量工具是一份有 96 個項目的自我報告問卷，每個項目採用 5 分制，從 1（非常不像我）到 5（非常像我）。每四個問題項目集中於一個性格優勢。此外，還附加了九個關於生活滿意度的問題，這些問題也採取 5 分制。在下文中，我們使用粗糙集理論探討資優學員的 24 個性格優勢和生活滿意度之間的關係。

分析方法與結果 - 粗糙集理論

粗糙集理論（RST）為基礎數學工具，用於研究在不同領域出現的不確定性問題（見「參考書目」[3]、[4] 和 [5] 的學術文章）。標準粗糙集理論應用在數據分析的主要優點是它不需要任何關於數據初步或附加的資料，例如統計中的概率分佈、Dempster-Shafer 理論中的基本概率分配、模糊集理論的集合成員資格或可能值。因此，它有時被稱為「非侵入性」數據分析方法。

不可區分性

當一個對象（比如對象 a）與其他對象擁有相同的一組資料（例如，就某一組屬性具有相同值），就可用資料而言，這組對象（表示為 R (a)）就不可彼此區分（彼此相似）。 由利用不可區分性這種關係生成等價類 (Equivalence Class)（R (a)）是 RS 理論的數學基礎。在標準 RST 中，定義 R(a) 是基於某一組屬性的值。

RST 使用一對名為「下近似集合」和「上近似集合」來近似一傳統集合。 $D \subseteq U$ （其中 U 是非空的有限集，稱為宇集）的「下近似集合」(lower approximation) 和「上近似集合」(upper approximation) 由以下程式定義：

$$R_{low}(D) = \cup_{a \in U} \{R(a): R(a) \subset D\}$$
$$R_{up}(D) = \cup_{a \in U} \{R(a): R(a) \cap D \neq \emptyset\} \quad (1)$$

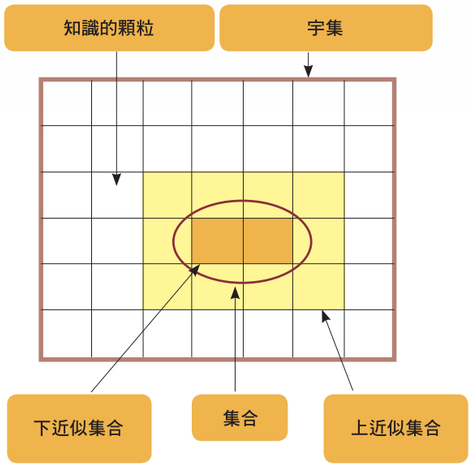
其中 $R(a)$ 表示由 $a \in U$ 生成的等價類。

D 的邊界區域 (Boundary Region) 定義為 $R_{Br}(D) = R_{up}(D) - R_{low}(D)$。相對於定義 R 的屬性集， $R_{low}(D)$ 集是由一定屬於 D 集的元素組成。$R_{up}(D)$ 集是由可能屬於 D 集的元素組成。 在這兩個近似集的基礎上，如果 D 的邊界區域是空的，D 集被喻為是明確的。如果 D 的邊界區並非是空的， D 被喻為是粗糙的（相對於 R）。 這在下面的圖一中顯示出來。 粗糙集也可以通過以下系數（$\beta_R(D)$）的數值表示：

$$\beta_R(D) = \frac{card(R_{low}(D))}{card(R_{up}(D))} \quad (2)$$

它被稱為*近似精確度 (accuracy of approximation)*，其中 card(D) 表示 D 集的基數（集合元素的數目）。明顯地，$0 \leq \beta_R(D) \leq 1$ 。若 $\beta_R(D) = 1$，D 集相對於 R 是明確的 ，如果 $\beta_R(D) < 1$，則 D 集相對於 R 是粗糙的。

圖一： 粗糙集



採用 RST 框架進行分析，首先我們將數據離散化如下。為簡化起見，過程中使用二進制值（0/1）。

每個性格優勢的二元屬性（0/1）：對於每個性格優勢，得出每個回應者相應四個項目的平均得分。 當得到的平均分大於 3.0 時，該回應者這個性格優勢屬性值設為 1；不然就是 0。

生活滿意度的二元屬性（0/1）：同樣地，回應者的生活滿意度屬性值是由相關問題的平均分推算出來，其中'1' - '滿意'，'0' - '不滿意'。

在目前的研究中，學員 24 個性格優勢的屬性將以 R 集代表，而「生活滿意」學員將會是 D 集。由於生活滿意度的某些問題缺少了一些學員的回應，回應者的總數量由 964 下調至 935。我們使用 R 集來生成基本集（知識的顆粒）。總共有 569 個基本集。473 個基本集有 559 個元素，它們屬於下近似集合。而 11 個基本集有 290 個元素，它們屬於邊界區域。因此，有 484 個基本集包含 849 個元素，它們屬於上近似集合。根據（2）所示方程，*近似精確度 $\beta_R(D)$ 可以計算，並且等於 0.66（= 559/849）。集合 D（「生活滿意」的回應者）被稱相對於 R（24 個性格優勢）為大致可定義 (roughly definable)*。這意味著使用 R，我們能夠決定 U 的一些元素（但不是全部）屬於 D（「生活滿意」的回應者）。

對於（1）所示方程中定義的下近似集合和上近似集合，可以使用附加參數 α 重新表示如下。

$$R_{low}(D, \alpha) = \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) \geq \alpha\}$$
$$R_{up}(D, \alpha) = \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) > 1-\alpha\}$$
$$R_{br}(D, \alpha) = \cup_{a \in U} \{R(a): \alpha > card(R(a) \cap D) / card(R(a)) > 1-\alpha\}, \text{ and}$$
$$U - R_{up}(D, \alpha) = \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) \leq 1-\alpha\}$$

其中 α 在（1）所示的方程中設定為 1。

由於研究中遇上數據的失真，參數 α（稱為*精確度變量*）可以設置為略小於 1 的值，例如 0.91，而不是 1。通過檢查近似精確度 $\beta_R(D)$ 相應的變化可以反映出其影響。*對於當前的研究，當 α 設置為 0.91，而不是 1 時，近似的精確度將從 0.66 增至 0.69*，這是因為當 α 減小時，邊界區域將變得「更薄」。

屬性的依賴關係

在 RST 中，*「資料系統」*是一對集合 $S = (U, R)$，其中 U 是非空的有限集，稱為宇集，而 R 是非空的屬性有限集。 每個 $r \in R$ 對應於函數 $r: U \rightarrow V_r$， 其中 V_r 稱為 r 屬性的值集。 U 的元素通常稱為「對象」。 在目前的研究中，我們考慮資料系統的特別例子稱為*「決策系統」。在決策系統，$S = (U, R, d)$，其中 $d \in R$*稱為「決策」的區分屬性，而 R 的元素則稱為條件屬性（或簡稱條件）。

