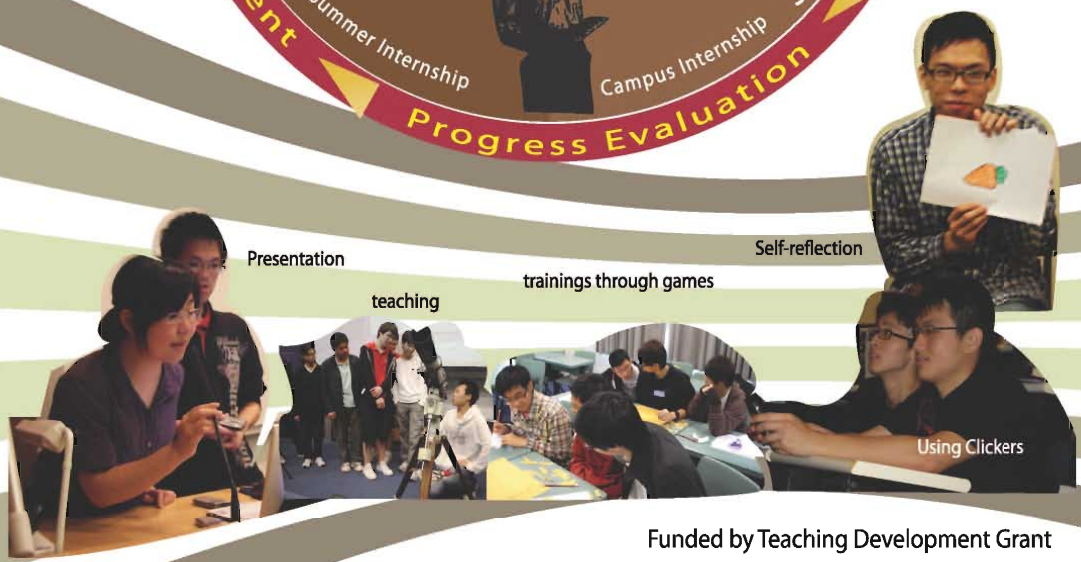
The Chinese University of Hong Kong
Department of Physics

Learning Through Teaching

An Undergraduate Learning Assistant Scheme



Funded by Teaching Development Grant

Content

All of us have two educations: one which we receive from others; another, and the most valuable, which we give ourselves.

- John Randolph

Acknowledgements

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All your support is what drives our efforts to make perfect, and make possible the successes we achieve. Thank you very much.

Project Team
'Learning Through Teaching -
An Undergraduate Learning Assistant Scheme'
Department of Physics

Preface

Though we always say school is a miniature of society, there is a real big gap between school environment and the reality, especially the present society. While rote learning was popular in the past, the orthodox spoon-feeding and examination oriented approach creates passive learners who are unable to compete in today's ever changing environment. Therefore, modern Hong Kong has embraced critical thinking and creativity in education, recent reforms have brought Hong Kong's curriculum into line with international standards to turn out well-rounded, capable students. In the past decade, Hong Kong's schools underwent a major overhaul in curriculum, methods of assessment, and language instruction. Student-focused changes moved away from exam-centered study toward whole-person development, in which active and interactive learning strategies are highly advocated to advance our students' generic abilities and skills. Different concerned parties start adjusting their roles and missions in education to the re-conceptualized pedagogic framework. In particular, the universities and secondary schools have been reshaping their curricula to involve students in a more self-motivated and reflective learning environment. As one of the supportive institutions, we have taken a proactive role in the reform. Apart from steering in a new teaching and learning direction – the Outcomes-based approach – to assure an effective delivery of quality education to our students, we have additionally implemented other learning strategies to echo the objectives on all-rounded development. For instance, experiential learning, problem-based learning, e-learning and self-directed learning are our major approaches to engage students in active and interactive learning. Last year, we obtained a Teaching Development Grant by the University Grant Committee from CUHK to launch this project namely 'Learning Through Teaching – An Undergraduate Learning Assistant Scheme', which was a training programme designed to enhance the generic competences of our students. The programme consisted of four stages including a public seminar on Teaching & Learning, 5 training workshops on personal growth, 2 teaching internships, and a poster presentation for the delivery of project's good practices. After completing every activity, there would be an evaluation conducted by the Centre of Learning Enhancement And Research (CLEAR) to collect feedback and comments.

This booklet is in four parts. Part One is about objectives and expectations. We will let you know what we concern and expect. Part Two is about plans and actions. All the activities carried out to fulfill the project goals are summarized in this part. Part Three is evaluation. It consisted of evaluation reports compiled by CLEAR, in which the contents were based on the feedback and suggestions made by the participants. Both quantitative and qualitative evaluation data were analyzed and summarized for further reference. The last part is a photo album showing the activity photos for your enjoyment. As the main theme of this project is 'Learning through Teaching', the concept of such learning strategy is emphasized.

We understand there is no absolute best learning method for all students, but we hope this project bring you new insights into your own practice. The project though may not be perfect, it intends to promote effective learning among teachers and students; to initiate good Teaching & Learning practices and inspire similar practices in our institution; more importantly, to offer our students with additional support and opportunities to attain personal fulfillment, success and happiness.

We are pleased to present to you the 'Learning Through Teaching – An Undergraduate Learning Assistant Scheme'. Let us set off hand in hand on the new Teaching and Learning era now!

A man of humanity is one who, in seeking to establish himself, finds a foothold for others and who, desiring attainment for himself, helps others to attain.

