

  
TEMASEK APPLIED SCIENCE SCHOOL

## Top Honours SAC-SINGLAS Laboratory Accreditation



Temasek Applied Science School (ASc) achieved a first for a local tertiary institution to be awarded accreditation under the **Singapore Laboratory Accreditation Scheme (SINGLAS)** by the **Singapore Accreditation Council (SAC)** for its Chemical and Biological Testing Laboratory in April 2009.

Under this internationally recognised scheme, the technical competency of testing and calibration laboratories are assessed against the general requirements of ISO/IEC 17025 and other specific technical considerations of each field.

ASc's testing laboratories are now in compliance with stringent ISO requirements, an endorsement of the competency, credibility, independence and integrity of its

laboratories to carry out conformity assessment activities.

This recognition by the industry is undoubtedly significant as it is a stamp of approval for its high quality assurance standard in the testing services provided to its customers. Training programmes are already in full swing in the newly established accredited laboratories, giving our students a head start in the workforce.

The accreditation of the School's laboratory adds value to its consultancy and technical services offered to partners and collaborators who demand high quality analytical testing services. This accreditation is aligned with the strategic thrust of Temasek Polytechnic (TP) to establish partnerships and promote collaborations.



**Atomic Absorption Spectroscopy** is a technique for determining the concentration of a particular metal element in a sample. The technique can be used to analyse the concentration of over 70 different metals in a solution. It typically makes use of a lateral flame in the Atomic Absorption Spectrophotometer to atomise the sample.

# A Scientia

Passion to make it happen!

A combination of the acronym 'ASc' for Temasek Applied Science School and the Latin word *scientia* which means knowledge, science and skill

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We would like to extend our appreciation to all who helped in the production of this magazine. Special thanks go to Mr Chue Phen Wei, Mr Lim Aik Leng and Mr Loh Han Liat for going out of their way to help us take some remarkably good photographs.

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Issue no. 5:  
Events from April 2008 to July 2009



“Bringing Education to Life and Life to Education” is no mean feat. Aspiring to reach the cutting edge of education and in her quest to explore new horizons, ASc’s success at educational innovation and excellence in food safety is indicative of her capability and competency.

## Bringing Education To Life And Life To Education Principal's Commendation Award For Educational Innovation

**KoolWerkz Learning Enterprise** achieved its well-earned recognition when it clinched the **Temasek Polytechnic Principal's Commendation Award for Educational Innovation** in 2008. This award recognises radical innovations in student learning.

The first Polytechnic in Singapore to set up and operate a fully licensed ice-cream/frozen dessert production plant, TP's KoolWerkz has adopted an innovative and novel technique where learning takes a great leap from the sanctuary of the classroom into the competitive world of business. TP's true entrepreneurial spirit comes alive at KoolWerkz, a joint venture with TP Entrepreneurship Centre, which provides broad-based food manufacturing and entrepreneurship training for our students.

Beaming with delight, Mrs Tay-Chan Su Chin, Deputy Director of ASc and Course Manager for the **Diploma in Applied Food Science & Nutrition** explained that “the uniqueness of

*the factory is in its realistic learning environment where students are able to immerse themselves at the plant during practical sessions.”*

This radical learning approach also integrates skills and knowledge of various critical subjects in Food Science Nutrition. With respect to entrepreneurship training, students have the opportunity to develop and implement sales and marketing strategies when they sell the frozen desserts.

The larger student population has also benefitted from this innovative idea of experiential learning through entrepreneurial projects with KoolWerkz as part of their subject requirements such as Student Internship Programme (SIP),

Cross-Disciplinary Subject (CDS) and Major Project (MP). An integral component of this learning enterprise is the development of life-long skills like teamwork, integrity, time management, planning skills and survival strategies for a dynamic business world.

To date, more than 700 full-time and part-time students have been trained at KoolWerkz. The training facility has also attracted organisations, such as the Ministry of Education, National Arts Council and a large following among the secondary schools, to learn how innovation and training can adopt a different approach “to bring education to life and life to education”.



## Bringing Education To Life Academic Apprenticeship Educational Innovation Award

PCEO Mr Boo Kheng Hua

“The emphasis is on both content and transferable skills.”

**Mr Loh Gin Hin**  
Manager/Academic Development

“A creative approach to teaching and learning.”

**Dr Khin Mar Mar**  
Section Head

“The redesigned curriculum enables students to learn content and skills at the real workplace, guided by industry practitioners and supported by their peers.”

**Dr Vijayakumari Seevaratnam**  
Deputy Director/ Academic Development,  
Course Manger/ Biomedical Science

“A borderless learning community... the way to go!”

**Ms Chew Swee Cheng**  
Manager/ IDM Technology

“Students are encouraged to be independent learners.”

**Ms Chew Lay Leng**  
Lecturer

“We need to modify our approach to education to keep pace with the changing times.”

**Mr Alvin Poh**  
Course Coordinator

The Biomedical Technology team had the honour of being the recipient of Temasek Polytechnic's inaugural **Educational Innovation Award** in September 2008.

This triumphant win was attributed to the revolutionary re-design of the third-year curriculum for the Biomedical Technology Option of the **Diploma in Biomedical Science**. The new curriculum brings education to life as students are given the opportunity to be on the ground to gain first-hand experience at the hospitals while reading modules critical to clinical laboratories in their final year.