數據分析中的一個重要問題是在決策系統 $S = (U, R, d)$ 中發現屬性之間的依賴關係。 直觀地，如果屬性 R 的值唯一地確定屬性 d 的值，則屬性 d 完全取決於一組屬性 R，表示為 $R \Rightarrow d$。 換句話說，如果在 R 和 d 的值之間存在函數依賴 (functional dependency) 的關係 ，則屬性 d 完全取決於 R 。一般來說，屬性 d 可以部分地取決於 R。這種函數依賴的關係可以以下面的方程正式地來定義。

我們會說 d 取決於 R 達 $k(\alpha)$ 的程度 $(0 \leq k(\alpha) \leq 1)$，用 $R \Rightarrow_{k(\alpha)} d$ 表示，其中

$$k(\alpha) = \gamma(R, d, \alpha) = \frac{card(Pos_R(d, \alpha))}{card(U)} \quad (4)$$

其中 $POS_R(d, \alpha) = U_{X \in U/d} R_{low}(X, \alpha)$

$POS_R(d, \alpha)$ 是相對於 R 而言 U/d 劃分 [1] (partition) 下的正區域。是 U 集的所有元素，其中可以使用 R「適當地」（在精確度變量 α 下）被分類為 U/d 劃分下的不同區域。如果 $k(\alpha) = 1$，我們說 d 完全取決於 R。如果 $k(\alpha) < 1$，我們說 d 部分取決於 R。 如果 $k(\alpha) = 0$，那麼 U/d 劃分 的正區域相對於 R 是空的。 系數 $k(\alpha)$ 表示宇集的所有元素，其中可以使用屬性 R「適當地」被分類為 U/d 劃分下的不同區域的比率，稱為*依賴程度 (degree of the dependency)*。 *對於當前的研究，R 將是 24 個性格優勢的屬性，以 0 或 1 作為值，並且 d 是生活滿意度的屬性。 依賴程度為 k(1) = 0.69，其中 α =1；及 k(0.91) = 0.72，其中 a=0.91。*

核心屬性

另一個重要問題是在 R 之中哪些屬性對於捕捉決策變量 d 的相關知識更為重要。 通常，我們猜想哪一個屬性子集，它本身足以決定與 d 的相關知識；這種屬性的子集 R' 稱為核心屬性 (Reduct)，正式定義如下。

設若一個決策系統 $S = (U, R, d)$, 其中 $U = \{u_1, u_2, \cdots u_n\}$，而 $R = \{r_1, \cdots, r_k\}$。 我們以 $(n \times n)$ 矩陣來表達決策系統 S 的可辨別矩陣 (discernibility matrix)，其正式定義如下 。

$$M(S) = [c_{i,j}] \quad \text{其中 } i, j \text{ 由 1 到 } n$$
$$c_{i,j} = \{r_m \in R: r_m(x_i) \neq r_m(x_j)\} \text{ if } d(x_i) \neq d(x_j) \qquad (5)$$
$$= \emptyset \quad \text{if } d(x_i) = d(x_j)$$

直觀地，$R' \subset R$ 屬性集稱為*「與 d 一致」(d-consistent)*，若 R' 與任何非空集 $c_{i,j}$ 有非空交集，即

$$R' \text{ 與 } d \text{ 一致，當且僅當 } \forall_{i,j}(c_{i,j} = \emptyset) \vee (R' \cap c_{i,j} \neq \emptyset) \qquad (6)$$

屬性集被稱為核心屬性 (Reduct)，如果「與 d 一致」屬性集中它是最小（相對於集包含關係）。 此外，在某些應用中，我們較常使用近似方法稱為 *γ- 核心屬性* (γ-reduct)，其中 $0 \leq \gamma \leq 1$ 是一個實數參數。屬性集 R' 被稱為 γ- 核心屬性，如果在所有具「辨別度」(discernibility degree，其定義如下）大於或等於 γ 屬性集中它是最小（相對於集包含關係）。

$$disc\_degree(R') = \frac{card(c_{i,j}: R' \cap c_{i,j} \neq \emptyset)}{card(c_{i,j}: c_{i,j} \neq \emptyset)} \geq \gamma \qquad (7)$$

有一種簡單的方法稱為「貪婪算法」(greedy algorithm) 可以幫助找到 γ- 核心屬性。在許多情況下，這種算法似乎非常有效。在搜索 γ- 核心屬性的每個步驟中，選擇最有希望的屬性（即，在當前可辨別矩陣中出現最頻繁的屬性）。基於這種方法，*在當前的研究中，我們發現決定生活滿意度（d）的首四個重要屬性 (R') 分別是（i）靈性；（ii）愛；（iii）自我調節；（iv）謙卑；即，R'= { 靈性，愛， 自我調節，謙卑 }。相應的 disc_degree（R'）= 0.92*。另一方面，與智慧相關的性格優勢似乎對於決定生活滿意度並不重要。為了比較，假設 *R"*= { 創造力，好奇心，判斷力，熱愛學習 }。相應的 *disc_degree (R") = 0.61*，它明顯低於 *disc_degree (R')*。此外，*R'* 跟 *R"* 決定屬性 d 之間的能力差異，也可以通過相應的依賴程度來反映。對於 $R' \Rightarrow_{k(\alpha)} d$, $k(0.91) = 0.36$。對於 $R'' \Rightarrow_{k(\alpha)} d$, $k(0.91) = 0.03$, 它也明顯低於 *R'* 的值。

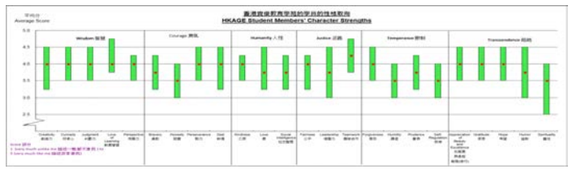
討論和總結

在粗糙集理論的框架下，生活滿意度能粗略地被 24 項性格優勢定義（近似精確度約為 0.7）。 同樣，生活滿意度大致取決於性格優勢，相應的依賴程度也約等於 0.7。

此外，我們發現超越性（靈性）、人性（愛）、節制（謙卑和自我調節）中的性格優勢對於決定生活滿意度，相比與智慧有關的性格優勢更加重要（相應的辨別度分別是 0.92 和 0.61）。 研究結果的某些方面與其他研究非常吻合。在「參考書目」[6] 的學術文章中，提到利用來自互聯網的三個成年人樣本，透過「性格優勢價值量表」調查多種性格優勢與生活滿意度之間的關係，也發現美學欣賞、創造力、判斷力和學習熱愛與生活滿意度的關係較弱。

圖二顯示學苑學員在 24 項性格優勢的平均分數。 由此可以看出，他們在誠實、謙卑、自我調節和靈性方面相對較弱；其中大部分（其後的三項）對他們的生活滿意度相當重要。

圖二： 學苑學員 24 項性格優勢 (25% 百分位數、中位數及 75% 百分位數)



事實上，香港和其他亞洲國家（例如新加坡和中國）的年輕人在這四個性格優勢中的平均得分相近。 這可能顯示今後可以為青年人提供更多改善這方面性格優勢的培訓方案及服務。

1 U / d 是一系列元素子集，它們是相互排斥和詳盡的。在每個子集內，所有元素都以 d 某一特定值為屬性。

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Rudimentary Analysis of Dependency Relationship between Character Strengths and Life Satisfaction using Rough Set Theory (RST)

Introduction

HKAGE strikes for a holistic development of its student members. In addition to the provisions of academic training, students' affective development is one of the main concerns of the Academy. Moral competence is one of the key components of affective development. In [1] under 'References', it is suggested that moral competence can be approached in terms of good character. A project was initiated to address moral competence among adolescents in terms of ubiquitously acknowledged strengths of characters. The project was called the Values in Action (VIA) Classification of Strengths, which specifically focuses on the strengths of character that contribute to optimal human development. The project identified components of good character and then devised instruments to assess them. As the outcomes of the project, the VIA-Youth questionnaire is developed, which is a self-report questionnaire with 96 items on 24 character strengths which are classified into six broad virtues (see Table 1).