- Confucius

Part One
Project Objectives

Literature Review

Before the commencement of the training programme, the team underwent a literature review to align with education trends and the latest development in Hong Kong higher education. As we were doing a project about student learning, we first asked a question of 'what is learning?', and then, 'which learning methodologies are espoused in higher education, especially for science students?'

What is learning?

Saljo in 1982 categorized learning as
1) A quantitative increase in knowledge
2) Memorizing
3) Acquisition of facts, methods etc. which can be retained and used when necessary
4) The abstraction of meaning
5) An interpretation process aimed at understanding reality

Marton at 1993 further added one more category
6) Developing as a person.

In Hong Kong, secondary schools play an important role in items 1-3 which can be classified as cognitive learning*, to help students lay a solid foundation of knowledge; while universities tend to put more emphasis on items 4-6, its academic life help facilitate and equip students with reflective learning practices# and powers of self-critical thought. When we talked about aspiration for learning in higher education, according to Harvey and Knight (1996), *the primary purpose of a university is to encourage the conditions for learning that is transformative for the learner. If higher education is to play an effective role: Then it must focus its attention on the transformative process of learning… To be an effective transformative process, higher education must itself be transformed… so that it produces transformative agents: critical reflective learners able to cope with a rapidly changing world.* (Harvey and Knight, 1996: viii)

**In cognitive learning, the individual learns by listening, watching, touching, reading, or experiencing and then processing and remembering the information. Cognitive learning might seem to be passive learning, because there is no motor movement.*

#According to Barnett (1992), engaging in reflective practice is a means by which the student can be enabled to develop the capacity to keep an eye on themselves, and to engage in critical dialogue with themselves in all they think and do…it is a reflexive process in which the student interrogates her/his thoughts or actions. In other words, the key to reflective learning is to become a powerful observer of your own thinking, sensing, and acting.

In this sense, higher education serves as a ground where the transformation for enhancement and empowerment of learners takes place. It is more than 'producing skilled acolytes' in a particular discipline though this is important, and should be a learning environment that treats students as intellectual performers rather than as compliant audience. *It transforms teaching and learning into an active process of coming to understand.* (Harvey and Knight, 1996; Brockbank and McGill, 2007) Thus students should work and study in an educational system that enables them to transform their conceptual ability and their self-awareness. This can be done through repeated practices and reflection. *Generic skills are also necessary conditions of higher education experience that enable students to deal with knowledge obsolescence and the recognition that students will probably move beyond their original domains of study* (Brockbank and McGill, 2007). Teachers also aware that generic competencies are becoming more important, *as these are skills enable our students to cope with a future in which there will be few certainties and the relevance half-life of knowledge will decrease* (Kember and McNaught, 2007). *'They (students) will be in a position to contribute to, and to be employed in , fields other than their own. They will have begun a life-long process of self exploration through their careers…If this is the case, I believe our students can truly be said to have had a tertiary education.'* One of the teachers winning a teacher-award interviewed by Kember said.

So, how we empower our students is to involve them in the evaluation process, give them greater control over their own learning as well as to develop their critical ability. (Harvey and Knight, 1996:9-10) In order to facilitate reflective learning in higher education, here we come to introduce a methodology: active learning, which refers to techniques where students do more than simply listen to a lecture. Students are DOING something including discovering, processing, and applying information.

Active learning derives from two basic assumptions: *(1) that learning is by nature an active endeavor and (2) that different people learn in different ways* (Meyers and Jones, 1993). Research shows greater learning when students engage in active learning. *The elements of active learning are talking and listening, writing, reading, and reflecting* (Meyers and Jones, 1993). Bonwell and Eison (1991) state that some characteristics of active learning are: students are involved in more than listening, less emphasis is placed on transmitting information and more on developing students' skills, students are involved in higher-order thinking (analysis, synthesis, evaluation), students are engaged in activities (e.g., reading discussing, writing), and greater emphasis is placed on students' exploration of their own attitudes and values.

Ways of encouraging active learning are numerous. According to Kember and McNaught (2007), approaches include projects, action research, student presentations, case-based teaching, problem-based learning, role-play, reflective journals, experiential learning, peer tutoring, computer-assisted teaching and case, games and simulations. Recently, the Physics Department has included some of these approaches as core elements in the

physics courses. The Department has just undergone a large-scale undergraduate programem review in 2009. In its self-evaluation document, the Department has offered learning activities such as STudent-Oriented Teaching classes (STOT, since 2005), seminar, project courses and peer-tutoring, which all provide additional chances for interactions and active learning through presentations, problem-solving and discussions. In addition, non-credit-bearing colloquia, internships and exchanges also offer experiential learning opportunities to students. Active learning of these kinds gives students possibilities to reflect upon their understanding of the basic concepts instead of drilling heavily on assignments, and also serves to improve students' communication skills and the ability to transfer the knowledge learnt to more lively contexts. These are how the Department echoes the underpinning concept of higher education aforecited in this passage (line 5, p.2), to *'transform teaching and learning into an active process of coming to understand.'*

However, the three-year normative physics undergraduate study seems insufficient for our students to build up ample confidence, thus results in a low score of the Students Experience Questionnaire (SEQ), a survey conducted in CUHK reflecting the learning experience and achievement of student. In the Action Plan written by the Physics Department for the 2009 Program Review, it admitted that the low SEQ score reflects more on a confidence problem rather than a problem with students' capability. As long as the direction of higher education we pursue is correct, we believe that the survey result can be improved by strengthening the generic competencies of our students, stating our learning objectives and outcomes more explicitly for a stronger reflection of their learning. The Review Panel in its conclusion of the 2009 Program Review stated that *'discussions with students designed to build students' confidence and appreciation of their own growth in knowledge and skills would be very beneficial',* nevertheless, under a tight teaching schedule, lecture does have its place and that active learning should not be done without content or objectives (Kathleen McKinney, 2010). The Department therefore is seeking additional ways to further engage students in a thorough learning reflective practice with specific objectives and content that caters for our physics students' needs.

