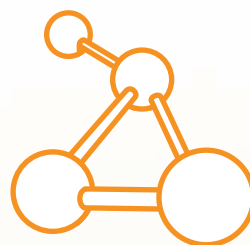


# 獲卓越教學獎的教學實踐

Teaching practices presented with the Award

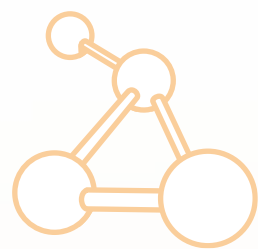


$$E=mc^2$$





$E=mc^2$



# 主動創新

## 探索科學求真精神

**獲卓越教學獎教師**

凌施茵老師

**所屬學校**

浸信會永隆中學

**教學對象**

中一至中二（科學科）

中三至中六（生物科）

### “教學理念

從生活出發，透過科學探究，讓學生愛上科學，培育勇於創新和求真的科學態度；藉考察體驗，突破地域與年齡局限，拓寬學生自主探索知識的空間。

”





## 教師專訪



▲舉辦跨科組活動「生活科學72小時」，提升學生對科學的興趣。



▲學生合作完成實驗，培養協作解難能力。

「薑汁撞奶」為甚麼會凝固？為甚麼砂糖可以製成棉花糖？這些生活上的大小問題，其實都能以科學原理解答。凌施茵老師相信，科學探究不應只局限在書本和課室裏，而是不論何地都能發掘科學帶來的樂趣。

凌老師教學20年，她坦言科學的發展一日千里，現今備受重視的「生物科技」，身為生物科教師的她卻從沒有深入學習過，「雖然書本或網上資料都可以用於教學，但我覺得這樣對學生有所虧欠。」因此，她重回大學進修，並在準備寫畢業論文時，選擇了研究自己喜歡的題目，又向學校申請成為兼職教師以爭取學習時間。凌老師覺得重返校園選擇研究題目進行自主探索的過程很愉快，她認為若學生也有自訂研究題目的空間去進行自主探索，定必提升他們的學習興趣和自主學習能力。

### 加入二維碼 一掃即學

凌老師決心把自己的學習經驗帶給學生，惟她強調讓學生從「你說我聽」的教學方式轉變成「自主學習」

並不能一蹴而就，「教師必須慢慢放手，減少學生在學習過程中的挫敗感」，故此，她由中一級開始，在課程中加入了不同的互動元素，循序漸進地培養學生主動探索的習慣。

凌老師認為學生在小學時已累積了良好的科學知識基礎，初中的課程應以深化已有知識，培訓學生探究精神為重點，若用傳統方式教學，學生必然很快失去興趣。她嘗試在工作紙上加上二維碼（QR碼），讓學生回家後用智能手機掃描二維碼，連結至短片，看完短片再做工作紙，作為家中的預習課。

她又預備一些小道具，透過學生親自動手做小實驗，加深對知識概念的掌握，同時培養求真精神。凌老師憶



▲透過「BIO對對碰遊戲卡」認識傳染病的特徵

述一次教「物質密度」時，她忽發奇想拿出一個十元硬幣，問學生能否設計實驗，找出硬幣銀色和金色的部分各佔的比例。他們用了一整節課去量度並計算答案，下課後有些學生更上網搜尋資料，並指出課堂上計算出來的答案有誤。「我十分欣賞學生在下課後仍用心查找答案，實踐了自主學習和培養出求真態度。」

### 循循善誘 無懼挑戰

學生就讀中五時，須自選題材，訂立研習的題目，再用一星期時間設計實驗，並找出結果。「平時都是我給他們題目，這次由他們自訂題目，不少學生都突然失去方向。」凌老師觀察到，高材生傾向選擇有把握的題材。「他們會選擇研究『薑汁撞奶』的原理，出錯的機會比較小。不過我會從中再給他們挑戰，例如研究不同脂肪比例的牛奶的凝固情況。」她又表示，學生最初設計的實驗步驟難免粗疏，也難免出錯，不過透過討論的過程，他們學懂慢慢修正實驗的步驟和記着正確做法，這種方式比教師平日面命耳提更有效。

### 科學源自生活 寓學習於娛樂

凌老師很樂意讓學生明白科學不只存在於課本中，更是源自生活。她不但帶領學生到戶外考察，了解生物和環境之間的關係，更從日常生活中取材，讓科學學習跳出書本。

讓凌老師印象最深刻的是，有一組學生研究果汁能否染髮，當他們的實驗研究進行到尾聲時，她送上自己的頭髮給學生進行最後測試，可惜結果不如預期。眼看實驗「失敗」了，學生難免失望。凌老師和學生一同檢



▲帶領中一級學生到濕地公園考察，學習量度風速。

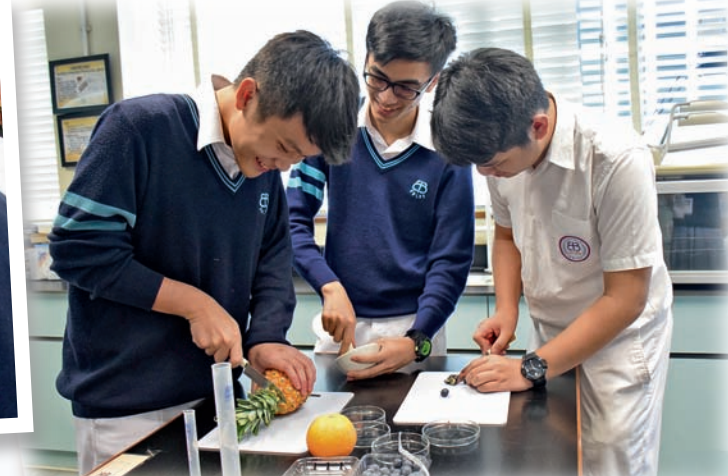
討實驗的步驟，並表示世上沒有失敗的實驗，每一個實驗都是有意義的，透過學生的探究、反思和檢討，可以去改進、修正，繼而一步步邁向成功。即使實驗結果與預期不同，但我們從中亦有所得着，因此不要害怕嘗試，也不要擔心失敗。」

然而，並非每個科學理論都能透過實驗查證，如高年級有關「傳染病」的課題，便需要學生牢牢記住各種知識，部分學生坦言感到吃力。凌老師為此製作了一系列學習卡，更設計了一些教學遊戲，讓學生「寓學習於娛樂」，提升對學科的興趣。

凌老師的課程讓學生愛上科學，「有畢業生在大學修讀社工系，卻為興趣選修了一科『生物科技』，因為很想念中學上生物課的時光！」而她最渴望的是，能培養學生根據科學證據作出明智抉擇的能力，並在生活中運用科學知識解決問題。



▲凌老師透過小組討論，引導學生從多角度思考問題。



▲跨學科專題探究，學生嘗試以果汁製作染髮劑。





## 教學分享

科學是一門有趣的知識，除了可讓學生學習到一套解難的技能，更重要的，是培養學生大膽創新而又嚴謹求真的態度。憑着對科學的熱愛，希望感染學生愛上科學，我一直抱持「飛越界限」、「自主探索」的理念，設計和嘗試不同的學習活動，信任學生「做得到」，與學生們一起經歷愉快而豐富的學習過程，達至教學相長。