Table 1: Six Broad Virtues of the VIA-Youth Questionnaire

Wisdom	Courage	Humanity	Justice	Temperance	Transcendence
Creativity	Bravery	Kindness	Fairness	Forgiveness	Appreciation of Beauty and Excellence
Curiosity	Honesty	Love	Leadership	Humility	Gratitude
Judgment	Persever-ance	Social Intelli-gence	Teamwork	Prudence	Hope
Love of Learning	Zest			Self-Regulation	Humour
Perspective					Spirituality

Note: In [2]under 'References,' the VIA classification identifies 24 character strengths organised under six broad virtues.

To assess the situation of affective development of gifted student members, we conducted in mid-2018 an e-survey and applied the VIA questionnaire to primary and secondary student members. Besides, nine question items on life satisfaction were asked.

Data Collection Method

A total of 8,597 invitation emails was sent respectively to the HKAGE primary student members via their parents' emails and the secondary student members. At the end, 964 of them were successfully enumerated, having an overall response rate of 11.2%. Table 2 shows gender, grade level and study domain distributions of target population and survey respondents respectively. The values of the effect size, Cohen's w were compiled to judge whether the target population and sample distribution were in line with each other. No prominently large differences respectively in gender, grade level and study domain distributions between target population and sample data were observed, as their effect sizes were all less than 0.3.

Table 2: Demographic Characteristics of Target Population and Respondents

Demographic Characteristics	True Population		Respondents		Effect Size w
	n	%	*n*	%	
Gender*					
Male	4,832	56.5	503	52.2	
Female	3,724	43.5	461	47.8	**0.087**
Grade level					
Upper Primary	3,016	35.1	464	48.1	
Lower Secondary	2,896	33.7	216	22.4	
Upper Secondary	2,685	31.2	284	29.5	**0.296**
Study Domain in the Academy					
Mathematics & Sciences	4,748	55.2	531	55.1	
Humanities & Leadership	3,090	35.9	318	33.0	
Multi-Domain	759	8.8	115	11.9	**0.115**
Total Number	8,597	100.0	964	100.0	

*Few missing data in Gender

As mentioned above, the measurement instrument in the current study was a self-report questionnaire with 96 items, each of which adopted a 5-point scale ranging from 1 (very much unlike me) to 5 (very much like me). Four question items were for each character strength. In addition, nine question items on life satisfaction, which were also on the 5-point scale, were asked. In the following, we explore the dependency relationship between the 24 character strengths and life satisfactions of our gifted student members using the RST.

Analysis Methodology and Results - Rough Set Theory

RST is a fundamental mathematical tool for studying uncertainty that may arise in various domains (see [3], [4], and [5] under 'References'). The main advantage of the standard RST in data analysis is that it does not need any preliminary or additional information about data like probability distributions in statistics, basic probability assignments in Dempster–Shafer theory, a grade of membership or the value of possibility in fuzzy set theory. Thus, it is sometimes called a "non-invasive" data analysis approach.

Indiscernibility

When an object (say, object a) possesses the same set of information (e.g., same values for a certain set of attributes) with others, this class of objects (denoted as R(a)) are indiscernible (similar) with respect to the available information about them. The equivalence class (R(a)) generated from this indiscernibility is the mathematical basis of RST. In the standard RST, R(a) is defined by values of a set of attributes possessed by the object.

RST approximates a traditional set using a pair of sets named the lower and upper approximation of the set. The lower and upper approximations of a set $D \subseteq U$ (where U is a non-empty, finite set, called the universe) are defined by the followings respectively:

$$R_{low}(D) = \cup_{a \in U} \{R(a): R(a) \subset D\}$$
$$R_{up}(D) = \cup_{a \in U} \{R(a): R(a) \cap D \neq \emptyset\} \qquad (1)$$

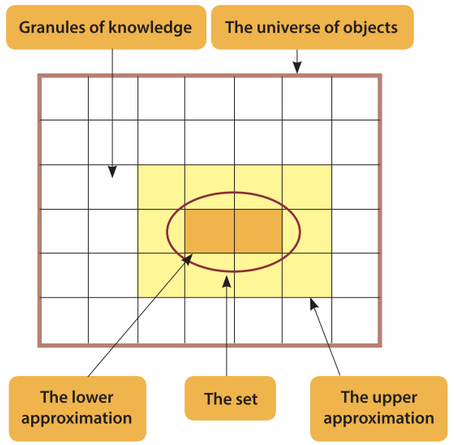
where $R(a)$ denotes the equivalence class of $a \in U$.

Boundary region of D is defined as $R_{Bn}(D) = R_{up}(D) - R_{low}(D)$. It can be said that with respect to the set of attributes defining the relation R, the set $R_{low}(D)$ is composed of elements which are certainly elements of the set D. The set $R_{up}(D)$ consists of elements which have the possibility of belonging to the set D. On the basis of these two approximations, a set D is said to be crisp if the boundary region of D is empty and D is said to be rough (with respect to R) if the boundary region of D is non-empty. This is shown schematically in Figure 1 below. A rough set can be also characterised numerically by the following coefficient:

$$\beta_R(D) = \frac{card(R_{low}(D))}{card(R_{up}(D))} \qquad (2)$$

It is called *accuracy of approximation*, where card(D) denotes the cardinality of the set D. Obviously, $0 \le \beta_R(D) \le 1$. If $\beta_R(D) = 1$, the set D is crisp with respect to R, and otherwise, if $\beta_R(D) < 1$, the set D is rough with respect to R.

Figure 1: A Rough Set



To adopt the RST framework for analysis, first we discretised our data set as follows. For sake of simplicity, binary values (0/1) were used in the process.

A binary attribute for each character strength (0/1): For each character strength, the average score of the corresponding four items of a respondent was derived. When the resultant average score was greater than 3.0, the attribute value of this character strength for this respondent was set to 1; otherwise 0.

A binary attribute for life satisfaction (0/1): Similarly, the attribute value of life satisfaction for a respondent was derived based on the average score of the relevant question items, where '1' - 'satisfied', '0' – 'unsatisfied'.