Divided into three phases, the initial phase of study involves mastering the basics using the case-based learning approach to inculcate the mindset of a medical laboratory technologist. This is followed closely by the immersion programme, where students contextualise their learning and work on authentic industry projects for the final year Major Project. The final phase of collaborative learning and consolidation enhances students' appreciation of the module in the context of industry practices. These changes have resulted in unparalleled opportunities for students to be exposed to the latest trends and developments in the biomedical field.

This innovative approach to learning infuses a range of methodologies such as Problem Based Learning (PBL), case-based studies, skill competency checklist and e-learning (blogs). The students have benefitted from the new programme and enthused that “the new curriculum focuses on a few critical subjects and enables us to spend more time on them within the context of a real workplace. Thus, we are able to learn content in greater depth”.

The opportunity at real-life education not only injects a sense of realism into the curriculum but also widens students' exposure in this field and prepares them for employment and continuous learning.



# Excellence In Food Safety

## Bistro Walk Café



Merely half a year into organising and setting the operational systems in place, work was underway to ensure that the café would achieve the internationally recognised **Hazard Analysis and Critical Control Point (HACCP)** certification.

Being a training café for the students of the **Diploma in Applied Food Science & Nutrition** as well as the **Diploma in Baking & Culinary Science**, this achievement revealed the capability development of the courses and the commitment of their café trainers and trainees in

ensuring high standards of food safety management. Moreover, this achievement was an endorsement of the **Bistro Walk Café's Food Safety Policy** in striving to provide safe quality food products that satisfy customers' requirements while complying with regulatory standards.

The adoption and implementation of the HACCP international food safety standard is an assurance that the food is prepared under strict hygienic conditions and this will instil confidence in its consumers.

After stringent HACCP audit checks covering categories ranging from its soups to beverages and desserts menu items, the café staff together with its QA/QC team, led by Ms Cheong Wing Fun and Mr Loh Gin Hin, ensured the implementation and adoption of the various food safety systems, procedures and processes, as well as various comprehensive training programmes. With these in place, the Bistro Walk Café now provides a real-life training ground for student café trainees to learn, practise, and maintain the HACCP standard and plans.

# AVA Food Safety Award

## KoolWerkz

KoolWerkz Learning Enterprise, TP's off-campus factory that provides broad-based training in food manufacturing and entrepreneurship, was the 2009 recipient of the **Certificate of Commendation** awarded by the **Agri-Food and Veterinary Authority of Singapore (AVA)**. It had previously received an "A" grading for two consecutive years (2007- 2008). This is the ultimate recognition for a food factory that has consistently maintained high standards in food safety.

Fully equipped with the set of ice-cream making plant and facilities, KoolWerkz has exposed students to a myriad of real-life learning opportunities in new product development, ice-cream processing, inventory management,

ISO 14001, **Hazard Analysis and Critical Control Point (HACCP)**, quality control and assurance, packaging, process optimisation, process automation, logistics and marketing strategies in a real business setting. With the equipment and processes to meet the requirements of a good factory, each batch of products goes through microbial and chemical tests in compliance with food safety regulations.

According to Mrs Tay-Chan Su Chin, Deputy Director of ASc and Course Manager for the **Diploma in Applied Food Science & Nutrition**, "winning the award is a true testimony of the robust food safety system that we have put in place in the operation of the training facility".





### Pedagogical Practice

At ASc, we take advantage of digital opportunities to help our students develop relevant skills through e-learning and interactive digital media. We also invest in 'real-world' learning environments, such as the new culinary laboratories, for intensive hands-on training. And we recognise the power of peer tutoring where academically weaker students learn from their stronger peers.

## Towards Learner Autonomy FPath e-Learning

**Fundamentals of Pathology (FPath)** is an e-learning subject taken by all Level 2 students in the Diplomas in **Biotechnology, Biomedical Science** and **Veterinary Technology**. Initially, students resisted this mode of delivery. They were apprehensive and feeling insecure without the traditional 'live' face-to-face contact in lectures and tutorials.

A critical factor in facilitating students' receptivity was the example set by committed staff who had to overcome their own discomfort with the new mode of teaching, communication and assessment. As lecturer Ms Magdeline Hor observed, "When staff embraced 'e-teaching', students picked up the cue on the seriousness of having to assume personal responsibility and to be diligent to keep on-task. Staff therefore had to persevere to a 'point of no return' throughout the teaching semester for students to realise that e-learning is here to stay."

The evolution of **FPath e-learning** at ASc has been essentially **blended e-learning** using many strategies including:

- **PowerPoint** animation
- **Collaborative learning** with **PBwiki** (now known as **PBworks** <http://pbworks.com/>).
- More rigorous **self-check tests** created in the **Learning Management System- Black Board™ (BB LMS)**

In the near future, staff and students can look forward to the '**Adaptive Release**' feature in the **Open Linking in a Virtual Learning Environment (OLIVE)**, the new LMS, which will allow creation of different learning paths for students who can then view content or participate in class activities based on pre-defined criteria.

"This mode of delivery was challenging for staff. We had to learn ways of building rapport for online collaboration, spend a tremendous amount of time and effort on the highly demanding work of assessing the students' online work for originality and determining students' individual contributions."

**Ms Chew Lay Leng, Lecturer**

"Eventually, students felt that the programme helped them as they worked in groups to discuss concepts or solve problems, and they had to give feedback to their peers e.g. through wikis, discussion forums, blogs."

**Dr Khin Mar Mar, Section Head**

"We want our students to be successful online learners, active and self-directed for continuous learning in their future workplace."

**Dr Vijayakumari Seevaratnam, Course Manager**

### Online Feedback from students

"E-learning is really a new experience for me. A good way to discipline oneself to really study."