In the science classroom, wondering should be as highly valued as knowing.

- 2061 Science Curriculum

Birth of 'Learning through Teaching – An Undergraduate Learning Assistants Scheme'

After performing the literature review, we planned to design a training scheme with following considerations: 1) our students' needs; 2) sustainability and flexibility; 3) departmental expectations. Ultimately, the 'Learning through Teaching – An Undergraduate Learning Assistants Scheme' (LA Scheme) was launched in January last year and our objectives were:

i. To perform as a pioneer to identify the difficulties and problems of the program through literature reviews and trial-runs;
ii. To help establish a sustainable Learning Assistantship system for the University-wide implementation;
iii. To share good practice and outcomes with other programmes and departments in the University;
iv. To help enhance experiential learning and e-portfolio of the undergraduates and provide them with opportunities to learn from teaching.

'Learning through Teaching' and 'Undergraduate Learning Assistants' were the project main themes which have clearly stated our means and goal. There are certainly many ways to learn. Students can learn through reading, writing, travelling, explorations…, but why through teaching? It is because, we believe, perhaps the most thorough learning experience is to **TEACH.** The best test of whether or not you really understand a concept is trying to teach it to someone else.

Teaching calls for complete understanding of the concept. When learning, however, we might have only seen those likely easy problems that in fact we didn't hit the boundary of our understanding. When you teach, you are being forced to grapple with the challenging questions your would-be students ask along that you won't be able to handle without mastery of what you're teaching. You are required to figure the answers out for yourself so you can explain them to others, that's why make teaching such a powerful tool for cementing your understanding of a subject. Teaching also pushes you to communicate your thoughts clearly and precisely. It helps you develop the extremely important skill of describing your ideas well enough for others to use them. So, Teach is not just good for those you help; it is also good for the one who teach. (Richard Rusczyk, 2010)

So the project was to train a batch of Learning Assistants (LA) – the project participants, to teach their peers basic physics. They participated in the planning of teaching activities and also involved in some teaching tasks on and off campus. Through these teaching activities, the LAs helped not only their peers learn physics, but also themselves to re-think and evaluate their own learning styles. In addition, the LAs were given opportunities to apply generic skills such as problem-solving, presentation, communication, time management and planning in the assistantship trainings. After trainings, we hoped they were able to stand out and present in confidence.

Figure 1, the 'Timeline of LA experience' model, was employed as a reference for the project implementation.

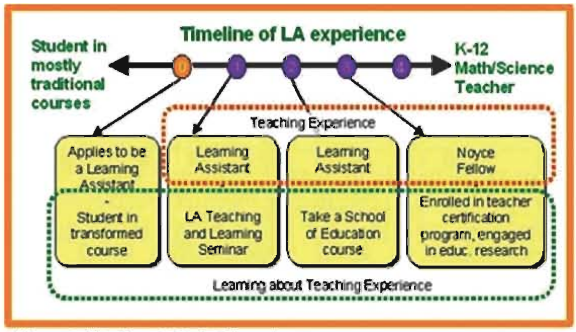
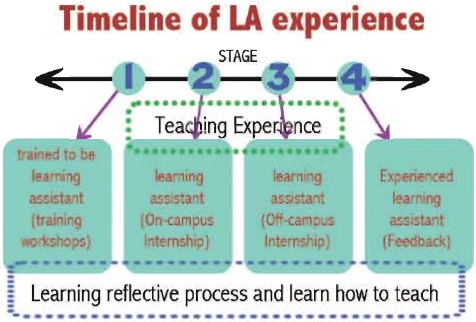


Figure 1. Timeline of the LA Experience

(The Learning Assistant model for Teacher Education in Science and Technology, Forum on Education of The American Physical Society Summer 2005 Newsletter) *The peers can be CUHK students in all disciplines or secondary schools students.

To suit our situation, the timeline has been modified as follows:

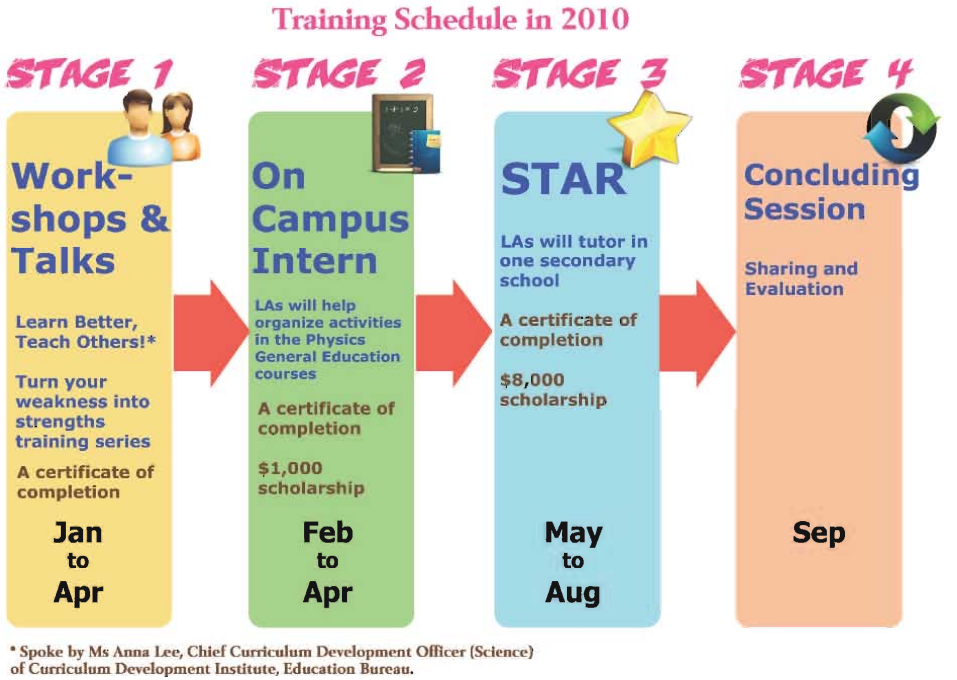


The framework consisted of four stages, and it was flexible, comprehensive and gradational. The first stage was a nurturing stage in which a series of workshops on self-development/awareness and consultation sessions were provided. It aimed to introduce to our students the project objectives and learning outcomes, and the concept and application of some essential generic skills. The second and third stages were internships. We offered on-the-job trainings to the students in which they could gain actual learning and teaching experience as well as practically reflect their learning styles. The last stage was a harvest stage that we gathered all evaluations for further improvement and shared good practices. In this part, we have been given some insights of recent trend of higher education through literature review, and have made a critical reflection upon the current teaching and learning practice in the department through self evaluation. We have also formulated certain expectations and an action framework for the project. Now we are going to present the details of activities and trainings in each stage, and shared with you our experiences of conducting the project.

Part Two

Project Activities

The project starting from October 2009 lasted for a year. In order to better accommodate the needs of the students, we have carried out a literature review in October, then formulate the framework and planned the activities in November. December was a promotion period for distributing posters, flyers and launching the website. The first activity, which was a talk about teaching and learning, was commenced in January 2010. The activity schedule is shown as follows:



* Spoke by Ms Anna Lee, Chief Curriculum Development Officer (Science) of Curriculum Development Institute, Education Bureau.

Stage 1 Training Series (From January to April)

Stage 1 was an introductory talk plus a series of training workshops. Throughout the stage, we addressed on the importance of self-development and the beneficiaries of learning through teaching. The following table shows the activities we have organized for our participants in stage 1.

	Date	Time	Topics	Speaker/ Trainer
Activity One: Talk	18 Jan (Mon)	4:30-6pm	Learn Better? Teach Others!	Ms Anna Lee, Education Bureau, HKSAR
Activity Two: 'Turn Your Weaknesses into Strengths' Series	25 Jan (Mon)	4:30-6:30pm	Manage Your Time	Mr Simon Ho, CLEAR, CUHK Sharing: Dr WH Siu, SKH St Benedicts School
	25 Feb (Thu)	4:30-6pm	Present Yourself to Your Best Advantage	Mr Simon Ho, CLEAR, CUHK
	4 Mar (Thu)	6:30-8:30pm	Take Your Power- Confidence Building	Ms Grace Wong, OSA, CUHK
	9 Mar (Tue)	4:30-6:30pm	Do Communicate	Ms Eunice Yip, OSA, CUHK
	25 Feb (Thu)	4:30-6pm	Set Off Your Better Life	Mr Simon Ho, CLEAR, CUHK

I) Learn Better, Teach Others!

The first activity namely 'Learn Better? Teach Others!' was delivered by Ms Anna Lee. Ms Lee is the Chief Curriculum Development Officer (Science) of Curriculum Development Institute in Education Bureau. She started with a game, telling us the interaction and the relationship between a learner and a teacher. By probing questions related to teaching and learning, she encouraged the audience to have a reflective thinking on learning styles. During the talk, Ms Lee shared with us her teaching experience and interesting stories as a science teacher in secondary school. In addition, she introduced to us the New Senior Secondary Education (NSS), particular in the key learning area of Science and the new element in the curriculum– Other Learning Experience. This talk was definitely beneficial for our students who want to pursue their career in education, as it was not only a sharing session, but also a very good opportunity to understand the recent direction of secondary education and the learning styles of students in Hong Kong nowadays . After the talk, we also did a survey on the learning needs of students. The feedback we collected were very useful to design learning activities in the future.

II) Turn your weaknesses into strengths!' Series

The second activity was a series of training workshops aimed to enhance our participants' self awareness and mental abilities to cope with different occasions and challenges through thought-provoking trainings guided by the workshop trainers. Each workshop lasted for about two hours, and the themes were chosen with reference to the programme review we did in June, 2009. As we found that our students were lack of some generic abilities to some extent, or they might feel frustrated when facing challenges. Therefore, we have made topics on the following common generic skills: presentation, communication, time management, self confidence and goal-setting. Realizing that these are not the skills we can teach by dictation, so games and discussion/sharing sessions were employed to make the learning environment more interesting, engaging and enjoyable. The talk targeted all students who wish to be a teacher in the future, or the one who wanted to know more about Hong Kong education, whereas this training series particularly served our Physics students, including the undergraduates and postgraduates.