In the current study, the full set of 24 attributes of character strengths would be the set R, and the set of 'satisfied' student would be the set D. Due to missing values in the responses on life satisfaction, the number of respondents was reduced from 964 to 935 instead. We used the set R to form elementary sets (granules of knowledge). Totally, there were 569 elementary sets. 473 of them with 559 elements belonged to the lower approximation. 11 of them with 290 elements belonged to the boundary region. Thus, 484 elementary sets with 849 elements belonged to the upper approximation. According to (2), *the accuracy of approximation $\beta_R(D)$ for the current study could be compiled and was equal to 0.66 (=559/849). The set D ('satisfied' respondents) is called roughly definable with respect to the R (24 character strengths).* This means that using R, we are able to decide for some elements (but not all) of U that they belong to D ('satisfied' respondent).

For the lower and upper approximations defined in (1), they could be reformulated with an additional parameter, α as follows.

$$\begin{aligned} R_{low}(D, \alpha) &= \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) \ge \alpha\} \\ R_{up}(D, \alpha) &= \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) > 1-\alpha\} \qquad (3) \\ R_{bn}(D, \alpha) &= \cup_{a \in U} \{R(a): \alpha > card(R(a) \cap D) / card(R(a)) > 1-\alpha\}, \text{ and} \\ U - R_{up}(D,\alpha) &= \cup_{a \in U} \{R(a): card(R(a) \cap D) / card(R(a)) \le 1-\alpha\} \end{aligned}$$

where α is set to 1 in the formulation shown in (1).

Due to 'noisy' data encountered in studies, the parameter α, which is called *a precision variable*, could be set to a value slightly less than 1, say 0.91, instead of 1. The impact could be reflected by examining the changes in the corresponding values of accuracy of approximation, $\beta_R(D)$. *For the current study, the accuracy of the approximation would be increased from 0.66 to 0.69 when α is set to 0.91, instead of 1.* It is because the boundary region will get 'thinner', as α decreases.

Dependency of Attributes

At RST, *an information system* is a pair of sets, $S = (U, R)$ where U is a non-empty, finite set, called the universal set and R is a non-empty finite set of attributes. Each $r \in R$ corresponds to the function $r: U \rightarrow V_r$, where V_r is called the value set of attribute r. Elements of U are usually called objects. In the current study, we consider a special case of information systems called *decision systems. In a decision system $S = (U, R, d)$, where $d \in R$* is a distinguished attribute called decision. The elements of R are called conditional attributes (or simply conditions).

An important issue in data analysis is discovering dependencies between attributes in a decision system $S = (U, R, d)$. Intuitively, the attribute d depends totally on a set of attributes R, denoted by $R \Rightarrow d$, if the values of attributes R uniquely determine the value of attribute d. In other words, attribute d depends totally on R, if there exists a functional dependency between the values of R and d. In general, the attribute d can depend partially on R. Formally such a dependency can be defined in the following way.

We will say that d depends on R to a degree $k(\alpha)$ $(0 \le k(\alpha) \le 1)$, denoted by $R \Rightarrow_{k(\alpha)} d$, where

$$k(\alpha) = \gamma(R, d, \alpha) = \frac{card(Pos_R(d,\alpha))}{card(U)} \qquad (4)$$

$$\text{where } POS_R(d,\alpha) = U_{X \in U/d}\, R_{low}(X,\alpha)$$

$POS_R(d,\alpha)$, which is called a positive region of the partition U/d[1] with respect to R, is the set of all elements of U that can be 'properly' classified (under the precision variable α) to blocks of the partition U/d, by means of R. If $k(\alpha) = 1$, we say that d depends totally on R; and if $k(\alpha) < 1$, we say that d depends partially on R. If $k(\alpha) = 0$, then the positive region of the partition U/d with respect to R is empty. The coefficient $k(\alpha)$ expresses the ratio of all elements of the universe, which can be 'properly' classified to blocks of the partition U/d, employing attributes R and will be called *the degree of the dependency. For the current study, R would be the attributes of 24 character strengths, taking on a value of either 0 or 1, and d the attribute of life satisfaction. The degree of dependency is k(1) = 0.69 where α=1, and k(0.91) = 0.72 where α=0.91.*

Reduct

Another important issue is whether there are attributes amongst R which are more important to capture the knowledge related to the decision variable d. Often, we wonder whether there is a subset of attributes which can, by itself, sufficiently characterise the knowledge in the database related to d; such a subset of attributes R' is called a reduct, which is formally defined in the following.

Given a decision system $S = (U, R, d)$, where $U = \{u_1, u_2, \ldots u_n\}$, and $R = \{r_1, \ldots, r_k\}$. By discernibility matrix of the decision system S we denote the $(n \times n)$ matrix defined as below.

$$\begin{aligned} M(S) &= [c_{i,j}] \qquad \text{where } i, j \text{ running from 1 to } n \\ c_{i,j} &= \{r_m \in R: r_m(x_i) \ne r_m(x_j)\} \quad \text{if } d(x_i) \ne d(x_j) \qquad (5) \\ &= \emptyset \qquad\qquad\qquad\qquad \text{if } d(x_i) = d(x_j) \end{aligned}$$

Intuitively, the set $R' \subset R$ of attributes is called *'consistent with d (or d-consistent)* if R' has nonempty intersection with any non-empty set $c_{i,j}$ i.e., R' is consistent with d if-and-only-if

$$\forall_{i,j}(c_{i,j} = \emptyset) \vee (R' \cap c_{i,j} \ne \emptyset\} \qquad (6)$$

The set of attributes is reduct if it is minimal (with respect to set inclusion) among d-consistent set of attributes. Moreover, in some applications, we prefer to use the approximation called γ-reduct, where $0 \le \gamma \le 1$ is a real parameter. The set of attributes is called γ-reduct if it is minimal (with respect to set inclusion) among the sets of attributes R' such that the discernibility degree defined as follows is greater than or equal to γ.

$$disc\_degree(R') = \frac{card(c_{i,j}: R' \cap c_{i,j} \ne \emptyset)}{card(c_{i,j}: c_{i,j} \ne \emptyset)} \ge \gamma \qquad (7)$$

There is a simple heuristic for finding γ-reduct called greedy algorithm. In many situations, this algorithm seems to be quite efficient. In each step of searching the set of attributes of γ-reduct, the most promising attribute (i.e., the one occurred most frequently in the discernibility matrix) is selected. Based on this heuristic, *for the current study we can find the top-4 important attributes (R') amongst the 24 character strengths in determining the life satisfaction (d). They are respectively (i) Spirituality; (ii) Love; (iii) Self-Regulation; and (iv) Humility in order of importance; i.e., R' = {Spirituality, Love, Self-Regulation, Humility}. The corresponding disc_degree(R') = 0.92*. On the other hand, it seems that the character strengths related to wisdom are not essential in determining the life satisfaction. For the sake of comparison, suppose R'' = {Creativity, Curiosity, Judgement, Love of Learning}. The corresponding *disc_degree(R'') = 0.61*, which is prominently lower than *disc_degree(R')*. Besides, the difference between R' and R'' in determining the attribute d could also be reflected by using the corresponding degree of dependency. For $R' \Rightarrow_{k(\alpha)} d$, *k(0.91) = 0.36. For $R'' \Rightarrow_{k(\alpha)} d$, k(0.91) = 0.03*, which is also prominently lower than the one for R'.