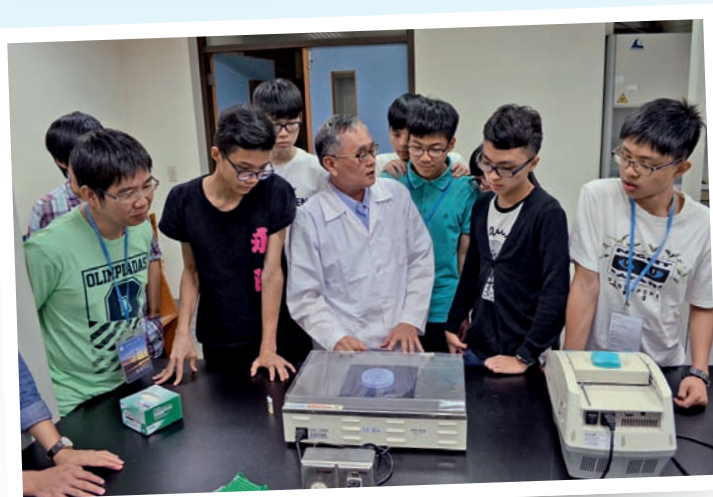
### 學習無界限

學習科學，不應局限在課室之內，因此，我有策略地編排不同的野外考察活動，讓學生在初中三年的科學和高中其中兩年的生物學習中，建立尊重自然生態及保育的態度。每年，我會帶領中五級修讀生物科的學生進行境外學習，參觀當地大學的實驗室，親身做生物科技實驗，如基因工程實驗。



▲透過檢視實驗結果與學生探討如何改良實驗設計

比起一般的課堂，這一系列多元化的活動，更能激發學生的興趣，讓他們對課題有更全面和立體的認識，所以有學生畢業後，在大學主修生物醫學科學，修讀生物科技或與醫護相關的也不少。我希望輔助學生飛越有形無形的界限，拓寬他們尋求知識的空間，幫助他們為自主學習作好準備。

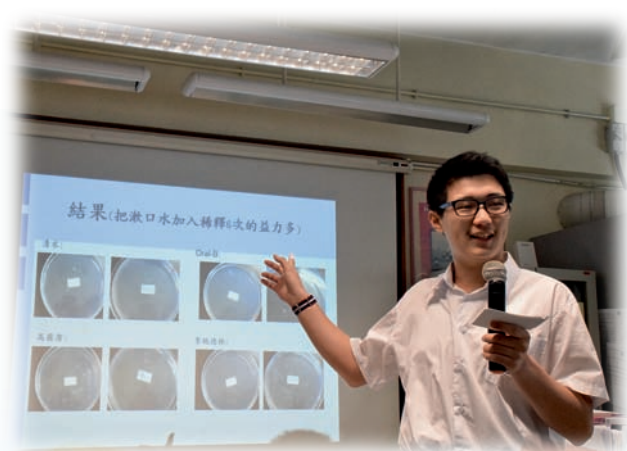


▲到境外進行考察學習，跟隨當地大學教授學習基因重組技術。

### 藉科學探究帶動「自主學習」

學校曾參加學校支援計劃。接受完專業培訓後，我更堅信透過科學探究活動，將課堂重心由教師轉移至學生，有策略地培訓學生掌握各種自主學習的技巧，循序漸進給予學生更多自由度，能讓他們懂得自訂探索目標，自己建構知識。

推行自主學習的策略共分三個層面，由中一級入學開始，課堂重點旨在發展學生科學探究的思維和技巧。我設計了不少更有趣的實驗，以取代教科書的部分實驗，讓學生更投入學習。例如：利用燒杯，把乾的粟米粒加熱製成「爆谷」，讓學生觀察過程中的變化，藉同學間的分享，學習觀察的技巧。第二階段，我讓學生分組，設計一個公平測試的方法，比較不同溫度對製作「爆谷」的影響，鞏固他們對公平測試的掌握。因着學生有不同的特質，有時需要透過不同題目重複訓練實驗技巧，在



▲中五級學生進行跨學科專題探究成果匯報

確定他們已對科學探究有穩固的基礎後，才開展最後的自主探索階段。在設計學習活動時，必須讓學生覺得這活動是「屬於他們的」，才能驅使學生積極主動去學習新知識，所以，在這階段我會利用一些生活情景或小玩具，激發他們探索科學原理的慾望。

有一次，我帶給學生一個很古老的玩具——「陶器小人偶」。若把熱水澆在人偶身上，它便會噴水，其實當中運用了中一級課程內「粒子理論」中的「氣壓」原理；這玩具使全班學生非常雀躍。孩子總是喜歡玩遊戲，但我要求他們先解釋小人偶噴水的原理，所以他們十分積極上課，不斷提問，互相補充答案，而每次我只回答「是」或「不是」，透過同學間的討論，他們便能釐清當中的科學原理。隨後，由他們分組設計公平測試，探究溫度和氣壓的關係。學生的設計可謂花樣百出，有一組用尺量度噴水距離，另一組則用秒錶量度噴水時間，又有一組用量筒量度噴水量。雖然各組設計不同，但全都緊扣探究題目，而且最後都能反思自己在參與活動中的表現有何優缺點，期望下次能再進一步，師生們都經歷了愉快又滿有成果的一節課。



▲學生利用小人偶自訂題目並設計實驗

一般人會認為，教師教導學生「自主學習」，就是讓學生自己去學習，自己甚麼都不用做。事實卻相反，不單每項學習活動都必須經過精心設計，教師必須細心留意，藉提問、點撥，引導學生自我完善。這比起傳統的教學方式雖然辛苦多倍，但學生卻終生受用。



▲學生參加科學比賽，展現自主探究的成果。

### 活在科學中

學習源自生活，科學若脫離生活，只會是一堆堆枯燥的文字和公式。

2015年台灣發生了「八仙水上樂園粉塵爆炸」慘劇，當中涉及「能量轉換」的概念，我藉此引入討論。看見學生能將知識轉移並運用曾習得的「氣壓」原理，來進行討論和解釋現象，可見以往精心策劃的學習活動，確實帶給他們深刻記憶，並能靈活運用於不同課題，效果令人驚喜。同樣，2016年「迷你倉大火」也能緊緊扣連「火三角」的課題，為學生提供很大的討論空間。除了知識層面，每次設計工作紙，我都會在最後加上一題處境題，例如：若你身在現場，你會怎樣救人自救？期望將知識應用在日常生活中，藉此深化學生的學習，並培養出他們正面的價值觀和態度。

### 結語

經過多年的教學實踐，看見學生不但能掌握科學的知識和技能，更對科學產生濃厚興趣，實在令人欣慰。反思過去的教學實踐，我堅信要讓學生成為獨立自主的終身學習者，教師用心教學必不可少。教師要具備靈敏的觸覺，要因應學生的需要調整教學策略，也要成為積極的自主學習者，不斷自我完善。

►凌老師在屯門區聯校教師專業發展日分享教學經驗







## 評審撮要

“帶領學生「飛越界限」、  
「自主探索」。”

凌施茵老師對推廣科學教育充滿熱誠和抱負，她認為教學是「生命影響生命」的工作，要使學生愛上科學，同樣要「生命影響生命」。在推動科學教育時，她所堅守的信念是帶領學生「飛越界限」及「自主探索」。凌老師以身作則，為學生樹立終身學習的榜樣，能與時並進，適時進修新的課程，務求掌握最新的科學知識，以優化科學教育的學與教。凌老師了解學生的不同學習需要，在初中科學科課題的設計上，積極向科組的同工提供意見，促進學與教的成效。