Workshop I: Manage Your Time

This workshop was about time management, a prime skill we must learn. It is important for us to manage well our time so as to achieve an ultimate balance of work and life. It is also vital for effective learning. After completion of the workshop, we expected that our students should be able to:

1. increase work and life satisfaction;
2. increase productivity;
3. have enough time for those who matter most to them;
4. feel less overwhelmed and more in control;
5. identify and focus on what is most important so they can achieve the results they desire;
6. find a better way to make faster decisions and with more peace of mind afterwards.

Besides trainings, we also invited our alumnus Dr Siu Wing Hon to share his teaching experience and viewpoints towards teaching and learning. Dr Siu is now a teacher of SKH St. Benedicts School, and has been teaching in secondary school for more than ten years. As we all know that being a secondary school teacher requires not only professional subject knowledge, but also a variety of skills and aptitudes to aid students in different areas. His sharing and advices given were useful and helpful for our students who were going to teach.

Workshop II: Present Yourself To Your Best Advantage

This workshop was about presentation skills. There is no greater secret weapon in society than to know how to persuade people of your ideas and mission. Being a great speaker is not a natural born trait and good presenting requires learning basic skills. In fact, everyone can learn the tricks of the masters. In this workshop, we taught our participants how to 1) hook the audience during speaking; 2) pack the key points into attractive stories, and 3) make use of computer software to create a presentation in a very short time. We expected that our participants could grasp the underpinning technique of presentation and achieve the following outcomes after the workshop:

1. feel more confident and comfortable with the presenting process;
2. be much able to communicate with the audience effectively;
3. enjoy every presentation opportunity;
4. assess individual weaknesses and strengths.

Workshop III: Take Your Power - Confidence Building

This workshop was about confidence building. It helped our students find ways of increasing self-awareness and self-confidence. The practice was reflective and interactive. Participants were requested to answer questions related to their own personality and then share with others their strengths and weaknesses. By sharing, participants knew some of the causes of low self-esteem. Moreover, they were taught how to identify and build on their strengths. Mutual support and encouragement were given among the groups. After the workshop, we expected the participants were able to:

1. improve self-awareness;
2. appreciate and learn to capitalize on their own strengths;
3. stay calm and confident in a stressful environment;
4. develop techniques to recognize how to deal with personal tough situations.

Workshop IV: Do Communicate!

This workshop was about enhancing communication skills. Effective communication is the key to a harmonious relationship. Involvement and effective communication skills are also vital to friendship building.

In this workshop, participants learnt how they could strengthen the relationship with others by better communication. We took a coaching approach so that everyone in the group would be ready to disclose what they found tough and insufficient. Through role play, self evaluation and sharing, everyone got feedback on how to strengthen their daily communication. At the end of the workshop, participants should be able to

1. know how to communicate effectively and avoid those ineffective ways of communication;
2. acquire listening skills and basic social skills in relating with others;
3. learn how to express themselves freely ;
4. gain an opportunity to make friends with other group members.

Workshop V: Set Off Your Better Life

This workshop was about goal-setting. Goal setting is a powerful process for thinking about your ideal future, and for motivating yourself to turn this vision of the future into reality. Meanwhile, when you get into the habit of setting and achieving goals, you'll find that your self-confidence builds fast, as you recognize your ability and competence in achieving the goals that you have set. We aimed to help our students to set realistic, sharp and clearly defined goals, that they could measure and take pride in the achievement of those goals. At the end of the workshop, participants should be able to :

1. realize the importance of goal setting in their lifetime;
2. set realistic goals which can help attain personal improvement;
3. put their goals into practice;
4. reflect upon and evaluate their goals and strategies by reviewing their own learning experiences and development.

Stage 2 On-Campus Internship (From February to April)

While carrying out the Stage 1's activities, the Stage 2 on-campus internship started to recruit a group of 'Learning Assistant' (LA) in late January. We hoped that our students would become more aware of themselves through teaching others, particular teaching in their professional area: physics. In this internship, the LA would assist in the planning and the completion of the teaching activities. These activities, as shown below, were offered to the CU students who enrolled in the physics general education courses:

Date	Time	Content
1 April (Thur)	7-10pm	Star-gazing I
8 April (Thur)	7-10pm	Star-gazing II
9 April (Thur)	2-5pm	Visit to Science Museum
17 April (Thur)	9:30am-12:30pm	Visit to Space Museum
19-23 April	2-4:15pm	Quiz Game using Clickers

Under the supervision of the project team members (the supervisors), the LAs were fully responsible for the organization of the activity, from planning the activity rundown, collecting and preparing teaching materials, to teaching students. Before every commencement of the activity, the LAs would have meetings to discuss the objectives and expected learning outcomes, and the possible scenarios of logistic arrangements. Some meetings were used as rehearsals. Rehearsal was extremely important, as it allowed the LAs to have a trial before the official 'public performance' (teaching in front of a large group of audience), and to ensure all details of the activity were adequately prepared and coordinated for professional presentation. Sometimes the LAs would have found problems during the rehearsals, for examples: presentation overrun, technical errors, misunderstanding of the concepts being taught etc., or they would debate over some management decisions such as division of labor and swapping groups. These meetings were a preview of their performance for further improvement. The supervisors could also make constructive comments on their presentation and skills.