Discussion and Summary

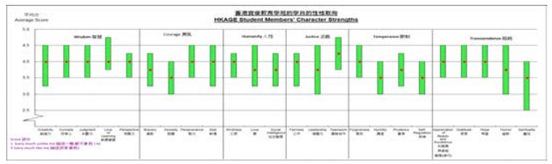
Under the framework of RST, life satisfaction is roughly defined with respect to the 24 character strengths (accuracy of the approximation is around 0.7). Similarly, the life satisfaction depends on the character strengths with the degree of dependency equal to around 0.7.

Besides, it is found that the character strengths in Transcendence (Spirituality), Humanity (Love), Temperance (Humility and Self-Regulation) are more important in determining the attribute of life satisfaction (discernibility degree = 0.92), as compared with the ones related to Wisdom (discernibility degree = 0.61). Some aspects of the findings are quite in line with some other study. In [6] under 'References, it is mentioned that the relationship between various character strengths and life satisfaction among the adults from three Internet samples using the VIA Inventory of Strengths was investigated. The intellectual strengths of Appreciation of Beauty, Creativity, Judgment, and Love of Learning were also found to be only weakly associated with life satisfaction.

Figure 2 below shows the average scores of 24 character strengths of HKAGE student members. It can be observed that they were relatively weak in Honesty, Humility, Self-Regulation and Spirituality; while most of them (the latter three) are important for life satisfaction.

In fact, youths in Hong Kong and other Asian countries (e.g., Singapore and China) got similar average scores in these four character strengths. This may indicate that more training programmes and services to improve these character strengths could be provided in future for youths.

Figure 2: 24 Character Strengths of HKAGE Student Members (25% Percentile, Median and 75% Percentile)



1. U/d is a family of subsets of elements, which are mutually exclusive and exhaustive. Within each subset, all elements take on a specific value of the attribute d.

References:
[1] Park, N., & Peterson C. (2006). Moral competence and character strengths among adolescents: the development and validation of the Values in Action Inventory of Strengths for Youth. *Journal of Adolescence* 29(6) 891-909.
[2] Peterson, C., & Seligman, M. E. P. (Eds.). (2004). *Character strengths and virtues. A handbook of classification*. Oxford, England: Oxford University Press.
[3] Pawlak, Z. & Skowron, A. (2007). Rudiments of Rough Sets. *Information Sciences* 177(2007) 3-27.
[4] Walczak, B. & Massart, D. L. (1999). Rough Sets Theory. *Chemometrics and Intelligent Laboratory Systems* 47(1999) 1-16.
[5] Hung Son Nguyen & Sinh Hoa Nguyen (1999). Rough Sets and Association Rule Generation. *Fundamenta Informaticae* 40(4) 383-405.
[6] Park, N., Peterson, C. & Seligman, M. E. P. (2004) Strengths of Character and Well Being. *Journal of Social and Clinical Psychology* 23(5) 603-619.

2019 年 3 月至 2019 年 5 月 學生課程及活動動向
設有甄選課程或先到先得課程
Forthcoming Student Programmes and Events in March 2019 to May 2019
Programmes with Screening or First-come-first-served Programmes

設有甄選課程：
- 課程設有不同的甄選方式，例如網上甄選問題、筆試或其他甄選方式。
- 根據學員在甄選中的表現來取錄學員，詳情請參閱各課程的資料。
- 如學員報名的課程與其他已取錄課程時間重疊，學苑將會考慮是否仍然取錄該學員。
- 學員應避免同時報讀時間重疊的課程。
- 學苑對課程取錄結果有最終決定權。

先到先得課程：此類課程報名採取先到先得，額滿即止的方式

Programmes with Screening:
- There are different screening methods for these programmes, for example, online screening question, written test or other screening methods.
- Student members are selected based on the performance in the screening. For more information, please refer to the programme info.
- If there is a time clash between the applied programme and other programmes to offer, we will consider if the student will still be accepted.
- Students should avoid applying programmes with time clash.
- The decision of HKAGE on the result of selection should be final.

First-come First Served Programmes: The capacity of this type of programmes is limited and are on first-come-first served basis.