"At times, e-learning was troublesome and difficult as we were not used to it at first. However now, I find that e-learning actually stimulates my thinking and understanding about the subject better."

"The tasks and assignments were designed in such a way that my knowledge of the subject was built up as I completed each task and assignment."

"I find this method of learning is relatively exciting in several ways though it did take me quite some time to adjust. It gets tough sometimes but I'm glad I had the opportunity to experience it."



## Exciting Experience With IDM Second Life



First-year students in ASc were given the opportunity to experience **Interactive Digital Media (IDM)** in workshops conducted at the start of their academic year in April 2009. Some 600 of these new students were introduced to the latest **3D immersive technology** using the **Second Life** platform.

The workshop, an innovative learning package, required students to do research on the topic of copyright and plagiarism. They then had to submit their findings using virtual posters, placing them in virtual rooms which they created in the orientation buildings *rezzed\** in Second Life. (\*rezz = to create or make an object appear)

Ms Chew Swee Cheng, Manager / IDM Technology, who led the Second Life team, was pleased that

her idea of using IDM to deliver the message of respecting intellectual property rights was well received by the students. She said, "The students were enthusiastic about the workshop mini project and the results of their labour were work of a very good quality! They also learnt about their own team members' work styles and attributes and what it takes to work effectively as a team."

The students' positive response is an encouraging sign to the School which has dedicated resources to the development of staff in exploring the use of **IDM technology** in the **academic curricula**. The other members of the Second Life team are IT support staff Mr Louis Tay and Mr Zhou Liang and academic staff Ms Chew Lay Leng, Mr Loh Han Liat and Mr Paul Cheung.



## Powerful Approach In Teaching-Learning Peer Tutoring

ASc has always been sensitive to the learning needs of its students and has several approaches to improve the academic performance of its Level 1 students. In 2008, it welcomed the initiative of TP's **Student Development Team** which set up a **Peer Tutoring Scheme** for ASc's Level 1 students with weak academic performance in term tests.

Together with the respective course teams, the Student Development Team identified subjects for peer tutoring, selecting the weakest 15% of students from each diploma, and

collaborated with **Care Persons** in encouraging academically strong students from within the same **Care Group** to peer-tutor their classmates.

It was heartening to see the number of students who volunteered as tutors as well as the 'thirst' of the tutees to increase their knowledge and understanding of the subject. The results for both semesters in the academic year 2008/2009 showed significant improvement in the weaker students' performance, indicating the strength of such a scheme where students can connect

more easily with their peers to teach and learn effectively from one another.

ASc lecturer Mr Tan Keng Beng, Manager/ Student Development, highly recommends the continuation of this win-win programme "as it has not only provided a conducive environment for academically weaker students to learn from their peers, but also the opportunity for students to practise character development such as compassion, perseverance, co-operation, respect and initiative."

Tutor How Yan Ling and tutee Ang Ziting, both from the **Diploma in Applied Food Science & Nutrition**, are certainly very happy with this programme.



## 'Real-world' Commercial Kitchen Settings New Culinary Laboratories

Three newly developed and specially equipped culinary laboratories, comprising **Asian, Bakery/Pastry and Western Kitchens**, were rolled out to support the **Diploma in Baking & Culinary Science**.

Each kitchen has its specific style of student training to facilitate learning, and simulates the 'real-world' commercial kitchen setting where students gain intensive hands-on training in fundamental baking and culinary skills. These kitchens are also equipped for students to develop and prepare recipes incorporating technology-based techniques, such as frozen dough and *sous vide*.

The course has a strong emphasis on Asian culinary training and the Asian

Kitchen is fully equipped to prepare an array of regional dishes from China. The kitchen set-up also houses an instructor's demonstration area that is linked both to the lecture theatre and classroom for both students and visitors alike to observe 'live' cooking demonstrations from the experts.

Students also have easy access to the School's nearby **Food Science and Food Processing Laboratories** where they learn to scientifically evaluate their food preparation methods as well as the sensory attributes of their prepared foods and meals. This is the uniqueness of this diploma course as food science is fused with the baking and culinary aspects as part of its formal training.





### Awards & Accomplishments

The sweet success of bagging awards is not the be-all and end-all of taking part in competitions. Even sweeter than the glory of winning is the edifying process that students go through in the pursuit of excellence!

## Singapore Junior Water Prize

This is a national competition which has inspired young people to be active in water and environmental issues. The projects must enhance the quality of life, through improvement of water quality, water resources management, water and wastewater treatment as well as water education and social aspects of water.

TP's team faced stiff competition from 42 teams from secondary schools, junior colleges and polytechnics but they managed to win the hearts of the judges with their project '**Portable Water Treatment Device (PWT) for Natural Disasters**' and was placed overall second, beating many premier institutions. It was truly a laudable achievement, being the only Polytechnic to be ranked among the top three in this keenly contested

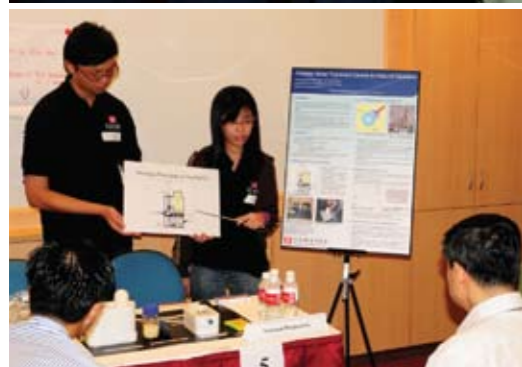
competition, where the winning team is given the opportunity to represent Singapore in the international arena at the prestigious Stockholm Junior Water Prize in Sweden.

