10.6212/CPE.2015.1602.06

科學教育與國民外交

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國際科學教育協會國際理事會(International Council of Associations for Science Education)，簡稱 ICASE 是聯合國教科文組織(United Nations Education Scientific and Cultural Organization)於 1972 年創立的，目的在推展世界各地的科學教育。時至今日，ICASE 已促使各科學教師協會、科教機構、以及各基金會形成合作網絡，共同致力於提升全球的科學教育，並促進國家的、區域性的、或是國際性的科學教育交流與合作。ICASE 也與其他 75 個國家的科教組織一起努力，支援世界各地的科學教育工作者，提高教學品質。ICASE 的成員包括美國、奈及利亞、土耳其、愛沙尼亞、紐西蘭、日本、澳洲、英國、巴西、中國大陸、俄國等國的科學家。

2014 年作者應邀至泰國蘇叻塔尼與春蓬的兩所大學，參加 ICASE 主辦的科教研討會，會中作者展示並說明了近年執行科技部實作計畫所產出的作品，獲得與會教師和學生的好評。因此，隨後作者又受邀參加印度 Sri Prakash 主辦的科教活動。Sri Prakash 學校是連鎖中學，在印度東岸沙塔巴南特地區頗負盛名。領導者 Mr.Vasu 辦學相當積極，極力大幅提高這系列學校的水準，曾親自到台北參訪建國中學、北一女中、師大附中和復興中學等校，進行非常熱絡的交流和觀摩。當年作者在沙塔巴南特城街道上，就可見到不少看板宣傳該科教活動(見圖 1)，令人印象深刻的是：青天白日國旗也在看板明顯之處，尊重之情誼溢於言表。

圖 1：2014 年活動看板

作者在 2014 年在泰國與印度的活動中展示的作品，主要都是科技部實作計畫所產出的作品，包括大型透明蒸汽機教具、史特林引擎、顯微鏡教具、以及法拉第定律教具；也包括作者創作的希侖蒸汽機、走馬天燈、超級彈性碰撞、旋轉燭台、風力發電機等(見圖 2)。作者巡迴各校，與數百位師生分享這些創新教具，引起不小迴響，沙塔巴南特報紙當年即有零星報導(見圖 3)。

圖 2(a)：大型透明蒸汽機教具

圖 2(b)：法拉第定律教具

圖 2(c)：風力發電機

圖 2(d)：大型顯微鏡教具等科技部實作計畫作品

2015 年 Sri Prakash 承辦 ICASE 之活動，再度邀請作者參與，此次作者除了攜帶自己創作之物理學教具，也配合少數有趣的其他教具，形成碰撞(改良的高斯來福、超級彈性碰撞)、熱機、法拉第定律 (包括單擺發電機與特斯拉線圈)、靜電等幾個主題，教學效果更好(遺憾的是，尚缺英文教材)。作者也參加了 ICASE 在 Sri Prakash 學校設置的教具展示室揭幕。

圖 3：2014 年印度文報紙報導

作者同時還帶去了組合式的顯微鏡教具，指導印度學生組裝。這款最新研發的顯微鏡教具，既可讓學生動手組合，大功告成之後，又能經由奇異的視覺效果，深入演示顯微鏡原理。Sri Prakash 學校師生在寓教於樂之際都十分肯定，也引起印度媒體之重視及採訪。由於 2014 年的經驗，作者感受到印度的友好氣氛，特地從台灣準備了印度國旗和中華民國國旗，置於實驗桌上，並拜託印度媒體朋友務必讓國旗出現在報紙上，因為這些作品成果和推廣其實都是中華民國政府所支持的。於是這項國際合作的消息，登上了包括 THE TIMES OF INDIA、THE HINOU、DECCAN Chronicle、THE NEW INDIAN EXPRESS 等印度的英文大報，連同其他印度語報紙總共獲近十家媒體廣泛報導，提高了我國於國際上之能見度(見圖 4)。

時移事推，海峽對岸在某些敏感事務

上的斤斤計較終將逐漸獲得緩解，台灣在教育、經濟、文化各方面的國際空間將越來越大，對台灣經貿、文化的發展亦將有更大的助益。

台灣科學教育蓬勃的程度，其實不下於日本，國際間之合作有其成功的條件，相互觀摩和支援而使得雙方都能獲利。作者的經驗發覺在北歐、中亞、印度、東南亞和非洲科學教育的研發成果，都頗受歡迎。如果外交部也能將這部分整合成拓展外交的小小助力，並與經貿等方面結合，並提供若干引導，相信更能增加此類合作的友好意義以及在產業上的價值。

令作者特別感動和感謝的是：印度朋友的友情與照顧。因為實作計畫工作量之大，事實上超乎想像，作者為準備這項國際交流活動，根本無暇顧及服裝，忙得不可開交之際匆匆搭機，印度朋友能理解作者的努力，但也察覺作者儀容上的邋遢，特地請人陪同至西服店致贈作者一套西裝。又為了避免影響萬能科大之授課，作者須連夜搭機返國，印度朋友也差人聯絡航空公司，安排整排空位的經濟艙，讓作者可以在午夜航班上躺一下，抵達新加坡時雖仍因疲憊不堪而身體不適，但多虧在印度洋上空有略事休息而能平安返國，完成了一次辛苦但滿載而歸的南亞之旅。

Stress on practical approach, says prof

Teachers told to focus on scientific processes, not facts

J. UMAMAHESHWAR RAO | DC
VISAKHAPATNAM, NOV. 19

Introducing students to simpler concepts like how a chunk of magnet defies gravitational force can foster conceptual understanding in them. This is what made Prof. Chien-Heng Chou of Vanung University of Taiwan shoulder the responsibility of imparting practical skills to students. Excerpts from his interview on what he feels about the Indian education system and areas having scope to undergo change.