課程日期 Programme Date	課程 / 活動 Programme/ Event	對象（香港資優教育學苑學員） Target Participant (HKAGE student members)	開始報名日期 Programme Application Start Date	截止報名日期 Programme Application Closing Date	報名結果發佈日期 Programme Application Result Announcement Date
人文學科（小學）Humanities (Primary)					
2019 年 3 月 2、9、16 及 30 日 上午 10 時 – 下午 1 時 2, 9, 16 and 30 March 2019 10:00a.m. – 1:00p.m.	**閱讀與寫作 I 課程（程度一）：中文小作家創作坊** (CLLP1121) （授課語言：粵語） Reading and Writing I Creative Writing I Course (Level 1): To Be a Novelist (CLLP1121) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 15 日 15 February 2019
2019 年 4 月至 5 月（暫定） April – May 2019 (TBC)	**批判及創意閱讀 II 課程（程度二）：字裡行間 - 短篇小說的批判及創意閱讀** (ELLP1252) （授課語言：英語） Reading and Writing II Course (Level 2): Between the Lines - Critical and Creative Reading of Short Fiction (ELLP1252) (Language: English)	小四至小六 P4 – P6	2019 年 1 月 24 日 （暫定） 24 January 2019 (TBC)	2019 年 2 月 11 日 （暫定） 11 February 2019 (TBC)	2019 年 2 月 22 日 （暫定） 22 February 2019 (TBC)
人文學科（中學）Humanities (Secondary)					
2019 年 2 月 23，3 月 2、9 及 23 日 下午 2 時 – 下午 5 時 2019 年 3 月 30 日 上午 10 時 – 下午 1 時 23 February, 2, 9, and 23 March 2019 2:00p.m. – 5:00p.m. 30 March 2019 10:00a.m. – 1:00p.m.	**中國歷史 II 課程（程度三）：香港源始：人類學和敘事學的進路（從新石器時代到「香港」得名）** (HUMS3610) （授課語言：粵語） Chinese History II Course (Level 3): Origin(s) of Hong Kong: Anthropological and Narratological Approach (from Neolithic period to the naming of 'Hong Kong') (HUMS3610) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 15 日 15 February 2019
2019 年 4 月 13 及 5 月 18 日 下午 2 時 – 下午 5 時 2019 年 4 月 27、5 月 4 及 11 日 上午 10 時 – 下午 1 時 13 April and 18 May 2019 2:00p.m. – 5:00p.m. 27 April, 4 and 11 May 2019 10:00a.m. – 1:00p.m.	**公眾歷史學課程（程度三）：殖民香港：戰爭和「意外的」經濟擴張（對照澳門、台灣、日本殖民）** (HUMS3620) （授課語言：粵語） Public History Course (Level 3): Colonialising Hong Kong: Wars and Unexpected Economic Expansion (comparative study with Macau, Taiwan and Japan) (HUMS3620) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 11 日 11 February 2019	2019 年 2 月 22 日 22 February 2019
2019 年 4 月 5 及 20 日 上午 11 時 – 下午 2 時 2019 年 4 月 6 及 4 月 13 日 上午 10 時 – 下午 1 時及 下午 2 時 – 下午 5 時 5 and 20 April 2019 11:00a.m. – 2:00p.m. 6 and 13 April 2019 10:00a.m – 1:00p.m. And 2:00p.m. – 5:00p.m.	**跨學科課程（程度三）：洗耳恭聽** (MULS1711) （授課語言：粵語） Multi-disciplinary Course (Level 3): Be all Ears and Beyond Listening (MULS1711) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 11 日 11 February 2019	2019 年 2 月 22 日 22 February 2019
數學科（小學）Mathematics (Primary)					
2019 年 3 月 2、9、16 及 23 日 上午 9 時 30 分 – 下午 12 時 30 分 2, 9, 16 and 23 March 2019 9:30a.m. – 12:30p.m.	**離散數學、概率、統計課程（程度一）：概率 - 似非而是的迷思** (MATP2522) （授課語言：粵語） Discrete Math, Probability, Statistics Course (Level 1): Probability Paradox (MATP2522) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 3 日 3 January 2019	2019 年 1 月 21 日 21 January 2019	2019 年 2 月 1 日 1 February 2019
2019 年 3 月 30 日 上午 9 時 30 分 – 下午 12 時 30 分 及 下午 1 時 30 分 – 下午 4 時 30 分 2019 年 4 月 6 日 上午 9 時 30 分 – 下午 12 時 30 分 及 下午 1 時 3 分 – 下午 5 時 30 分 30 March 2019 9:30 a.m. – 12:30 p.m. and 1:30 p.m. – 4:30 p.m. 6 April 2019 9:30 a.m. – 12:30 p.m. and 1:30 p.m. – 5:30 p.m.	**跨範疇及跨學科課程（程度一）：數學起動（一）**（MATP1911） （授課語言：粵語） Across Domains and Interdisciplinary Course (Level 1)：Open Up Your Mind 1 (MATP1911) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 3 日 3 January 2019	2019 年 1 月 21 日 21 January 2019	2019 年 2 月 1 日 1 February 2019
2019 年 5 月 4、11、18 及 25 日 下午 2 時 – 下午 5 時 4, 11, 18 and 25 May 2019 2:00 p.m. – 5:00 p.m.	**離散數學、概率、統計課程（程度一）：概率 - 用數學來計算運氣** （MATP1521） （授課語言：英語） Discrete Math, Probability, Statistics Course (Level 1): Probability- When luck meet with Mathematics (MATP1521) (Language: English)	小四至小六 P4 – P6	2019 年 1 月 3 日 3 January 2019	2019 年 1 月 21 日 21 January 2019	2019 年 2 月 1 日 1 February 2019
數學科（中學）Mathematics (Secondary)					
能力傾向測試： 2019 年 2 月 11 日 下午 4 時 30 分 – 下午 6 時 30 分 2019 年 3 月 9、16、23、30、4 月 6、13、27、5 月 4 及 11 日 下午 2 時 – 下午 5 時 30 分 Aptitude Test: 11 February 2019 4:30p.m. – 6:30p.m. 9, 16, 23, 30 March, 6, 13, 27 April, 4 and,11 May 2019 2:00p.m. – 5:30p.m.	**2019 中國女子數學奧林匹克訓練（第一期）** (MATS1121) （授課語言：粵語） CGMO Training 2019 (Phase I) (MATS1121) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 22 日 22 February 2019
能力傾向測試： 2019 年 2 月 11 日 下午 4 時 30 分 – 下午 6 時 30 分 2019 年 3 月 9、16、23、30、4 月 6、13、27、5 月 4 及 11 日 下午 2 時 – 下午 5 時 30 分 Aptitude Test: 11 February 2019 4:30p.m. – 6:30p.m. 9, 16, 23, 30 March, 6, 13, 27 April, 4 and 11 May 2019 2:00p.m. – 5:30p.m.	**2019 數林匹克初探（第一期）** (MATS1151) (授課語言:粵語) Introduction to Olympiad Mathematics 2019 (Phase I) (MATS1151) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 22 日 22 February 2019

評核試： 2019 年 2 月 9 日 上午 10 時 – 正午 12 時 2019 年 3 月 9、16、23 及 30 日 上午 9 時 30 分 – 下午 12 時 30 分 Screening Test: 9 February 2019 10:00a.m. – 12:00n.n. 9, 16, 23 and 30 March 2019 9:30a.m. – 12:30p.m.	**代數課程（程度四）：矩陣與方程** (MATS3240) （授課語言：英語） Algebra Course (Level 4): Matrices and Equations (MATS3240) (Language: English)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 22 日 22 February 2019
評核試： 2019 年 2 月 9 日 下午 2 時 30 分 – 下午 3 時 30 分 2019 年 4 月 23 至 26 日 下午 2 時 30 分 – 下午 4 時 30 分 Screening Test: 9 February 2019 2:30p.m. – 3:30p.m. 23 – 26 April 2019 2:30p.m. – 4:30p.m.	**跨範疇及跨學科課程（程度四）：數理邏輯學導論及其在人工智能中的應用** (MATS3810) （授課語言：粵語） Across Domains and Interdisciplinary Course (Level 4): Introduction to Mathematical Logics and Its Applications in Artificial Intelligence (MATS3810) (Language: Cantonese)	中一至中六 S1 – S6	2019 年 1 月 3 日 3 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 22 日 22 February 2019

科學科（小學）Sciences (Primary)

2019 年 4 月 23 及 24 日 上午 9 時 30 分 – 下午 12 時 30 分 下午 1 時 30 分 – 下午 4 時 30 分 23 and 24 April 2019 9:30a.m. – 12:30p.m. 1:30p.m. – 4:30p.m.	**光學（程度一）：製作單筒望遠鏡** (SCIP1061) （授課語言：英語） Optics (Level 1): Making a Monocular (SCIP1061) (Language: English)	小四至小六 P4 – P6	2019 年 1 月 10 日 10 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 2 月 15 日 15 February 2019
2019 年 4 月 23 及 24 日 上午 9 時 – 正午 12 時 下午 2 時 – 下午 5 時 23 and 24 April 2019 9:00a.m. – 12:00n.n. 2:00p.m. – 5:00p.m.	**電腦控制機械人基礎課程：逃離迷宮編程課程** (TECP1132) （授課語言：英語） Introductory Course in Computer Controlled Robots: Jumping Sumo Maze Course (TECP1132) (Language: English)	小四至小六 P4 – P6	2019 年 1 月 10 日 10 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 2 月 15 日 15 February 2019

科學科（中學）Sciences (Secondary)