The team comprising Seow Zi Yang, Debbie Teo Jia Ling from **ASc (Chemical Engineering)** and Kevin Zheng Wei Lun from **ENG (Mechatronics)** was mentored by ASc's dedicated Lecturer Mr Lim Aik Leng. Debbie recalled that *"the recent regional natural disasters like the Asian Tsunami and Cyclone Nargis made us realise the importance of providing clean drinking water to prevent further suffering and loss of lives. It is always a challenge to deliver water promptly to disaster victims because of the breakdown in the communication infrastructure. So we saw the urgent need to*

*develop a more sustainable solution in the form of a treatment device to produce clean drinking water"*.

Debbie and her team, driven by the urgency of this project, worked very hard, adopting a research-oriented approach and their efforts paid off when they impressed the judges with their innovative improvements to the existing prototype of the PWT and its pump design.

The PWT is unique as it incorporates various water treatment methods and a novel UV-photocatalytic disinfection unit which removes different classes of pollutants from contaminated surface water to produce clean drinking water. Best of all, its compact and rugged design is suitable for natural disaster relief efforts.



## Tan Kah Kee Young Inventors' Award



Under the supervision of Project Officer Mr Daniel Tan (**Diploma in Veterinary Technology**), team members Munawwarah Binte Hamdi and Alex Li Yinliang from the **Diploma in Biomedical Science** and Xavier Gogniat Tan from the **Diploma in Biotechnology** received the **Commendation Award** at this year's **Tan Kah Kee Young Inventors' Award**. This event was graced by Ms Grace Fu, Senior Minister of State, Ministry of Education and Ministry of National Development at the Science Centre Singapore on 23 May 2009.

The winning project, **OffShore Food Fish Measuring Device OSF-1**, eliminates the mishandling of fish when obtaining morphometric measurements such as its length and weight. Using the conventional method often results in stress and possible injury to the protective coating of the fish. This innovative device measures the length and weight of fish as they swim through it and the estimated weight of fish is taken based on the water displacement principle.

## Green Wave Environmental Care Competition

For the first time in the history of ASc, a team from the **Diploma in Chemical Engineering** has been ranked **third** among the tertiary institutions in this hotly contested competition to share green ideas.

In view of the world's dire energy situation together with the relentless rise in energy prices, Wang Yen Chin, Sophia Chng and Lee Shwu Ping's project to harness and use escaping heat energy from the kitchen stove struck a chord with the judges. Shwu Ping explained that *"the energy radiated at the top of the stove is utilised but there is a lot of wasted energy which can be harnessed"*.

The students designed a coil-shaped heat exchanger prototype to absorb this waste heat for useful purposes such as heating water for daily use. They perfected the prototype by fitting in a multi-pass heat exchanger for maximum heat absorption using small diameter copper coils.





# SFMA Food Product Concept Competition

The annual national competition organised by the **Singapore Food Manufacturers' Association (SFMA)**, in its second running, saw more food companies as well as Institutions of Higher Learning taking part. A total of 29 food product concepts, supported by the various local SMEs, were presented. Students were challenged to develop an innovative food product and judged on the following criteria: consumer appeal and benefits, innovation and originality, health and nutrition considerations, market potential and sales, packaging and presentation, sensory and palatability appeal.

Two teams from the **Diploma in Applied Food Science & Nutrition** bagged 2 of 7 awards and cash prizes: **'Wild Lime and Chilli Seasoning for Wholegrain Instant Noodles'** was the **first runner-up** and **'Cocoa Malt Mochi Filling'** was the **most popular product**. A double bite!

The first runner-up team, Enn Cai Ying, Yeo Chern Shin and Lee Yun

Wei Felicia, developed a seasoning with a refreshing taste of lime-laced spiciness for wholegrain instant noodles. Overwhelmed with emotions, Felicia reflected that *"the whole process which started from scratch, the numerous trials conducted, the knowledge gained everyday: all these experiences will stay with me"*.

TP was awarded the most popular product prize for the second year running thanks to the team comprising Ng Yun Ting Sherrilyn, Lee Zhen Ping Deborah and Lim Qing Xiu, for their innovative mochi filling recipe containing soluble fibre and iron with a surprising crunch in the middle of this traditional Japanese rice cake. Team leader Sherrilyn remarked that *"the competition exposure itself was the real prize for all of us"* whilst Deborah believed that *"marketing skills in advertising as well as packaging are truly essential in gaining the initial attention of the potential consumers."*



# Tabasco HoTChef Culinary Team Challenge

The pioneer batch of **Baking & Culinary Science** students did the School proud when both its teams each led by Edmund Lim Kai Wai and Aloysius Tay Yu Wei came in first and second runners-up respectively in the culinary competition organised by the **Singapore Junior Chefs Club**. There were 8 teams contending in this challenge.

This friendly team competition drew aspiring chefs together, giving them an opportunity to display their culinary skills. Building on the theme **TABASCO**, the competitors had to create *amuse bouche / canapes* incorporating 5 types of Tabasco

seasonings in the menu. Both teams underwent rigorous training under the supervision of the culinary instructors. On the intensive training, Yong Wei commented, *"The ideas for the various dishes were in a state of flux and we had to be adaptable. The real challenge lay in preparing and artistically presenting 10 portions of 2 innovative dishes within 2 hours."*

The students have to now prepare for the upcoming culinary competition held in conjunction with the **Food Hotel Asia Exhibition** in April 2010.