Activity 1&2: Star gazing I&II

The GE courses chosen were all about astronomy and meteorology. These two activities were organized, on one hand, enhancing the GE students' understanding of the knowledge taught on the lessons, on the other hand, developing our LAs with skills relevant to their study. The first activity was held to teach the GE students basic stargazing skills and the second activity was basic stargazing photography and the use of stargazing equipments. The very first task the LAs should do was to ensure they had sufficient knowledge to teach a group of students without physics background. They tended to share the responsibility according to their specialty. Some of the LAs were members of the CU Astronomy club so they were assigned to be the leaders of the activity. The others followed learn how to teach the 'layman' the stargazing concept. This required the LAs to adjust their presentation tone and content to suit the level and needs of the audience. In addition to overcoming teaching challenges, the LAs also got a chance to learn new knowledge and advance their techniques in the preparation. For instance, the team borrowed from Space Museum a digital planetarium dome which is a 2 meter sq. portable dome designed to illustrate planetary motion and astronomical concepts. It enables a small group of 10+ people to enjoy the digital projection of our planets and to learn how our planets work in an interesting way. Most of the LAs were new to this system and did not know how to set up the dome. After several meetings, they finally could handle the equipment and learnt the functions of the new digital system.

As stargazing is an activity heavily subjected to the weather condition, the LAs have prepared a contingency plan in case of bad weather. We regarded it as a training of their ability in risk management.

Activity 3 &4: Visit Science Museum and Space Museum

These two activities provided opportunities for both the GE students and our LAs to stay up-to-date on the latest science advancement in physics and astronomy.

Activity 5: Quiz Games using Clickers

Since a year ago, the Faculty of Science has been promoting the use of clickers, a set of student response system used to give instant feedback or answers electronically. In this activity, our LAs were required to use clickers to run the quiz games in the last lesson of the GE courses. This game was an examination revision to test how much GE students had grasped the subject concepts and knowledge. With the guidance of the GE course teachers, the LAs set questions, prepared answers and run the game. By using this system, both the audience and our LAs could have as much interaction as possible. When the LAs showed the question on screen, the audience immediately answered the questions by means of the clickers. As our LAs did not have much teaching experience in prior, the use of this e-learning system might help facilitate their teaching and presentation.

At the end of each activity, a simple questionnaire was distributed to the GE students for comments. The feedback was essential to evaluate and improve the performance of the LAs.

Stage 3 Summer Teacher AppRenticeship (STAR)* (From May to August)

While Stage 2 was an in-house internship in which our LAs served a group of non-physics students at university level, Stage 3 was another challenge that our LAs served a group of secondary students studying physics in high schools. This was an off-campus summer internship called Summer Teacher Apprenticeship (STAR), starting from May through to August. This STAR programme, commenced since 2002, has been a flagship internship programme in the Physics Department. It aims at broadening students' perspectives in teaching and learning physics and to gain invaluable experience for a possible teaching career. Considering its idea and objectives similar to this 'Learning through Teaching' project, this year, we incorporated STAR in the project to provide a more comprehensive training and follow-up to the STAR students.

Each LA (STAR students) of this stage was assigned to a designate secondary school, and was supervised by the affiliated experienced physics teacher (mostly our alumni). They were responsible for carrying out all kinds of teaching related work, including preparation of notes and exercises, supervising lab sessions, teaching remedial and/or enrichment classes, organizing extra-curricular activities, etc. In other words, the LAs acted as a little teacher teaching secondary students ranging from F.1-7 in summer time.

**The scholarship of Stage 3 was funded by the Department of Physics*

We have interviewed a batch of students and finally selected six for this stage. These students performed quite well in their majors (G.P.A over 3) as well as in the public examinations. In the interview, the selection panel, which consisted of one project member, Dr. Pang and all the secondary school supervisors, also looked at their personality and willingness to pick up teaching duties. Most of the interviewees showed a strong desire to choose teaching as a career after graduation.

After the selection, we provided a training to equip the six STAR LAs with some basic knowledge and skills of teaching. The training that facilitated by Dr. Pang included several sessions such as briefing of job duties, teaching practices, dicussion and evaluation. The LAs were encouraged to raise as much as possible problems they foresaw that they might encounter, and then found out solutions together. It aimed to prepare the LAs both psychologically and technically to deal with real challenges they were going to face in the internship. It was worth to mention that, with the aid of the CUHK unit - Information Technology Service Centre, we made use of the new e-learning technology called 'EchoSystem'. By using this service, the presentation with the powerpoint slides showing to the audience was video-taped, the video would then be posted online for further viewing. The LAs could review their presentation performance anytime after the training. It was definitely convenient for making discussion and evaluation.

During the internship, the LAs must attend regular meetings with our team members to report their progress and talk about their performance at school. They pointed out the difficulties encountered, and shared their joyful experience among the team. In this connection, all LAs gathered to exchange useful information and give support to each other. Although the LAs worked individually in their assigned school, they could share same discussion topics, identify similar problems, and find possible solutions in the meeting. Throughout the stage, we expected our LAs to achieve the following outcomes:

1. Reflect their recent learning style;
2. Evaluate their understanding of basic physics knowledge;
3. Build teamwork spirit and mutual support;
4. Familiarize with the recent teaching practices in secondary school;
5. Sharpen their presentation and communication skills

Apart from giving tutorials and preparing teaching materials at schools, the LAs also organized joint-school activity. The LAs found that their relationship with the secondary school students was enhanced and becoming closed and interactive after the activity.