透過一系列的課前準備，凌老師能培養學生課前預習的良好習慣，以及提升他們的自學能力。凌老師預先搜尋及製作一些教學短片，以「翻轉課堂」的模式，讓學生於家中自學，並透過一系列的課前準備，引導學生思考、討論及自行設計實驗。她把不同組別的實驗設計提供予學生討論，在討論的過程中，學生學懂欣賞不同設計的優點，亦能建議如何改善個別設計不足之處，學習變得更積極投入，學習效能也有所提升。

凌老師為學生提供科學探究的學習機會，能按學生能力去設計課堂教學活動。課堂所見，凌老師在教授「利用植物製作酸鹼指示劑」的課題時，讓學生自行設計實驗，以自選植物製作酸鹼指示劑，並進行測試，以檢視指示劑用作測試溶液的酸鹼值時的準確度。為了提升學習興趣，凌老師以比賽方式評估各組的表現，而比賽的「評分準則」也交予學生自行制訂，為自主學習建立穩固基礎。凌老師在課堂上與學生討論「評分準則」時，能靈活運用相關的電腦程式，促進課堂內師生的互動和



▲凌老師透過有效的提問，促進課堂上師生互動。

加強學習氣氛。凌老師能照顧學生的多樣性，適時給予學生正面的回饋，並善用提問、點撥、補充等教學技巧，促進學與教。

凌老師每年均會帶領中五級學生進行境外學習，參觀當地大學的實驗室，並學習和體驗高端的實驗操作，讓他們學習最新的生物科技實驗技術，以豐富學生的科學知識，拓寬他們的視野。她積極與校內及校外教師分享學與教的經驗，互相交流心得；亦與其他學校的教師建立學習圈，讓同工在不同的平台上作互動交流，為教師的專業發展作出貢獻。

### 索取有關教學實踐資料的途徑

📍 學校網址：  
<http://www.bwlss.edu.hk>

### 聯絡方法

📞 聯絡人：凌施茵老師

📞 學校電話：2464 3638

📞 學校傳真：3463 4382

✉ 電郵：lsy@bwlss.edu.hk

▼ Left to right: Ms LIN Mei-yu, Dr SUEN Ka-chun and Mr LI Man-ho



## Nurturing Students' Scientific Literacy

### “Teaching Philosophy

We adopt the Predict-Observe-Explain (POE) approach in science teaching. To broaden students' horizons, we have been enhancing our school-based Science curriculum by adding Biotechnological topics to junior Science curriculum. We believe that scientific literacy is properly cultivated through the provision of authentic learning experience.”

### Teachers presented with the Award

Dr SUEN Ka-chun  
Ms LIN Mei-yu  
Mr LI Man-ho

### School

Po Leung Kuk  
Laws Foundation College

### Subjects taught

Science (S1-2)  
Biology (S3-6)





## Interview with the Teachers

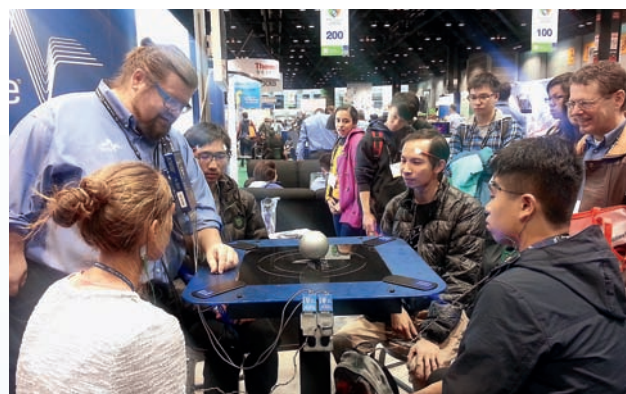
### Nurturing critical thinking

"The nature of science is to find solutions to a problem. We encourage students to act as scientists when dealing with an issue. Before jumping to conclusion, they have to observe, collect evidence, conduct experiments and analyse the findings," said Dr SUEN Ka-chun, the Head of the Board of Science, who coordinates the development of the Science curricula at the School. "The training in science will benefit students for a lifetime. Nowadays, we receive tons of information through the media. Scientific and unbiased analysis of the information would come in handy when we need to verify the accuracy of information."

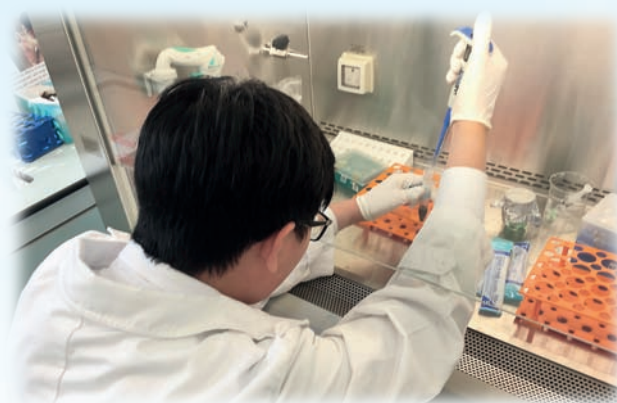
### Adopting integrated curriculum

The School sees the importance of Biotechnology in the future development of science. So all junior students are required to study Biotechnology as is an integral part of the school-based Science curriculum. The topics covered are intriguing, such as the genetic modification of *E. coli* and the effects of antibiotics and anti-bacterial agents like Dettol. When there are closer links between the Science curriculum and daily life, students are motivated to learn more.

Mathematics can be a hurdle deterring students from studying science. "Certain science formulae do require mathematical interpretation that may be a bit abstract for some students, but we seek to explain the relationship among different variables in a formula through experiments," explained Mr LI Man-ho, the teacher-in-charge of the Gifted Education Programme. He gave an illustration, "When we



▲ Two students and Dr. SUEN taking part in a "brainwave" competition in a neuroscience conference in the United States of America (U.S.A.)



▲ A student preparing plant extract to conduct cell culture experiments

teach the density formula (density equals to mass over volume), we ask students to mould the same amount of resin clay into various shapes and put the moulded objects in water. They find that some float while some sink, despite the fact that all objects have the same weight. Then they understand better what density means. They get so thrilled that they start a competition to see whose designs have a lower density and float better."

Over the years, Mr LI has witnessed improvement in students' learning attitude when they become engaged in science lessons through conducting experiments. In some cases, students even learnt the relevant mathematical concepts by themselves in order to develop a deeper understanding of the science concepts that interest them. This shows that students have the ability to learn, although not at the same pace and in the same way.

### Inspiring budding scientists

Students seldom get bored, as they can explore a wide range of topics in science lessons. For example, the problem-based learning approach prompts students to review science literature by themselves to find answers to questions. "Not long ago, there was widespread news coverage about the harmful effects of using Millennium Oil for cooking. I then came up with the idea of asking students to find out what would happen when cells were exposed to Millennium Oil. They were motivated to conduct experiments," Dr SUEN recalled.

The lesson on Millennium Oil is certainly one of the many memorable lessons Dr SUEN's students had. When asked about the next hot topic to be examined, Dr SUEN firmly said, "Stem cells. Stem cells bring us tremendous medical benefits, but they can turn themselves into cancer cells too."