# SIFST Biennial Student Symposium

The efforts of students from the **Diploma in Applied Food Science & Nutrition** to continually seek new ways to meet the demands of consumers for healthier shelf-stable products, had not gone unnoticed when Tan Bao Zhu's presentation on **"Development of a Shelf-Stable and Low Glycemic Index (GI) Muffin"** secured the top prize in the diploma category, beating 10 teams, at this symposium organised by the **Singapore Institute of Food Science & Technology (SIFST)**. A commendable achievement for the second time running!

Making inroads in the Southeast Asian market, this low GI muffin has the potential to increase the variety of low GI products in the Asian market. Remaining shelf-stable for a month without the use of chemical preservatives or additives should increase interest for more research in this area.

In the midst of basking in his glory, Bao Zhu has to prepare for the **11th ASEAN Food Conference** after winning a return air ticket to Brunei.



# Baking Competition With National Starch

To spur the innovative spirit among students, a baking competition was jointly organised with **National Starch Food Innovation** in August 2008. The objective of the competition was to innovatively incorporate starch-based ingredients to improve the textural properties of baked snacks. The organisers were in search of creative recipes using their starch products for showcasing to their international clientele.

Under the tutelage of the chefs and lecturers, students worked and enjoyed this first-hand experience at learning to use the different starches for a variety of recipes to enhance the texture of the products.







Staying relevant is key at Asc where keeping in touch with the latest technology and trends has led to collaborations with major industry players and other innovations in the areas of Traditional Chinese Medicine (TCM), water and wastewater treatment and nutrition clinical studies. And to top it all, the funding of a research project in nanotechnology by the Ministry of Education.

## Collaboration with NORIT Singapore

The Singapore subsidiary of the Netherlands based group, **NORIT**, which is in the forefront of supplying water purification products, has embarked on a pilot study on their **Membrane Bioreactor (MBR)** plant located at the **Jurong Water Reclamation Plant** with two lecturers Mr Lim Aik Leng and Mr Dion Khoo, from the **Diploma in Chemical Engineering**.

Driving this study was the need to determine the effectiveness of the MBR system and NORIT's Airlift® MBR

membranes in the reclamation of wastewater.

MBR is a technology which integrates biological wastewater treatment with membrane separation to produce high quality treated effluent for reuse. The conventional wastewater treatment plants are being retrofitted with the MBR system to meet the increasing demand for reclaimed wastewater and the need for more stringent effluent discharge limits. In addition, cost reduction has

pushed MBRs to become an established alternative way to treat wastewater.

MBR technology is suitable for use in Singapore with its shorter treatment time, enhanced product quality and smaller footprint. The effluent produced by the MBR, which is of better quality, can be used directly as Industrial Effluent for non-potable use or it can go directly to the reverse osmosis process for **NEWater** production, reducing the footprint and operational cost of the NEWater Factory.



## Nanotech Saving The Environment

In December 2008, the Nanotechnology research group in Asc successfully secured the **Ministry of Education (MOE) 2008 Innovation Fund Grant** of \$480,000 which is effective between April 2009 and March 2012. It will fund the team's research in magnetic cellulases for biofuel fermentation.

*"The grant will now pave the way for us to build our strengths in nanotechnology and green energy."*  
**Mr Lim Tse Loong Wallace**

*"We are grateful to MOE for its support in giving us and our students an opportunity to participate in the development of new applications of biotechnology. Such support helps seed our young generation with hope, motivation and confidence in home-grown research and development."*  
**Mr Lloyd George**

Global depletion of energy resources as well as the increase in energy consumption has created a serious global issue that needs to be tackled.

A renewable solution is the use of solar energy in the form of biomass. Global potential of bioenergy is found in energy crops and lignocellulosic residues. Lignocellulosic biomass comprises approximately 50% of the world's biomass and its annual production is estimated between 10-50 billion tons. However as only 49.8% of the 1.67 million tons of waste generated annually is recycled, this waste can serve as a huge source of lignocellulosic biomass for biofuel production and can be processed to yield cellulose which can then be hydrolysed into bioethanol.

As the cellulase production accounts for a significant portion of the total cost of enzymatic conversion of celluloses, the nanotechnology research group is working on fixing cellulase onto magnetic nanoparticles as this will aid in separating and recovering the enzyme from the slurry of lignocellulosic masses and its hydrolysed products. Furthermore, when the cellulase is fixed on supports, the potential of increasing the robustness, long-term stability and hydrolytic



capability is significant and will further reduce the cost of bioethanol production.

This project is spearheaded by two Asc lecturers, Mr Lim Tse Loong Wallace and Mr Lloyd George, and assisted by students. Whilst Mr Lim has been working on the synthesis, characterisation and application of inorganic nanoparticles, Mr Lloyd's contribution is in the area of protein technology research and development.



# Nutrition Clinical Studies

Obesity has reached epidemic proportions globally, with more than 1 billion overweight adults (at least 300 million of them being clinically obese) and is a major contributor to the global burden of chronic disease and disability. In Singapore, the national health surveys have shown that the prevalence of obesity has increased steadily from 5.1% in 1992 to 6.9% in 2004.