Part Three
Evaluation

Evaluation is an important part of the teaching and learning process, therefore, surveys in the form of questionnaire and focus group were conducted after the completion of each activity. In this project, evaluation served the following purposes:

For the project team:

1. To gain an understanding of program operation;
2. To document program effectiveness;
3. Examine strengths and weaknesses of program;

For participants:

1. To identify ways to think about their skills and the areas they want to develop;
2. To reflect on their learning style and strategies so as to enhance and improve their learning in the future.

The evaluation reports below, which were compiled by the project evaluation unit CLEAR, have summarized the feedback and comments of the three-stage participants and have shown how well the project was doing. CLEAR helped conduct two focus-group evaluations and the results were shown as follows.

Stage 1 and 2 activity

In general, students' opinions were very positive towards the Learning through Teaching – An Undergraduate Learning Assistant Training Scheme, no matter on the workshops in stage 1, or the on-campus internship in stage 2. Although the focus group interview took place right after finishing stage 2, students also talked about their expectations of the forthcoming Summer Teacher AppRenticeship (STAR) in stage 3 and one student talked about his experience in the previous on the STAR programme. Their opinions towards stage 3 were also very promising. A set of semi-structure questions was designed as a guideline of the focus group. The discussion was mainly focused on the below dimensions:

1. Learning: What have you learnt through engaging in the various activities in the project?

2. Sustainability: Will you welcome the idea that similar activities be held each year for students in Science? What are the factors that will affect the sustainability of the project? How can they be overcome? Is the model transferrable to other contexts and the potential benefits and challenges in doing so?

3. Improvement: What can be done to further improve the project from the students' perspective?

Stage 1 – workshops

Activity

A variety of workshops were organized to help students developing and reinforcing different life skills, such as, time-management, presentation, confidence, communication and life goal setting. All the interviewees revealed that they had participated in the workshop, from at least 1 to 5 sessions.

Learning and sustainability

As a whole, interviewees had positive feedbacks towards the workshop series. They all agreed the workshops helped them to improve their skills and enrich their knowledge on different aspects. Additionally, they believed the workshops not only equipped them with better hard skills, but also inspired them to have a more in depth reflection on themselves. At the end, they were able to apply and make use of the skills into their daily lives or school lives. One interviewee gave an example of how he successfully improved his time management by organizing more differentiated timeslots learnt from the workshop.

Improvement

Basically, all students showed great interest in the workshops and were willing to participate in more sessions. However, some of them encountered problems such as time table clash. Some said they realized the workshop sessions too late and at the time they had already got other engagements. In this regard, a more effective promotion and compatible timeslots provided to these physics students are suggested to boost their participation rate.

Interviewees also remarked that workshops were one-off events. The change of learning skills or habits needs more than a lesson but a series of follow-up activities as well. They need to transfer the hard skills/ knowledge into a practical context.

Stage 2 - On Campus Internship

Activity

The objective of the on campus internship was to enhance students' understanding in physics knowledge and general education by experiencing teaching in actual operations of a University General Education Course (GE Course). Interviewees were required to organize the GE course by preparing teaching materials, helping lead the tutorials and assisting in classroom teaching.

Learning and sustainability

This internship program had been widely welcomed by the interviewees. All of them agreed that the internship program provided them a very good opportunity to organize activities which were skills that could rarely be acquired within the routine academic

curriculum. By teaching others in the GE course, they also had to chance to reinforce the knowledge that they had already learnt. It was also a very good chance for them to work as a team; learning how to allocate the tasks respective to their unique expertise. Besides, they also gained the sense of satisfaction through arising others' interests on the topics they taught.

Improvement

The interviewees suggested that stage 2 could be further improved if the topics were not limited to GE courses. In addition, the interviewees suggested an online sharing platform, such as, forum, for them to exchange information or knowledge with participants in the courses for enriched interactions.

Stage 3 - Off-Campus Internship - Summer Teacher AppRenticeship (STAR)

Activity

In this part of the programme, participates would be required to provide teaching assistant in secondary schools. The major objective of this scheme was to provide an opportunity for participants to acquire essential practical experience in teaching Secondary School Physics curriculum and/or general Physics knowledge. Students learnt through the teaching experiences.

Learning and sustainability

Some of the interviewees will join the STAR programme in summer. One of the interviewees actually had joined the programme in the last year. All interviewees, no matter whether they had an interest in joining the scheme or not, believed the off-campus internship would be definitely a good experience. The Interviewees who did not consider joining it explained the teaching experience seemed not relevant to their future career goal as teaching was not their intended career path. However, as for interviewees who wanted to be a teacher, this internship program unquestionably provided them with a very good opportunity to practise teaching as well as to learn many other skills through teaching: for example, not only was it an opportunity for them to consolidate the knowledge learnt, it was also a time to learn oral and explanation skills, to communicate effectively with students/ people, and to build relationship.

Conclusion

Interviewees in general agreed that the Learning through Teaching scheme enhanced learning various aspects: knowledge as well as soft skills. The experience was also enjoyable to them. However, they generally had a concern on the missing of connection between different stages. That is, the skills learnt in the workshops in stage 1 were not reinforced when they assisted the activities in stage 2. The activity experiences were also not directly related to the STAR environment in stage 3. Also, despite there were a certain level of benefit to learning in each of the stages, the students did not find these experiences had made massive changes to them and to their learning. Nevertheless, the programme was a valuable and worthwhile experience.

Stage 3 activity

The focus group interview was formed by a group of 5 students from the Physics Department who were participants of the Programme and 2 facilitators from the Centre for Learning Enhancement And Research (CLEAR). Interviewees were explained about the meeting purpose clearly before the interview started. They also understood that information collected would remain strictly confidential. With the consensus from the interviewees, an audio record of the meeting was kept.