Students at Po Leung Kuk Laws Foundation College (PLKLFC) are nurtured to contribute to society using their science knowledge. Dr SUEN added, "Not only are new issues worth exploring, some seemingly trivial topics, like insects, also shed light on science investigations."

### Creating new learning opportunities

Knowing that exposure to the outside world could have lasting effects on students' personality and intellectual development, teachers at PLKLFC keep offering new learning opportunities for students to expand their knowledge and stretch their potentials. Interdisciplinary links were created between the Science curriculum and other subjects, such as Geography. For instance, students are guided to do research on horseshoe crabs, and to participate in various local and overseas conferences to promote the conservation of the species.

The most rewarding of all is not about winning awards and prizes, but gaining first-hand experience through collaborating with like-minded counterparts through joining competitions and conferences. The students at PLKLFC are encouraged to demonstrate their capability in the "Be-A-Scientist" programme. Moreover, five batches of students have participated in international conferences, such as Annual Meeting of Society for Neuroscience held in the U.S.A.. Six research reports written by students were published in Science Arena, an international science journal.



▲ Students discussing the experimental procedures with Mr LI

"Peer interaction facilitates learning and sharing of knowledge, and bridges the ability gap between students," said Ms LIN Mei-yu, the Head of the Integrated Science Department, as she recalled one of her most memorable experience. "Once, we asked students to investigate the life span of lobsters. Students turned surprisingly enthusiastic about taking care of the lobsters after this project started. They formed groups and shared the duties among themselves. Some were responsible for feeding the lobsters and cleaning the tank, while others nursed the lobsters to breed. They even went back to school during

holidays to ensure that the little creatures were well taken care of. In the process, they shared the practices which worked and reflected on those which failed. Because of this, they developed a closer collaboration. Since I guided them along the way during the project, I also became closer to them too. It's truly satisfying to see them develop deeper understanding of the subject through collaborating with their classmates," Ms LIN's eyes twinkled with merriment when she recalled such fruitful work.



▲ Students discussing how to make wine

### Reviewing and improving Science curricula

Conducting experiments requires patience and perseverance. There is no guarantee on getting the desired results. No matter how cautious one seeks to be, the possibility of failing cannot be eliminated. "Undesirable outcomes are meaningful findings too," Dr SUEN said in an encouraging tone. "As Carl Jung said, 'Knowledge rests not upon truth alone, but upon error also.' " It is this point of view that has inspired the awarded teachers at PLKLFC to keep reviewing and improving their Science curricula. To them, the satisfaction lies not in how brilliant students do in examinations, but how fruitful the learning experience is. The Award presented to the teachers is an acknowledgement of their endeavours and the School's commitment to providing a comprehensive Science curriculum for nurturing the all-round development of students in all these years. "There are still lots to be done," the team of teachers nodded in agreement. "We hope that we would trigger a ripple effect by sharing our teaching experience," said Dr SUEN.

With no doubt, this dedicated team of teachers always think positive. Supported by the school management's forward-thinking, the teachers at PLKLFC will continue to enhance the school's science education and help students learning more about science.





## Teachers' Sharing

By providing various learning opportunities for students, their interest, curiosity and creativity in science can be nurtured. As scientists always predict, observe and explain the results of experiments, we adopt the "Predict-Observe-Explain (POE)" approach in science lessons to nurture students' scientific literacy. To develop scientific literacy of students, we plan interactive lessons for them and create various learning opportunities in which students can enhance their science process skills.

### Reflecting on teaching effectiveness

In lesson planning and curriculum development, we, as science teachers, always ask ourselves, "Are students learning science in our science lessons?" Sometimes, we may think that our lesson is good enough as it is full of interactive activities, manageable lesson content and well-designed assignments. Yet, students might be regurgitating concepts listed in textbooks or worksheets without truly understanding them. For example, although students may be able to give many reasons why plants need water, they may have no interest in predicting and observing what a plant will become in the absence of water. Then, it is time for us to think about whether the objective of the lesson is properly met.

### Enhancing students' understanding

How can we make lessons effective for students to learn science? To answer this question, we need to know how scientists conduct investigations and analysis. They always predict, observe and explain the results of experiments. Therefore, we adopt the POE approach in science lessons. The POE approach allows students to make predictions before doing an experiment. Through discussing the predictions made by different students, teachers can create an interactive lesson. From our experience, the POE approach can be applied to all science lessons as students' prior knowledge is challenged. Once it is challenged, new knowledge is built up and active learning occurs. Another important reason why we implement POE approach in science lessons is that students' perceptions of

a scientific concept is uncovered in the process of "Predict, Observe and Explain". Therefore, a science teacher can understand what students are thinking about and then develop a suitable learning strategy to help them build up a new science concept. In the process of "Explain", students utilise and integrate the concepts that they have learnt to explain observations. Therefore, POE is a good approach to promote inquiry-based learning and enhance science understanding. It is our belief that students under the training of POE will develop interest towards science. In our classes, we observe that students like science as they are not asked to memorise a fact but inspired to learn a concept.

### Nurturing future scientists

In some of our enrichment programmes for scientifically gifted students, we integrate POE into research-based learning. It is encouraging to see that they like science very much as they are excited to do experiments in the laboratory after school. We believe that our teaching strategy is effective in promoting students' interest, curiosity and creativity in science.



▲ Two students examining the quality of products invented by other students



▲ Two students awarded a prize in The China Adolescents Science and Technology Innovation Contest  
► Students sharing their experience of invented products

As a science teacher, we are dedicated to nurturing future scientists. In recent years, many of our students who are groomed as young scientists have achieved outstanding performance in scientific research and inventions.

### Highlights of the school-based curriculum

It is important that we cater for students with different interests and abilities. We create various learning opportunities for students to explore and experience science.



▲ Students discussing how to make an effective parachute on Science Day

To nurture students' scientific literacy, we have incorporated elements of biotechnology, adopted gifted education programmes and devised different "Be-a-scientist" activities in our school-based Science curriculum for junior levels in addition to covering the core parts in the junior Science curriculum. In 2011/12, we launched "Young Scientists' Conference" in which P6 and S1 students shared their scientific research data and inventions. To nurture gifted students, we also started "Budding Scientists" programme aiming at P6 to S2 students in 2012/13 and encouraged our students to present their research findings in international conferences.



▲ Students presenting their research findings in an international conference held in the U.S.A.

### Establishing a learning community

In the past 12 years, we also put much emphasis on teachers' continuing professional development in curriculum planning. Our whole team of science teachers put various teaching strategies into practice when teaching different topics in the Science curriculum and formed a learning community to share our experience.

### Conclusion

Our belief is that students will like science when they are engaged in interactive activities which give them the experience of being a scientist.



▲ Awarded teachers sharing their experience in conducting learning and teaching activities





## Assessment Summary

“The implementation of the “Predict-Observe-Explain” approach to nurture students’ scientific and analytical skills”

The awarded teachers are enthusiastic for their work. To achieve the goal of nurturing young talents, the Board of Science has been set up to develop the school-based Science curriculum which promotes scientific literacy among students on the one hand, and grooms the talent of the gifted students on the other. Such innovative school-based Science curriculum serves to provide students with extensive science research opportunities.

The awarded teachers have profound knowledge in Biological Science. They always have close collaboration with each other and have professional sharing meetings and peer lesson observations, so as to enable them to reflect and refine their strategies and skills in science teaching.