2019 年 4 月 23、24 及 27 日 上午 9 時 30 分 – 下午 12 時 30 分 2019 年 4 月 27 日 下午 2 時 – 下午 5 時 23, 24, 27 April 2019 9:30a.m. – 12:00n.n. 27 April 2019 2:00p.m. – 5:00p.m.	**機械學與電學 I 課程（程度三）** (SCIS2042) （授課語言：英語） (TBC) Mechanics and Electricity I Course (Level 3) (SCIS2042) (Language: English) （暫定）	中一至中三 S1- S3	2019 年 1 月 10 日 10 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 2 月 15 日 15 February 2019
2019 年 3 月 23 及 30 日 上午 9 時 30 分 – 下午 12 時 30 分 2019 年 4 月 6、24 及 27 日 上午 9 時 30 分 – 下午 12 時 30 分 2019 年 4 月 6、24 及 27 日 下午 2 時 – 下午 5 時 2019 年 5 月 4 日 上午 9 時 30 分 – 下午 12 時 30 分 23, 30 March 2019, 9:30a.m. – 12:30p.m. 6, 24, 27 April 2019 9:30a.m. – 12:30p.m. 6, 24, 27April 2019 2:00p.m. – 5:00p.m. 4 May 2019 9:30a.m. – 12:30p.m.	**人工智能與機械學習進階課程：機械智能—原理與應用** (TECS2461) （授課語言：英語，並以粵語 / 普通話輔助） （暫定） Intermediate Course in Artificial Intelligence and Machine Learning: Machine Intelligence – Principles and Applications (TECS2461) (Language: English supplemented by Cantonese/Putonghua) (TBC)	中一至中六 S1- S6	2019 年 1 月 10 日 10 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 2 月 15 日 15 February 2019

領導才能（中學）Leadership (Secondary)

講課： 2019 年 3 月 2、9 及 16 日 上午 10 時 – 下午 1 時 2019 年 3 月 23 日 上午 9 時 – 下午 1 時 下午 2 時 – 6 時 導修課： A 小組 2019 年 3 月 2 日 下午 2 時 – 下午 4 時 2019 年 3 月 9 日 下午 6 時 – 晚上 8 時 2019 年 3 月 16 日 下午 4 時 – 下午 6 時 B 小組 2019 年 3 月 2 日 下午 4 時 – 下午 6 時 2019 年 3 月 9 日 下午 2 時 – 下午 4 時 2019 年 3 月 16 日 下午 6 時 – 晚上 8 時 C 小組 2019 年 3 月 2 日 下午 6 時 – 晚上 8 時 2019 年 3 月 9 日 下午 4 時 – 下午 6 時 2019 年 3 月 16 日 下午 2 時 – 下午 4 時	Lecture: 2, 9, 16 March 2019 10:00a.m. – 1:00p.m. 23 March 2019 9:00a.m. – 1:00p.m. 2:00p.m. – 6:00p.m. Tutorial: **Group A** 2 March 2019 2:00p.m. – 4:00p.m. 9 March 2019 6:00p.m. – 8:00p.m. 16 March 2019 4:00p.m. – 6:00p.m. **Group B** 2 March 2019 4:00p.m. – 6:00p.m. 9 March 2019 2:00p.m. – 4:00p.m. 16 March 2019 6:00p.m. – 8:00p.m. **Group C** 2 March 2019 6:00p.m. – 8:00p.m. 9 March 2019 4:00p.m. – 6:00p.m. 16 March 2019 2:00p.m. – 4:00p.m.	**必要的溝通技巧進階課程（程度四）：成功的 TED 演講秘訣** (LEAS2252) （授課語言：英語） Leadership Enhancer - Essential Communication Skills Course (Level 4): Effective Presentations – TED style (LEAS2252) (Language: English)	中四至中六 S4 – S6	2019 年 1 月 10 日 10 January 2019	2019 年 2 月 4 日 4 February 2019	2019 年 2 月 15 日 15 February 2019

其他活動 Other activities

不適用 Not applicable	**學員作品徵集出版計劃 2018/19** Out Stand (OS) – Collection of Students' Work: A Publication Scheme 2018/19	小四至中六 P4-S6	2018 年 9 月 17 日 17 Sep 2018	2019 年 2 月 28 日 28 February 2019	瀏覽相關網頁資訊 For details please refer to this website
2019 年 4 月（暫定） April 2019 (TBC)	**Project Access Hong Kong 海外留學經驗分享講座** (ALE/COL/002) （授課語言：粵語 / 英語）（暫定） Experience Sharing Talk on Studying Abroad by Project Access Hong Kong (ALE/COL/002) (Language: Cantonese/ English) (TBC)	中三至中六香港資優教育學苑初步及正式學員（暫定） S3 – S6 HKAGE preliminary and full members (TBC)	2019 年 1 月 （暫定） January 2019 (TBC)	2019 年 2 月 （暫定） February 2019 (TBC)	先到先得，額滿即止 （暫定） First-come-first-served (TBC)

個人成長及社交發展（小學）Personal Growth and Social Development (Primary)

2019 年 3 月 9、16、23、24 日、4 月 6、13、18、23 日、5 月 4、11、18、25 日 上午 9 時 – 下午 1 時 2019 年 3 月 2、30 日、4 月 6、24、25、27 日、5 月 4、11 日 下午 2 時 – 下午 6 時 （學員只須選擇參與一節） 9, 16, 23, 24 March, 6, 13, 18, 23 April, 4, 11, 18 and 25 May 2019 9:00a.m. – 1:00p.m. 2, 30 March, 6, 24, 25, 27 April, 4 and 11 May 2019 2:00p.m. – 6:00p.m. (Students can only choose one session to join)	**Let Us Shine!** (LUSA1819013-025) (LUSJC1819001-007) （授課語言：粵語 / 英語） 詳情請參閱學苑網站 Let Us Shine! (LUSA1819013-025) (LUSJC1819001-007) (Language: Cantonese / English) For details please refer to the HKAGE website	小四至小六 P4 – P6	2019 年 1 月 10 日 10 January 2019	詳情請參閱學苑網站 For details please refer to HKAGE website	詳情請參閱學苑網站 For details please refer to HKAGE website
2019 年 5 月 11、18 及 25 日 上午 10 時 – 下午 12 時 30 分 11, 18 and 15 May 2019 10:00a.m. – 12:30p.m.	**認識自我 - 分享小組** (JC2W-S041) （授課語言：粵語） Self-Awareness – Sharing Workshop (JC2W-S041) (Language: Cantonese)	小四至小六及已完成 "Let Us Shine!" P4 – P6 & have completed "Let Us Shine!"	2019 年 1 月 31 日 31 January 2019	2019 年 4 月 12 日 12 April 2019	2019 年 4 月 19 日 19 April 2019

個人成長及社交發展（中學）Personal Growth and Social Development (Secondary)					
2019 年 3 月至 5 月 March to May 2019	**聚焦小組（不同領域）**(SG/001) （授課語言：粵語 / 英語） Focus Groups (in different areas) (SG/001) (Language: Cantonese/ English)	中一至中六香港資優教育學苑正式學員 S1 – S6 HKAGE full members	2019 年 1 月 January 2019	2019 年 2 月 February 2019	2019 年 2 月 February 2019
2019 年 2 月至 22 日 22 February 2019	**染出真我（高中同學會籌辦）** (SSCLUB/001) （授課語言：粵語） Tie It Dye It (Organised by Senior Student Club) (SSCLUB/001) (Language: Cantonese)	中一至中六香港資優教育學苑初步及正式學員 S1 to S6 HKAGE preliminary and full members	2018 年 12 月 11 日 11 December 2018	2019 年 2 月 8 日 8 February 2019	先到先得，額滿即止 First-come-first-served