What have you observed in Indian students? What changes do you expect in the Indian academic system?

It is vital to understand that theoretical lessons don't lead to hands-on experience without practical training. Incorporating practical classes right from childhood can sort out this lacuna. Teachers must focus on scientific processes, not facts.

What methods could be adapted to make lessons more interesting?

Education is fun if we approach it practically, else it will sound like rocket science. Teachers should incorporate innovative methods while teaching science to spark interest in students. During my tours I say this and I follow the same methods at my Green Energy Lab at my university in Taiwan.

Do you think Indian books need change?

I feel students here are deprived of a full learning experience due to busy schedules. That's why I tried to provide some physics textbooks that could remedy textbooks on thermal dynamics, fundamental physics and fluid mechanisms.

Which country has the perfect education system?

The Japanese education system is practical-oriented and can nurture ideas. President Obama has been asking teachers to stress a practical approach.

Education is fun if we approach it practically, else it will sound like rocket science. Teachers should incorporate innovative methods while teaching science to spark interest in students
— Chein-heng Chou

Assistant Professor Dr Chou Chien Heng of the Department of Electro-Optical Engineering of Taiwan's Van-Nung University gives tips to children. —DC

Students receive hands-on training with instruments

DC CORRESPONDENT
VISAKHAPATNAM, NOV. 19

Students of Sri Prakash Vidyaniketan were introduced to a set of intriguing experimental instruments by Prof. Chien-Heng Chou at Vanung University in Taiwan with a hands-on workshop on Thursday.

The live demonstrations not only made the session enjoyable and interesting, but also helped the students enhance their scientific skills.

Speaking to *Deccan Chronicle*, Director of Sri Prakash Vidyaniketan, Chitturi Vasu Prakash, said, "It is a proud moment for Prakashites to be part of the International Council of Associations for Science Education (ICASE), which spans the world

THE LIVE demonstrations not only made the session enjoyable and interesting, but also helped the students enhance their scientific skills.

AROUND 100 enthusiastic students attended the workshop and gained immense practical knowledge.

led by an International Executive Committee and representatives from Africa, Asia, Pacific Europe and many other countries. Workshops like these can impart practical training to the students."

Prof. Chou demonstrated and gave an experience with hand on scientific experiments to the students on how to assemble the compound microscope using all the simple scientific instruments that are required to organise it.

The ICASE lab also included equipments like Curiosity Rover, Match Puzzles, Magnetic Levitator Newtons Cradle Human Anatomy models among many which are truly unique to the city.

Around 100 enthusiastic students attended the workshop and gained practical knowledge.

The workshop concluded with thestudents creating a compound microscope from the given basic components. G. Bhanu, a grade nine student, said that the programme was highly enlightening, educative and innovative and added that he learnt many things from the workshop.

The play way to hone skills

Educational exchange programme with Thailand helps students of Sri Prakash think beyond the curriculum

RANI DEVALLA

VISAKHAPATNAM: A group of students was on a mission to create a high resolution microscope using a concave mirror, a convex lens, a torch, a couple of wooden sticks, and some low-cost stuff.

Guiding them in the process was Chou Chien-Heng, Assistant Professor of Department of Electro-Optical Engineering of Vanung University, Taiwan.

It was part of the week-long educational exchange programme with Thailand presented by Sri Prakash Vidyaniketan. After flagging off an International Council of Associations for Science Education (ICASE) at the school's Kapuluppada branch on Wednesday, the international exchange programme got off to an interesting start on Thursday with a series of workshops.

Teaching simple science concepts in a play-way method, Janchai Yingprayoon of Suon Sunanda Rajabhat University, Bangkok, said that the programme aimed at training teachers as well.

"It helps teachers in assisting the students come up with a new thesis through an informal learning approach," he said.

Experts who arrived from Thailand for the purpose said that the ICASE allowed students to think beyond their curriculum.

"Take, for instance, this pinpoint. when I place this on my face, the impression can be formed automatically. This kind of experiment inspires us to create something innovative," says Abhay Nandan, a Class IX student, demonstrating the process. As part of the exchange programme, some of the students donned the role of young trainers and introduced international students to quilling art.

Dee-Jean Ong, Head-curriculum, Development and Training of Real Education Group, Malaysia, engaged the little ones in a series of fun-filled activities while explaining simple concepts of science to them. Director of the school Ch. Vasu Prakash said: "The arena is meant to allow students think beyond their textbooks. And the new facility rouses their curiosity to explore further in the domain."

Assistant Professor of the Department of Electro-Optical Engineering, Vanung University, Chou Chien-Heng, training students in creating a microscope using low-cost material in Visakhapatnam. — PHOTO: C.V. SUBRAHMANYAM

圖 4：2015 年大篇幅報導。
可見青天白日滿地紅國旗。