For the junior levels, the awarded teachers have further developed a 3-year junior gifted programme, the Budding Scientists, for students from P6 to junior secondary levels, to help students acquire basic knowledge and skills in setting up experiments related to Biology, Chemistry and Physics. As for the senior levels, regarding the gifted education programme, some of the students are selected to advance their studies in the school-based Neuroscience Curriculum in which students try to apply knowledge and skills acquired by doing research projects.

The awarded teachers are able to help students develop curiosity, interest and creativity in scientific investigation. They provide students with various learning experience, enabling them to apply their knowledge and skills acquired and cultivate positive values and attitudes in the process. Lessons conducted by the awarded teachers were very well planned and incorporated lots of students’ group activities. They were able to skillfully adopt the “POE” teaching model, which encourages students to predict, to observe and to explain. As observed, through this “POE” approach, students’ investigation skills and presentation skills were enhanced.

In order to better bridge the science learning from P6 to S1 and S2, the awarded teachers design the Biology and junior



▲ Students engaging in a group discussion about water and plant issues

secondary Science curricula for students studying at P6 in its through-train partner primary school, targeting the smooth transition at interface with the junior secondary Science Curriculum and the provision of a balanced foundation in Science Education for students. In addition, the awarded teachers have organized Joint-school Young Scientists’ Conference for P6 and S1 students, which serves to enhance students’ abilities to apply science knowledge in daily life and to develop their potential to conduct scientific investigation.

The awarded teachers have successfully nurtured students’ scientific literacy. Students have participated in a number of international competitions and events in science research projects, delivered their research results, and won a number of awards in national competitions and events.

The awarded teachers have shared the school’s experience in the development of STEM education and the school-based Biotechnology Curriculum through conducting workshops, conferences and seminars.

### Ways to Obtain Information on the Teaching Practice

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▼ Left to right: Mr CHUNG Cheuk-hung, Vincent, Mr HO Tik-shun, Ms LEUNG Yue-shan, Jennifer and Dr CHAN Pik-ying



## Empowering Students to Become Independent Learners in Scientific Investigation

### “Teaching Philosophy

We believe that an understanding of the biodiversity of plants promotes awareness of environmental conservation. Adopting a multidisciplinary approach, STREAM, we would like to educate the younger generation to observe the principles of sustainable development, develop an awareness of environmental conservation, and act as a responsible citizen.”

#### Teachers presented with the Award

Mr HO Tik-shun  
Ms LEUNG Yue-shan, Jennifer  
Dr CHAN Pik-ying  
Mr CHUNG Cheuk-hung, Vincent

#### School

The Chinese Foundation  
Secondary School

#### Subjects taught

Science (S1-3)  
Biology (S4-6)





## Interview with the Teachers

### Learning outside classrooms

Over the years, sustainable development has been one of the core agendas promoted by United Nations, and it is also one of the core values of the education at the Chinese Foundation Secondary School (CFSS). One of the major tasks of the school is to enhance students' well-being and nurture their whole-person development. Students are provided with numerous opportunities to learn outside classrooms, such as the CFSS Environmental Trail and Medicinal Plant Garden.

Since CFSS was founded in 2000, the School has made concerted efforts to develop the Environmental Trail, gradually adding various facilities such as the garden for ferns, cacti and precious medicinal plants. The Seed Bank, Herbarium & Seedling Nursery Center, and Geology and Climate Change Center were also set up in the School to help students gain a more comprehensive understanding of topics relating to biodiversity. Now the campus is housing 1046 species of plants, among which there are over 200 species of seed specimens and fossil specimens. And the collection is still expanding. Simply stepping outside the classroom, students could venture into nature to learn about plants. "The Environmental Trail is home to an array of birds and insects. More birds and butterflies have been attracted to visit our school since the Trail was built," said Ms Jennifer LEUNG, the Head of Biology Department, sharing the joy of seeing the natural environment blending in with the school.

A variety of activities can be conducted when students are immersed in an environment which gives them authentic learning experiences. For instance, students can check out mushrooms budding on the Trail after rain, video-record the



▲ Students conducting science investigation



▲ Mr HO leading students to investigate the plants biodiversity in the Environmental Trail at school

process of growth at time interval and share the recordings with their peers. "Experiential learning has certainly aroused students' interest in learning Science. We have noticed a change in attitude over time. They have become more inquisitive and appreciative of what nature has given us, which reflects that the approach used is effective," said Mr HO Tik-shun, the Assistant Principal responsible for Academic Affairs and Curriculum.

### Developing generic skills

"To think outside the box" is not a mere motto but a practice upheld by all at CFSS. Teachers keep exploring innovative ways to guide students. Instead of being asked to memorise concepts as a matter of fact, students are encouraged to examine, integrate and internalise the information they have acquired. Application of Information Technology has proven to be one of the effective means, both in learning and teaching. Since 2009, QR code has been used as a teaching aid to facilitate learning. Students can use their mobile devices to scan the code to obtain information of individual plants. Besides, they can analyse the temperature and light intensity data collected by using mobile devices, or hold discussions among themselves through the mobile application. "Treasure hunt apps are very popular too. Students enjoy the experience of learning through exploring. They keep asking me about the hunting game," said Mr Vincent CHUNG, a Science teacher. He is well aware of the advantages of introducing e-learning tools to the classroom, which enable students to increase their passion for learning. The awarded teaching team has created an online learning community to encourage the sharing of knowledge on electronic platforms. The Cloud Knowledge-Based (CKB) was therefore constructed to store students' findings.

When students are engaged in various activities, they use multiple generic skills at the same time, such as reading and writing skills, analytical/numeracy skills, presentation skills and investigation skills. They can explore art while making drawings of morphology of selected specimens. Those interested in engineering can take a step further to construct robotic sensor devices for scientific investigations.

### Applying Knowledge

"Students' creativity amazes me," said Dr CHAN Pik-Ying, the Head of Science Department. "During the experiment on testing the anti-oxidising properties of herbal tea, the extract from mint leaves only shown low anti-oxidising ability. Students then came up with the idea of adding lemon and lime to the mint extract. To their surprise, the anti-oxidizing ability of extract from mint leaves drastically increased ten times." They gained a sense of satisfaction after finding out the solution through trial and error. This shows how students benefit from self-directed learning.

According to Dr CHAN, most of the experiments are designed to help students develop investigative skills. For instance, when students test the effectiveness of using sugar cane residues and tangerine peels as the absorbents to remove lead content from water, they are not only required to apply knowledge of Chemistry, Biology and Mathematics during the experiment, they are also developing their problem-solving and thinking skills.

Dr CHAN went on to explain another experiment students conducted, of which the aim was to find out if Pu'er tea, among different kinds of tea, could reduce the hangover effect after alcohol consumption. To most people, Pu'er tea, sugar cane, tangerine, lemon and lime are merely food and drinks, but students treat them as materials for experiment. They treasure the opportunity to learn Popular Science, hoping that they could make a valuable contribution towards enhancing sustainable development of our environment. Often, a big discovery begins from a small thought.

To help students develop global perspectives, the school offers sponsorship for students to participate in exchange programmes. In the study tour to Finland, students, with the guidance from teachers, conducted surveys and science investigations to understand more about the Finnish innovation and sustainable development of natural resources. Among all the activities, students find school visits the most rewarding. "The Finnish students like to think, discuss, raise questions and then find solutions by reading further. This is something that we should learn from them," a student remarked after participating in the tour.