ASc's endeavour in nutrition clinical studies aims to scientifically substantiate the effects of nutrients and functional ingredients in enhancing human health. These studies to be conducted in healthy human subjects or patients could take the form of clinical studies, epidemiological studies or metabolic studies. Their focus will be on the following areas:

- Nutritional Assessment
- Glycemic Index Research
- Nutrition and Immunology
- Lipid Studies
- Nutrition Education

ASc staff, in various disciplines including nutrition, food science, biomedical science, analytical chemistry, immunology, veterinary science, would function as a core team to undertake research and provide consultancy for the industry. TP has also signed a **Memorandum of Understanding** with **Changi General Hospital** to collaborate in this area. The results obtained and knowledge gained will be translated into practical approaches with the support of our industry partners to benefit the community at large. This is in line with the Singapore government's direction to promote a healthy lifestyle among Singaporeans.



# Traditional Chinese Medicine Efficacy Studies Using Animal Models



In the name of technology, ASc is keeping abreast of developments by providing consultancy services to test the efficacy of TCM products using animal models. Backed by excellent facilities, namely the **Temasek Applied Science Research Centre** and **Temasek Animal Facility**, and supported by a competent team comprising veterinarians, medical technologists, chemists and technical support staff, ASc is geared up to take on the challenge.

While the Applied Science Research Centre is equipped with state-of-the-art equipment and laboratories to spearhead and support the research work, the Temasek Animal Facility has been licensed to use laboratory animals for research and scientific purposes.

There have already been several completed consultancy studies on testing TCM products using animal models.

The efficacy study of a product for the treatment of Type 2 diabetes



was recently completed with a major industry player. ASc has also been approached by a well-known TCM manufacturer to conduct efficacy studies on one of its leading products. In collaboration with a hospital, the School plans to use the results obtained from the animal models to conduct clinical studies of TCM products on human subjects.





At ASc, we believe in synergy, especially in collaborating with our industry partners to meet the growing demand for adult training. The School has organised a number of part-time courses in culinary science, acupressure and environment and water technology. A range of diploma and certificate courses will be offered in preparation for the surge in the biopharmaceutical industry.



## A Growing Player In Biopharmaceutical Industry

In line with the developments in the biomedical science industry in Singapore, ASc has moved to the forefront to establish itself as a leading player in providing specialised training for the new biopharmaceutical industry. In the near future, ASc aims to become a reference resource centre and beta testing site, providing training and consultancy for the bioprocess industry in Singapore and the region.

In collaboration with established industry partners, **Pall Filtration Pte Ltd** and **GE Healthcare Pte Ltd**, training programmes for staff, students and industry professionals are underway.

Working with **Sartorius Stedim Singapore Pte Ltd**, ASc has established a joint Technical Application Centre in TP.

The incorporation of relevant modules and just-in-time workshops in the full-time Diplomas in **Biotechnology, Chemical Engineering** and **Pharmaceutical Science** has equipped graduates with the latest knowledge and skills, enhancing their employability. In the pipeline are a range of specialist diploma and certificate courses to equip the industry with the pre-requisite expertise. A **Specialist Diploma in Biopharmaceutical Technology** endorsed by SPUR will be made available to relevant

diploma and degree holders. ITE graduates will have the option of taking up certificate programmes aligned to the WDA/WSQ framework while industry professionals can anticipate short courses in newer bioprocessing technologies, jointly organised by the polytechnic and industry partners.

With this comprehensive range of programmes for school leavers and working adults, the School has taken a big leap forward to position itself as a centre of excellence in providing a skilled workforce for the expanding biopharmaceutical industry in Singapore and the region.



## Adult Training



### Diploma In Acupressure

A 3-year part-time **Certificate/ Diploma in Acupressure** is jointly offered by ASc and the **Singapore College of Traditional Chinese Medicine (SCTCM)**. The course is conducted in Mandarin over 2 phases. Course graduands will be awarded a Certificate in Acupressure on successful completion of Level 1, while a Diploma will be conferred on those who pass both Levels 2 and 3.

TCM has become increasingly popular as an alternative form of

medicine. This has generated considerable demand for professional development and personal enrichment courses. Acupressure is well-known for its therapeutic effects, as well as for its benefits in enhancing health and promoting total well-being. The objective of the course is to provide participants with comprehensive theoretical and practical training to equip them with relevant skills to be competent acupressure practitioners in wellness.

The programme commenced in March 2007 and to date, two batches of participants have been conferred with the Certificate in Acupressure. In April 2009, ASc had its first intake for the Diploma in Acupressure.

In the pipeline is the Specialist Diploma in Modern TCM Applications scheduled to commence in 2010.





## Training in Food Safety & Culinary Science

Chefs from the F&B industry gathered for a 3-day workshop organised by ASc on managing food safety in the industry. The workshop included hands-on sessions on **HACCP** application, food hygiene and food microbiology. Participants also explored ways to plan healthier

menus through understanding and applying various nutritional guidelines. The workshop concluded with a culinary demonstration on the use of certain food ingredients to develop and provide different textural effects in foods.

The participants found the course very enlightening and relevant. They especially enjoyed the hands-on nature of the workshop. One participant enthused that *"the course is applicable to my line of work and the lecturers have made it very comprehensible"*.



## Specialist Diploma In Environment & Water Technology

A favourite with the industry, this one-year **Specialist Diploma in Environment & Water Technology** is in its second run. The course aims to provide participants with the theoretical and practical knowledge to operate environment and utility installations for the environment and water industry.

Environment and water technology, which has substantial economic potential, is expected to grow from 0.6% in 2003 to 1.5% in 2015. There are presently 250 companies in Singapore, of which 50 are international and local companies providing water-related services. The course participants are mainly from the statutory boards, water treatment, semiconductor and chemical industries.