A set of semi-structure questions was designed as a guideline of the focus group interview. The discussion was mainly focused on the below dimensions:

Skills/ other benefits

1) Could you please brief describe the running of teaching practice?
2) What have you learnt through teaching? (knowledge, generic skills, attitudinal changes or others?)
3) Will you recommend students in the later cohorts to join the programme if it is run again? Why/ why not?

The points mentioned by the participants were summarized below.

Summary

As the participants' comments to the previous parts of the programme were already collected in previous surveys and the last interview, the main focus of this interview was on the last part of the programme (teaching practice). In general, students' opinions were mildly positive about the experience, as they thought the experience led to valuable outcomes such as personal development skills. The students, however, also mentioned a few challenges they encountered during the teaching practice and made some suggestions.

Participants' experiences

Participants were asked to give brief descriptions on the teaching practice at the very beginning of the interview. They recalled that they were assigned to secondary schools for the practice, to teach or assist in teaching students physics in different levels of classes. There were certain variations in their nature of work required to do, the number of hours for each teaching session and the number of sessions they were told to do per week. Much of the arrangement was dependent on the administration of the schools the participants were assigned to. Examples of job nature included holding tutorial classes and supplementary lessons, and assisting teaching during normal classes. The period of teaching practice was about 3 months and the number of lessons for most participants varied from one day to every day per week, but it was also heard from one participant that there was no fixed class schedule.

Outcomes in the period

A number of learning outcomes were mentioned, including:

- Interpersonal relationship: having the opportunity to try building the relationship with the students by playing with them during recess time.

- ***Strategies for teaching:***

  a) having the experience of conveying knowledge in a way that would be clearly understandable for students. Participants said this required them to think in some different ways and angles they were not used to. For example, the participants were able to understand abstract physical formulae and equations, but it might not be the same case for students. One of the participants said he used exact numbers and exercises as examples to let students understand the concepts instead of just showing the formulae and equations;

  b) participants were benefited by the mentors' advices and teaching. For example, one said the mentor suggested he could be more able to draw student attention and speak in the right way by imaging himself as a performer instead of a teacher.

- ***Classroom management:*** one participant remarked that the method of punishment could be more diversified in order to find one which would be effective (e.g. putting students in detention class would be more effective than writing lines);

- One participant said the experience let him ***revise and consolidate subject knowledge***. However, some said the topics they were told to teach were basic and the gain in knowledge through teaching them was not great.

- ***Other skills and attitudes:*** confidence in speaking in public, organizational skills to put ideas logically in context for better explanation and attitudes such as gaining job responsibility were mentioned as part of the outcomes of the experience.

Problems encountered

Participants mentioned two main problems during their teaching practice. The first one was a large variation in students' level. One of them recalled that there was a large variation in the student abilities in his class: those who were more able would understand about 80% to 90% content, while those who were less able would not understand the content at all. The second problem was students' low learning incentive. Participants thought it was difficult to find solutions for these problems, reasons were:

- Not enough time (they could just teach them for three months);
- The class size was too big;
- The participants thought themselves were not "formidable" enough.

Overall views and suggestions

The teaching practice provided a good experience for the students, especially for those who wanted to be teachers in the future. They had a chance to learn the real conditions of teaching and to explore solution to some problems on teaching. As mentioned above, they learnt a number of personal and teaching skills through the process too. Some remarked that their working attitudes improved as a result. Participants thought the teaching practice experience might not be very beneficial if one did not plan to be a teacher. They reasoned that on one hand the Programme was demanding for them as it took them considerable time such that they were less able to have other plans in the summer holiday. They regarded that if students' interest was in other areas, they would learn more relevant knowledge and skills through internship arrangements (if they exist) in those areas.

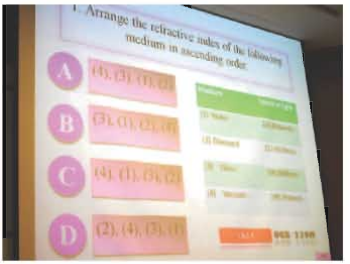
Participants had a number of suggestions:

- They would like to be asked to do various teaching activities in schools rather than to attend classes only, e.g. extra-curricular activities, lab session, homework marking;
- They would like the variation of job duties in schools are less. Some negotiations by the programme admin with the various schools may be needed.
- Better payment.
- They should be given workshops about class management before going to teach in schools

The afterwords by the project team

We were pleased to know that the particpants' comments were positive and encouraging, yet there were space for improvment in some areas such as promotion and arrangement. The main idea of the project was well received within the Department and the project outcomes were generally achieved. It was also glad to see that the participants were satisfied with the project objectives and found the activities useful for their personal development and learning enhancement. In order to continue this success, the project team is going to have a poster presentation on 22 October, 2010 at the "Teaching and Learning Innovation Expo 2010" organized by CLEAR, CUHK, to dissiminate its good practices and share the experience with the university community. In addition, the project team will continue to implement the on-campus-Learning Assistant (Stage 2) as well as the STAR (Stage 3) internship programmes. We would, again, consider to hold workshops regarding personal development for our students. We earnestly hope that, our students are able to learn effectively, and also have an all-round development in the course of their university life.

Precious Moment



Precious Memory















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The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires.

- William Arthur Ward

http://www.phy.cuhk.edu.hk/tdg