- 有關學生課程及活動的最新消息，請瀏覽：http://www.hkage.org.hk/b5/student-programme/face-to-face。
- 有關網上學習課程的詳情，請瀏覽：http://www.hkage.org.hk/b5/student-programme/online。
- 有關學生講座的詳情，請瀏覽：https://www.hkage.org.hk/b5/talk
- 所有課程資料僅供參考之用，如有更改，恕不另函通知。所有資料以網頁的最後公佈為準。
- For updated information of student programmes and events, please visit: http://www.hkage.org.hk/en/student-programme/face-to-face.
- For details of online programmes, please visit: http://www.hkage.org.hk/en/student-programme/online.
- For details of student talks, please visit:https://www.hkage.org.hk/en/talk
- All the programme information is for reference only and is subject to change without prior notice. All information is subject to the latest announcement on the website.

2019 年 3 月至 2019 年 5 月 學生課程及活動動向
非甄選課程
Forthcoming Student Programmes and Events in March 2019 to May 2019
Programmes with No Screening

非甄選課程：
- 此類課程不設任何甄選問題、選拔試或其他甄選方式。
- 學員可於下列課程中報讀最多 5 個課程。報名時，學員必須列明志願（第一志願、第二志願、第三志願如此類推）。
- 學員只可遞交報名一次。報名遞交後，不得更改志願及課程。
- 學員如報名截止前退出課程，志願將維持不變。（例：學員選了三個課程後，申請退出第一志願課程。學苑只會維持學員的第二志願及第三志願，而不會提升學員的志願。
- 學苑會先根據學員志願，再以電腦系統隨機取錄學員。如學員獲取錄的課程與其他課程時間重疊，學苑將會因應情況考慮是否仍然取錄學員。
- 未曾完成申請課程的學員將獲優先考慮
- 學員應避免同時報讀時間重疊的課程。
- 學苑對課程取錄結果有最終決定權。

Programmes with No Screening:
- There are no screening questions, written test or other screening methods for this type of programmes.
- Student members can select up to 5 programmes from a list of selection. Student members have to state the priority when submitting the application. (1st priority, 2nd priority, 3rd priority, etc)
- Application can only be submitted once. Once it is submitted, the priority and the programme selection cannot be changed.
- If a student member withdraws from a programme before the application deadline, the choice priority will remain unchanged. (Example: A student selected three progarmmes and withdraws from the 1st priority programme. The choice of 2nd and 3rd priority will remain unchanged with no promotion in priority.
- We will select the students based on the student's choice of priorities and a randomly generated selection by the computer system. If there is time clash between the applied programme and other programmes with offer, we will consider if the student will still be accepted.
- Priorities will be given to student members who have not completed the applied programmes.
- Students should avoid applying programmes with time clash.
- The decision of HKAGE on the result of selection should be final.

課程日期 Programme Date	課程 / 活動 Programme/ Event	對象（香港資優教育學苑學員） Target Participant (HKAGE student members)	開始報名日期 Programme Application Start Date	截止報名日期 Programme Application Closing Date	報名結果發佈日期 Programme Application Result Announcement Date
人文學科（小學）Humanities (Primary)					
2019 年 3 月 2、9、16、23 及 30 日 上午 10 時 – 下午 1 時 2, 9, 16, 23 and 30 March2019 10:00a.m. – 1:00p.m.	**倫理 I（程度二）課程：人生與倫理**(HUMP1321) （授課語言：粵語） Ethics I (Level 2) Course: Life and Ethics (HUMP1321) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
2019 年 3 月 16、23 日及 4 月 13 日 上午 10 時 – 下午 1 時 2019 年 3 月 30 日及 4 月 6 日 下午 2 時 – 下午 5 時 16, 23 March and 13 April 2019 10:00a.m. – 1:00p.m. 30 March and 6 April 2019 2:00p.m. – 5:00p.m.	**香港社會課程（程度一）：從有形到無形**(HUMP1541) （授課語言：粵語） Hong Kong Society Course (Level 1): From Tangible to Intangible (HUMP1541) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
2019 年 4 月 23 及 24 日 上午 9 時 30 分 – 下午 12 時 30 分 2019 年 4 月 25 日 上午 9 時 30 分 – 下午 12 時 30 分及 下午 2 時 – 下午 5 時 23 and 24 April 2019 9:30a.m. – 12:30p.m. 25 April 2019 9:30a.m. – 12:30p.m. and 2:00p.m. – 5:00p.m.	**基礎新聞學課程（程度一）：小記者 面向世界**(HUMP1811) （授課語言：粵語） Basic Journalism (Level 1): Junior Journalist Scheme (HUMP1811) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
科學科（小學）Sciences (Primary)					
2019 年 4 月 23 及 25 日 上午 10 時 – 下午 1 時 下午 2 時 – 下午 5 時 23 and 25 April 2019 10:00a.m. – 1:00p.m. 2:00p.m. – 5:00p.m.	**再生能源課程（程度一）：救救地球先生**(SCIP1311) （授課語言：粵語） Renewable Energy Course (Level 1): Save Mr. Earth (SCIP1311) (Language: Cantonese)	小四至小六 P4 – P6	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
領導才能（中學）Leadership (Secondary)					
2019 年 3 月 23、30 日及 4 月 6 日 上午 9 時 30 分 – 下午 12 時 30 分 下午 2 時 – 下午 5 時 23, 30 March and 6 April 2019 9:30a.m. – 12:30p.m. 2:00p.m. – 5:00p.m.	**領導才能基礎課程：領袖演講學 - 你必須卻未學好的演說與溝通**(LEAS1220) （授課語言：粵語） Introductory Course in Leadership: Leadership Speech - What you should know about public speaking and communication (LEAS1220) (Language: Cantonese)	中一至中四 S1 – S4	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
個人成長及社交發展（中學）Personal Growth and Social Development (Secondary)					
2019 年 3 月 16 日 上午 9 時 30 分 – 下午 12 時 30 分 16 March 2019 9:30a.m. – 12:30p.m.	**情意教育工作坊 — 自我管理 (III)** (PGSSW0035) （授課語言：粵語） Affective Education Workshop: Self Management III (PGSSW0035) (Language: Cantonese)	中一至中三 S1 – S3	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019
2019 年 5 月 4 日 上午 9 時 30 分 – 下午 12 時 30 分 4 May 2019 9:30a.m. – 12:30p.m.	**情意教育工作坊 — 社交關係 (I)** (PGSSW0036) （授課語言：粵語） Affective Education Workshop: Social Relationship I (PGSSW0036) (Language: Cantonese)	中一至中三 S1 – S3	2019 年 1 月 17 日 17 January 2019	2019 年 1 月 24 日 24 January 2019	2019 年 1 月 31 日 31 January 2019

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We always welcome feedback and enquiries on this issue of *Gifted Gateway*. Please do not hesitate to contact us.

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