## Partnership With Hockhua Group

November 2008 marked a significant development for **Traditional Chinese Medicine (TCM)** in ASc when we concluded a mutually beneficial agreement with Hockhua Group, a TCM healthcare product manufacturing, trading and retail company in Singapore.

Established in 1986, Hockhua Group consists of 6 trading companies, 41 traditional medicine retail outlets and 17 oriental herbal tea stores island-wide. This liaison now allows our staff and students to tap on Hockhua's experience and expertise in GMP and Halal Certification. Reciprocating this gesture, ASc will serve as the technical arm of Hockhua, providing testing and consultancy services.





Seizing opportunities to serve and contribute to society, Asc students stayed home to play host to their Malaysian 'SMYC' family and fanned out to low-income homes on a Health Mapping Exercise and further afield to Thailand and Cambodia on their Overseas Community Projects (OCP). They now share with us their insights and lasting impressions of these deeply enriching experiences.

## Community Projects At Home & Abroad

### Chiang Mai, April '08

Diploma : **Veterinary Technology**, 11 students

Project : **Elephant Conservation**

Mission : To interact with wildlife in the Elephant Nature Park (ENP), participate in the elephant and forest conservation

This project exposed us to many 'first-time' tasks such as harvesting soybeans, constructing fences, cleaning elephant shelters and mulching (laying elephant dung on vegetation).

We had debriefs and reflection sessions to track our learning progress and keep us focused on our intended goals. We grew closer as a team working alongside each other to complete all tasks safely and successfully. It was tough trying to overcome unforeseen challenges and work outside our comfort zones but that helped us to develop resilience, strength and adaptability.

We met Sangduen Chailert (Lek), the famous founder of this award-winning sanctuary where elephants can live out their lives in dignity. Lek told us of the dangers in rescuing abused or injured elephants from logging camps, trekking camps, temple owners and mahouts (who use the elephants as street beggars). But she is undaunted by death threats and other difficulties because of her love for elephants.

**Dawn Ong**, Year 2

I am very inspired by Lek. Her deep respect for the elephants is an unforgettable lesson for me. I am also impressed by how gently the vets handled the elephants and other animals in the sanctuary. When I returned to TP, I treated the laboratory animals with more care, giving them the dignity they deserve,

mindful of the need to reduce their stress and trauma.

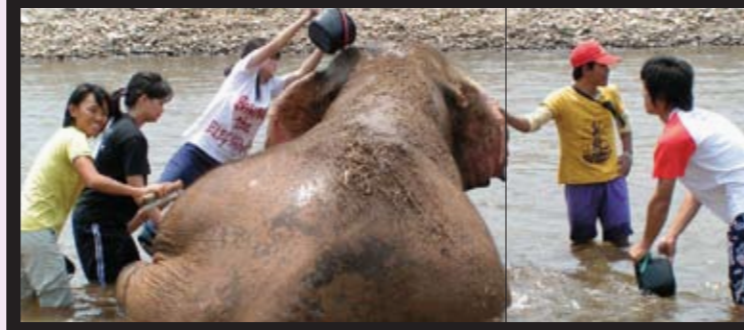
I feel that every student should go on an OCP as there are many learning opportunities for personal growth and development e.g. leadership qualities and skills were things we experienced and saw in action! We didn't have to sit through boring talks on leadership!

**Shermaine Tay**, Year 2

We had immense fun repairing the elephants' mud pits and getting all muddied, something we wouldn't think of doing back home! My favourite elephant was 5-year-old Tong Jan ('Golden Moon'). I can't explain it but I just felt drawn to her. I think that's how it should be with humans and the animal world – we should feel this special connection – we should stay in close touch with nature and remember that our actions or omissions can unwittingly hurt our animal friends.

This OCP made a deep impact on us. So when we returned, we organised a two-day roadshow to raise awareness on elephant conservation. We also sold handicraft and other items and sent over about S\$1,000.00 to the ENP. I'm glad TP students who came to our roadshow were interested to know more about how elephants have been abused through the brutal **Pajaan** method to make them submissive to their human owners. More needs to be done to protect and treasure wildlife. I guess we'll have to do whatever we can.

**Soon Le Ying**, Year 2



### ► Baray & Phnom Penh, October '08

Diploma : **Chemical Engineering**, 10 students

Project : **Use of Local Resources to Improve Livelihoods**

Mission : To construct a cooking stove with improved heat transfer efficiency and to produce syrups from starch by using crude amylase enzyme from germinated wheat grains

Participants : 36 village and city participants, aged 16 to 69, including students, housewives, woodworkers, farmers, weavers, construction workers nominated by Girls' Brigade, Cambodia

To tell the truth, our morale was very low at the beginning because we thought it was so boring for the participants to have to listen to us and so tiring for us to conduct two demonstrations for every workshop, two workshops a day. But when we discovered how deeply interested the participants were to learn from us, we were so surprised. It motivated us to really do a good job in explaining and helping them to understand. I know earning money is not easy for them but we should not just give hand-outs, we have to give them skills so that they can 'catch their own fish' which is what they truly want.

**Adrian Hadi Heng**, Year 1

We were supposed to share our expertise, but actually I took away from the Cambodians and this OCP experience more than what I gave. I certainly gained more than what I could have learned in a classroom and more than what money can buy. I want to go back again to share a new set of skills and to see the Cambodians again. If I can see how much better the Cambodians are doing, I'll be happy!