### Contributing to the community

The school culture encourages students to live in peace with the environment and with the community. This has inspired students to actively take part in community services. Through the Community Roadside Tree Project, students explained to the public about the benefits of planting trees along the roadside. In a workshop held by HK SciFest 2017, the public were invited to the Medicinal Plant Garden of CFSS to learn from students about how to make insect repellents using Chinese herbs. "Knowing that there is growing interest in using natural herbs as insect repellent owing to the spread of diseases such as Dengue Fever and Zika, students show the public how to grow the right choice of plants to stop mosquitoes from breeding in Fun Science Festival," Mr HO recalled with enthusiasm. It is a pleasure to see nearly everyone at school try to put knowledge into practice.



▲ Mr HO explaining the features of the specimen to students inside the Specimen Room which has a collection of over hundreds of fossils

### The way forward

The team of awarded teachers at CFSS is full of enthusiasm for teaching. They have dedicated themselves whole-heartedly to education. To them, teaching is not merely about the transfer of knowledge, but nurturing the whole-person development of students. "Winning the Chief Executive's Award for Teaching Excellence is a recognition of the School's concerted efforts. We still have lots to learn," said Mr HO. The team of teachers will continue to fine-tune the curriculum to enhance students' knowledge of sustainable development in a broader and deeper perspective. "We have many new ideas in mind," said Mr CHUNG. Perhaps students might forget some of the subject knowledge after they have left school, but they will surely remember the interactive lessons that teach them how to be responsible global citizens.





## Teachers' Sharing

### Building an environmental trail

Ten years ago, the place where the Environmental Trail was currently situated used to be a resting place for students during recess and lunchtime. Attracted by the vast diversity of trees, many birds build nests there. The tranquility of the place led us to think about whether the Trail could be converted into a learning ground to promote Popular Science and raise students' awareness of environmental protection. It is our hope that the boundless setting could allow students to explore biodiversity and develop global perspectives on environmental issues. Knowing that the Earth is plagued by problems such as resources exploitation and habitat destruction, students need to take steps to alleviate the aggravating environmental problems. The Environmental Trail embodies the values we would like to instil in students-being a mindful and responsible citizen who cares for the Earth. It might sound like a high expectation, yet we know it is a worthy cause deserving our endeavour when we see students relish the investigation of conducting biodiversity experiments in the Trail.

### Challenges encountered

To utilise the Trail for learning and teaching, we do not only have to identify all the plant species, but also reform the S3 Science and Information Technology curriculum so as to create interdisciplinary links between the two subjects.



▲ Student using a mobile device to scan the QR code on the display boards in the Trail to obtain information about the plant



▲ Students using mobile devices to study plant biodiversity at the Environmental Trail at school

Science teachers are responsible to develop the interactive content on plant biodiversity, while I.T. teachers provide assistance in setting up a network which allows students to learn plant biodiversity using mobile devices outdoors.

The development of the Mobile Learning Pilot Scheme took a year to complete. With the concerted efforts of the staff in the Science Department and the I.T. Department at school, we successfully established an online knowledge-based platform which contains detailed information of the plants, together with short video clips made by students. Students could access the information using their mobile devices by scanning the QR code on the display boards in the Trail. Though the development process requires strenuous efforts, the results are truly rewarding. After using this platform, Biology lessons have since then become more interesting and engaging.

However, just a few thematic lessons in junior science and I.T. are insufficient for students to fully utilise the Trail for inquiry learning. Different school clubs and subject departments also conduct activities at the Trail to give students authentic learning experiences. The Science Club and Green Guru Team use the Trail for their treasure hunt workshops and plant specimen collection and preservation workshops.



◀ Students making plant specimen in one of the activities conducted by the Science Club



▲ Students developing their investigative skills in studying the specimen stored in the Seed Bank

Campus TV team and I.T. teachers use the Trail for delivering the module of Creative Media. Visual Art teachers design tasks for students to do sketching of birds and plants on campus. Biology teachers ask students to collect herbal samples for extracting phytochemicals for their research projects and ecological studies. Our team has played an important role in coordination and resource management. The Scheme has inspired colleagues to collaborate with various teams and department for enhancing learning and teaching.

### Contributing to the community

The success of the online platform for outdoor learning at our school has provoked us to think about whether we can do something not just for our school but also the society. Besides acquiring knowledge and skills, students should internalise the concepts and values acquired in the curriculum, and spread the message of environmental conservation in the community.

With reference to the online platform developed for our school, we created a similar mobile application which allows children and the elderly to make herbal specimens from



▲ Students promoting plant biodiversity conservation in HK SciFest 2017 Fun Science Carnival



▲ Students conducting an investigative experiment

roadside trees in our community upon obtaining a license of herbal collection from the Agriculture, Fisheries and Conservation Department for this social service project. Several mobile learning workshops have also been launched in the local community to raise citizens' awareness of environmental conservation. It has been the second year we collaborate with the Science Museum in HK SciFest to promote biodiversity in the territory.

### Nurturing students

It is rewarding to see students take the initiatives to work on the projects related to biodiversity conservation and sustainability. They won local and national awards for their projects in science competitions and their efforts were widely recognised. We are most delighted that students are not examination-oriented, but are genuinely interested in constructing, integrating and internalising science knowledge through investigations. With a good learning attitude, students' academic performance in public examinations has greatly improved.

Some graduates are now working in government and non-government sectors on environmental conservation. Many students have also revealed their interest in pursuing further studies in science-related fields. Our alumni have helped their juniors through career talks and experience sharing sessions in their alma mater in recent years. We are pleased to be able to contribute to society by nurturing youngsters that can shoulder responsibility.

We are delighted that our effort has been recognised and we were given the Chief Executive's Award for Teaching Excellence. We would continue to strive for excellence in teaching and establish a positive and energetic environment for nurturing young talents.





## Assessment Summary

“To enhance students' scientific literacy and research skills through the study of plant biodiversity

The awarded teaching team is composed of four teachers. They all have profound knowledge in various science subjects and have shown great passion and innovation in teaching and curriculum planning. By fostering a culture of continuous reflection on pedagogical issues for enhancing the effectiveness of learning and teaching, they have made concerted effort to help students develop their collaboration skills, investigative skills and higher-order thinking skills.

The awarded teaching team has worked out a holistic and systematic plan to promote scientific literacy, which includes students' robust understanding of scientific concepts and processes and the application of science in authentic contexts. They have developed a coherent and systematic school-based Science curriculum that integrates the learning of plant biodiversity and environmental conservation with the Secondary Science curriculum. In addition, the awarded teachers have employed an inquiry approach and mobile learning to help students develop scientific literacy and groom their talent for future development.

The awarded teachers have made good use of the resources available both in the school and in the community to conduct activities which arouse students' interest in learning and engage them in exploring plant biodiversity and environmental conservation both inside and outside classrooms with a view to helping them gain global perspectives on environmental issues. Students of all levels are involved in many school-based science projects, such as the Seed Bank, Tree Project and the Chinese Foundation Secondary School Environmental Trail, so as to cultivate their interest in learning, particularly in plant biodiversity. Professional sharing and lesson observation have been conducted regularly to enable team members to monitor and evaluate curriculum implementation.

Members of the team effectively help students explore further on plant biodiversity and environmental conservation in



” ▲ Encouraging students to conduct science investigation on properties of fruit juice

an inquiry and interdisciplinary approach, i.e. STREAM (Science, Technology, Reading and Writing, Engineering, Arts and Mathematics) approach.

The awarded teachers demonstrated excellent classroom skills. Some interesting experiments were arranged to effectively arouse students' curiosity and interest in science investigation. Essential science process skills, such as making observation and taking measurements to verify the predicted results, were adequately included in the lessons. Teachers demonstrated their confidence and skills in leading students to carry out collaborative learning activities. As observed, students had strong learner autonomy, and were able to complete the learning tasks in groups efficiently. They could also use e-learning tool for pre-lesson reading and sharing ideas or findings during the lessons. Students were able to discuss, summarise and present their findings systematically.

The awarded teaching team has been invited for sharing and conducting seminars and exhibitions in relation to the promotion of biodiversity and other good practices in Science Education.

### Ways to Obtain Information on the Teaching Practice

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## 情境教學 引發學習興趣

獲卓越教學獎教師  
施瑪恩

所屬學校  
嗇色園主辦可譽中學暨  
可譽小學

教學對象  
中一至中三（科學科）  
中四至中六（生物科）

### “教學理念

研習科學除了學習科學原理，還可訓練自學探究、邏輯思考和分析解難等能力。要讓學生熱愛科學，首先要培養他們對科學的興趣。

”





## 教師專訪

「假如你是魯賓遜，流落荒島，沒有食水飲用，你會怎麼辦？」聽到教師提問，學生踴躍發表意見，有人說只好望天打卦等待下雨，有人提議過濾海水飲用……別以為學生在上語文課，一起討論和構思故事情節。他們其實正在上施瑪恩老師的科學課，通過情境故事學習海水淨化的科學原理。

施老師是一位敢於創新、富想像力和創意的教育工作者，擅長創設有趣情境，引發學生共鳴，培養他們對學習科學的興趣。他說在中學時代受到一位老師的薰陶而愛上科學，「他用心教學，不但教曉我很多科學知識，還經常跟我分享做人處世的道理，彼此關係亦師亦友。」恩師的言傳身教，施老師銘記於心，當上教師後，他決心以恩師為榜樣，以生命影響生命。「我希望學生對科學產生濃厚興趣，他們日後不一定要當科學家，或從事科研工作，最重要是懷有好奇心、求知欲和探究精神，不斷學習新知識。」

### 革新學與教模式 鼓勵參賽

施老師認為，通過學習科學，可以訓練自學探究、明辨性思考和解難的能力。「今天所學的科學知識，隨着時代進步或會變得過時，唯有擁有這些能力才能受用終身。」然而，他發現以往的科學科課程偏重教授基礎科學知識，教學模式沉悶死板，難以誘發學生的學習興趣和高階思維。以做實驗為例，學生依足程序，一個步驟接一個步驟去完成，既單調又跟日常生活掛不上鉤，學生未必明白箇中意義。他決心革新固有教學模式，讓學生體會學習科學其實充滿樂趣。

為此，施老師花了不少心思，如設計自主學習工作紙，除了詳細列明各個單元的學習目標和基礎概念外，還附有高階問題，讓學生在課前作深層次的預習。因應各單元內容，施老師加入情境主題，在課堂上與學生一同討論，引導他們思考，例如透過魯賓遜流落荒島要解決飲用水的情境，讓學生了解水的淨化原理，讓學生明白科學原理可確切應用於解決生活難



▲施老師重視課堂師生之間的討論，善於引導學生思考。

題，跟日常生活息息相關。

除了中央課程以外，施老師亦經常設計趣味科學活動，如製作牛奶膠水，讓學生體驗科學的樂趣。施老師又積極鼓勵學生組隊參與學界科學比賽，發揮科學研究的潛能。近年，該校學生在不同的學界科學比賽中，如香港學生科學比賽、香港青少年創新科技大賽等，均取得優異成績。學生研究的題目均取材自日常生活，如研究以生果皮製成紙張，提升紙的降解速度，反映他們具有敏銳的觀察力。

### 創意無限 發掘有趣點子

談及革新教學模式過程中的最大挑戰，施老師笑言是如何發掘和構思能夠引發學生共鳴的有趣點子，作為情境教學的題材。最難忘的一次，是他要教授結晶的原理，思前想後也毫無頭緒。某天靈機一觸，想出利用學生愛吃的棒棒糖變「戲法」，在課室即場示範將棒棒糖變成「鑽石珠」，要求學生破解當中的科學原理。學生由於從未見過「鑽石珠」，感到很新奇，議論紛紛，爭

▶學生進行小組研究，討論如何設計實驗。



▲學生透過顯微鏡觀察微生物樣本

▶學生走出課室學習，考察植物和生態。

相發言，提出自己的見解。雖然答案未必正確，但最重要是敢於嘗試，大膽假設。施老師坦言，構思有趣點子並不容易，但看到學生投入學習，感到非常值得，而他十分享受跟學生的課堂互動。學生學得開心，投入課堂，是他從事教學工作最大的滿足感。

施老師深明要推動課程革新，單靠個別教師的力量並不足夠，而是需要教學團隊互相協作。故此，他經常跟科組教師交流，分享教學經驗和心得，集思廣益，一同研究和發掘新穎有趣的教學點子，提升教學效能和學生的學習動機。公餘時間，他更會跟同樣任職教師的太太鑽研教學新意念，每次有新構思，都教他興奮不已。在施老師和教學團隊共同努力下，校內近年成功營造濃厚的科學氛圍，孕育不少科學尖子。

### 喜見學生成長 實現夢想

施老師憶述，曾有一名舊生，初中時代學業成績未算突出，但對科學充滿熱情。他跟同學組隊參加學界科學比賽，屢次獲獎，亦加入校內科學團隊，參與籌辦不



▲課堂學習氣氛濃厚，學生踴躍發言。



▲學生利用平板電腦記錄實驗過程

同類型的科學活動，向其他學校的學生及公眾推廣科學知識。「我很高興看到這位學生找到自己的閃亮點，通過參與不同活動和比賽，變得有自信，不但科學科成績出眾，連帶其他學科都有明顯進步，最終如願入讀心儀的香港大學。」看到學生不斷成長，實現自己的夢想，施老師深感喜悅和安慰。

施老師深信，優化學與教、提升學生的學習成效，是持續改善的過程，沒有最好，只有更好。展望未來，他將繼續發掘和設計新穎教學模式，如引入電子學習，進一步推動自主學習，同時促進課堂上師生間的互動，讓學生體驗更多研習科學的樂趣。





## 教學分享

作為教師，我們肩負起教育下一代的責任，但又有誰能預知二十年後，社會會變成怎樣？世界發展又會如何呢？我現在所傳授的知識都是「舊知識」，唯獨價值觀及共通能力，如自學能力、溝通能力、創造力等，才能讓下一代更易適應日後世界發展的步伐。所以我相信，科學教師除了能透過教學活動，培養學生對科學的興趣，以及讓他們掌握基本的學科知識和技能外，更重要的是要讓學生具有自學能力，以助他們日後能持續學習及發展潛能。