**Sebastian Xu ZheYang**, Year 1

### ► Phnom Penh, October '08

Diplomas : **Applied Food Science & Nutrition (AFSN)**, 6 students  
**Consumer Science & Technology (CST)**, 4 students

Project : **Nutrition Education**

Mission : To impart nutrition knowledge through workshops viz. Nutrition in Pregnancy & Lactation, Healthy Eating & Nutritional Concerns for Cambodians and Food Hygiene and Safety

Participants : 47 Community Health Educators and women leaders nominated by the Cambodian Ministry of Women Affairs

We had great fun playing games! The participants were hungry for knowledge and very appreciative of how we tried to promote healthy dietary practices and lifestyles. They were open to what we shared with them on nutrition-related causes of death and common dietary myths in their culture.

**Loh Ci En Joanne**, Year 2, AFSN

Top marks for this OCP experience! It opened my mind to other cultures and increased my confidence in adapting to a new culture or country... I'm getting the hang of a Transnational Mindset.

**Charmian Tan Zi Hui**, Year 3, CST



## Phnom Penh, October '08

Diploma : **Baking & Culinary Science**, 12 students  
 Project : **Training in Managing of Cafeteria**  
 Mission : To conduct training in food safety, food presentation and managing of cafeteria  
 Participants : 45 young working adults nominated by Girls' Brigade, Cambodia

I was assigned to teach 'food presentation'. At first, I thought that Cambodians, being poor, won't be interested in how aesthetically pleasing food should be presented. But they were so eager to learn, laughing happily as they watched the presentations! Later, when I visited the 'killing fields', I understood better my trainees' deep longing to pick up skills, to move on in life.

**Cheryl Ho Xue Wei**, Year 2

Diploma : **Biomedical Science**, 12 students  
 Project : **Health Education**  
 Mission : To impart knowledge on Diabetes Mellitus, Menopause, Endometrial and Breast Cancers  
 Participants : 34 Community Health Educators and other women leaders in development programmes nominated by Girls' Brigade, Cambodia

We were absolutely thrilled to be the pioneer batch from our Dip to go on this OCP! Preparing for the workshops was exciting but so taxing because we had school projects, CCAs, work and other commitments. But we learnt better time management! And we enjoyed working together, planning for our workshops to be interactive with activities like role plays, mimes, demonstrations, case studies and puzzles.

**Chiu Wye Weng**, Year 1

We had to rush out the materials to be sent in advance to Cambodia for translation into the Khmer language. The language issue taught us the importance of using easy-to-understand medical terminologies as well as the crucial role of a competent interpreter. The project also challenged us to be more creative and to polish our skills in presentation, communication, project management and teamwork. Quite a learning journey for us!

**Vo Thu Hong Anh**, Year 2

The participants were such keen learners – making their own notes, asking us so many questions even beyond the scope of the workshops! They were very grateful when we handed them all the workshop materials for their use when sharing with their fellow villagers. It felt good to know we had played a part in helping their community to be more aware of diseases and their prevention.

**Joshua Chew Eu Min**, Year 2



## Singapore, June '09

Diplomas : **Biomedical Science (BMS), Chemical Engineering (ChE)**, 2 students  
 Project : **Singapore-Malaysia Youth Camp (SMYC)**, an annual joint project between our National Youth Council and the Malaysian Ministry of Youth and Sports  
 Mission : To host Malaysian counterparts in fun-filled programme aimed at strengthening bilateral relations and promoting friendship and mutual understanding among youths from Singapore and Malaysia  
 Participants : 40 Malaysian and Singaporean youths

Before the camp, we attended talks, rehearsed performances and prepared welcome gifts for the Malaysian contingent. The 11 Saturdays that we gave up for preparations was a great learning time as we faced obstacles and setbacks. During the 9-day camp, we had our share of clashes which was inevitable given the diverse backgrounds, cultures, mindsets and idiosyncrasies of the youths who came together. However, the contingents from both sides resolved the issues quickly and we soon became a closely-knit 14th SMYC family. Cooooo!

**Grace Ke Yanxiu**, Year 3, BMS

Highlights for the camp included sports and adventure, institutional visits, homestay and cultural exchange. If I had to choose the most memorable activity, I would definitely say that it was the rafting because that truly bonded the Malaysian and Singapore contingents really well. Grace and I are proud to be part of this project which has since its inception seen more than 1,000 participants. We feel privileged to have been given the opportunity to play a role in the strengthening of 'family ties'.

**Sharon Tang Xue Er**, Year 3, ChE



Diplomas : **Biomedical Science (BMS), Pharmaceutical Science (PHS), Applied Food Science & Nutrition (AFSN), Consumer Science & Technology (CST)**, 48 students  
 Project : **Health Mapping Exercise**  
 Mission : To conduct free Health Screenings in collaboration with the Singapore Heart Foundation  
 Participants : 100 lower-income residents living in the one- and two-room flats of the small public housing estate at Dakota Crescent in the vicinity of Old Airport Road

This was an eye-opening experience for many students who had never seen the living conditions of this segment of society. They tried their best to reach out to the residents, communicating in Chinese dialects, Malay or Tamil. The students were highly motivated knowing that the results of this health needs survey would be very useful to the charity organisations which would then have a clearer picture of the residents' needs.

**Candy Choo**, Year 2, BMS student project team leader

All we can do as students is to be grateful for what we have and offer our services to help out in community services. We are not rich, but we can still work together on something simple like sacrificing a whole weekend going door-to-door finding out the health status of the residents. Teamwork and enthusiasm can do wonders!

**Celia Jong**, Year 2, AFSN student project team leader