### 推動自主學習 把學習交還給學生

從2012年起，我以自主學習模式進行科學科的學與教。學生須於課前根據自主學習工作紙「自學提綱」的導引問題進行自習，而我會透過檢視學生的自學提綱，了解他們的學習進度及難點，讓我在課堂前預先規劃適當的教學策略，去協助學生解決疑問及困難。

由於學生已帶着相當的知識上課，課堂的節奏當然可以增快，同時我亦可預先掌握持不同立場的學生的意見，上課時便能刻意把矛盾提出來，讓課堂上的討論更互動，更有學習的火花。以中一級科學科為例，學生學習生物具有的七個特徵後，再探究「病毒」是否具備生物的特徵。在上校本生物科技課時，可以透過實驗，比較用梘液洗手之前及之後的微生物數目有多少。學生需運用已有知識，透過討論或實驗探究找出答案。此類挑戰性問題，有助提高學生的明辨性思考能力。



▲運用電子平台輔助學生進行自主學習



▲學生於課堂內進行互相質詢以激發思考

### 從零開始 持續優化 由苦變甘

在推行自主學習的初期，未知方向是否正確，策略是否得宜，可謂走在迷霧中。從提綱的設計、學與教模式的轉變，以至小組的培訓及合作學習等，都充滿了挑戰，工作量固然增加不少，但果效看似未見彰顯。還記得起初我很貪心地把大量的學習內容加入自學提綱中，但往往導致課堂學習目標太多，一則教學未能完成，二則學生亦吃不消。及後，我把自學提綱的設計以一至兩節課為學習單位，並配合清晰的學習目標，讓每節課都能引發學生經歷共學及互學，課後進行反思，讓自主學習更流暢及完整地進行。

當逐步建構自學提綱後，我便進一步優化提綱，以照顧不同學習能力的學生，如在提綱內設立一些延展學習內容或挑戰題，以照顧能力較高之學生。而能力稍遜的學生則可完成基礎題或根據輔助指示完成較高階的題目。近年，我亦嘗試在適當的課題或活動中引入電子學習元素，以輔助學生學習。透過使用合適的電子平台，學生能瞬間共享成果，討論能延展至課堂以外，教師亦能輕鬆進行數據分析，回饋教學。

經歷了這幾年的摸索及改良，自主學習模式亦得以有系統地建構起來，而我亦樂於看到學與教的效果；學生能在眾人面前從容自信地發表意見；他們能在學習上互補不足，自行釐清學習疑團；我還看到一些學生能深入自學，甚至超越教師所定的範圍，自行探索學習。這些能力，正是教師所期望在學生身上體現出來的。



◀學生透過學習校本生物科技實驗，探討微生物的特性。



▲學生組成科學團隊，於社區內推廣基礎的生物科技知識。

▶高中學生利用DNA樣本，進行凝膠電泳實驗。

### 發展校本生物科技教育 營造科研氛圍

除了恆常的科學課程外，我在2004年開始逐步建構中小學的校本生物工程課程，從微生物學到遺傳學，從培養微生物到進行DNA凝膠電泳實驗，透過持續修訂教材及實驗設計，務求使實驗效果更理想，學與教更有效。

我亦致力營造一個濃厚科學氛圍的校園，以提升學生和家長對科學的興趣。我鼓勵學生多參與公開的活動及比賽，他們在學界的科學比賽中屢獲殊榮。



▲學生參與培訓自主學習小組組長的「勇闖高峰」活動



▲學生參加香港學生科學比賽，在展覽中為參觀者介紹他們的研究題目。



此外，透過舉辦多元化的科學活動，並組織科學團隊參與社區科學推廣活動等，皆有助培養學生學習科學的興趣及動機，藉此提升整所學校的科學氛圍。

### 科組教師並肩同行 讓學生發光發熱

我記得在一次自主學習小組組長的培訓活動中，我指示學生面對面手持金屬棒，並排列成一座山丘似的「樓梯級」，讓各人輪流從「山丘」的左邊走到右邊。當攀登者踏上金屬棒，手持金屬棒的學生便大聲呼叫，但仍咬緊牙關支撐着同學沉重的身軀。任務幾經辛苦終於完成，學生十分高興。我問他們體會了甚麼，有人說要挑戰自己，向更高目標進發；亦有人說要團隊合作，否則大家都完成不了任務。的確，我實在感謝可譽中學裏有很多的同行者，尤其科學科各組的同事，多年來大家攜手並肩同行，組成了一道最堅固的「梯級」，讓學生一步一步的往上攀，使他們無論在校內及校外，皆能在科學領域中屢獲佳績，發光發熱，並促進自主學習的能力，成為茁壯成長的科學小幼苗！





## 評審撮要

“以多元化的學與教策略，  
照顧學生的多樣性及提升  
學習科學的興趣。”

獲獎教師施瑪恩對科學教育充滿熱誠，樂於嘗試和設計新的學與教策略，以推動學生積極學習。施老師以日常生活的例子作引子，設計相關的教學活動，以培養學生對科學的興趣，讓他們掌握基本的科學知識及探究技能。

學校曾安排施老師兼教同一辦學團體的小學部常識科，豐富他的教學經驗。他為不同學習階段的學生製作了科學教材，以培育小學及中學生的科學素養及思維能力。他亦為小學暨中學設計了「一條龍」式的校本生物工程課程，使小學常識科部分課題能暢順銜接初中學科課程。

施老師認為學生要有獨立自主的學習能力，以助他們日後能持續學習，適應未來世界的急速發展。為此，他設計了「自學提綱」工作紙，以培養學生課前預習的良好習慣。上課前，他會預先收集學生的自學提綱課業進行檢視，以了解學生的學習難點，然後訂立相應程度的學習目標，並調適相關的學與教策略，以提升學與教的成效。課後，學生要在自學提綱內反思學習進程，施老師可藉此檢視教學成果，以便有需要時作跟進。

施老師的洞察力強，能以不同的學與教策略照顧學生的多樣性。從觀課所見，施老師在任教「細胞週期與細胞分裂」的課題時，一方面滲入挑戰題，以照顧對科學有濃厚興趣和才能的學生；另一方面，在照顧學習能力稍遜的學生時，會透過多感官學習模式和「手腦並用」的學習活動，以加深學生對學習內容的掌握。作課堂小結時，施老師邀請了一位學生用身體模擬染色體的形態，然後由其他學生在人體上貼上字條，以清晰顯示染色體各部分的正確名稱。由此可見，施老師善於以簡單的活



▲施老師用模型示範 DNA 的雙螺旋結構

動去加強學生的學習興趣，能切合以學生為中心的理念及適時給予學生正面的回饋，成效顯著。

此外，施老師為校本生物科技課程設立了評估機制，透過學生的學習過程、課業表現、課堂反應、測考成績等去檢視學與教成效，並適時調節學與教策略及方法，幫助學生建構科學知識。

施老師為不同學習能力的學生提供培訓機會，協助他們組織科學團隊，並委任部分中學生擔任小小科學家或科學大使，向社區內的小學推廣科普教育，讓部分中學生能透過服務來發展他們的潛能。他亦積極與校內及校外同工分享教學經驗，交流心得，促進教師專業發展。

### 索取有關教學實踐資料的途徑

📍 學校網址：  
<http://www.hoyu.edu.hk>

### 聯絡方法

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☎ 學校電話：2109 1001  
📠 學校傳真：2109 2002  
✉ 電郵：smy@hoyu.edu.hk