

Science competitions inspire students to search for testing and certification applications

Testing and certification plays an important part in ensuring the quality and safety of thousands of everyday products, thereby safeguarding consumer interests. To give local youngsters new insights into what testing and certification is all about, two science competitions for secondary school students were held recently.

Participating teams were encouraged to apply their scientific knowledge and creativity to develop innovative, eco-friendly and practical testing solutions. Along the way, the students also had to draw on a range of competencies including presentation, problem-solving, critical thinking and collaborative skills.



Video contest

The Hong Kong Council for Testing and Certification (HKCTC) co-organised the "Digi-Science" Video Production Competition for Hong Kong Secondary Schools 2018-19 with the Hong Kong Association for Science and Mathematics Education.

Taking the theme of "Testing Science for Green Living", participating students were invited to submit a two-minute video depicting innovative testing experiments. Members of the HKCTC, Ms Stephanie Lam and Ms Pearl Tse, served as judges. The chosen topics, quality of videos and presentation skills were their primary assessment criteria.

"I assessed the flow of ideas and the tests the teams showcased," Lam said. "The maximum length of each video was two minutes, so contestants had to convey their ideas succinctly and highlight their core message."

Tse placed more emphasis on the teams' creativity and the techniques used to carry out their experiments. She was pleasantly surprised to see how meticulously they conducted their tests to achieve the highest possible degree of accuracy.

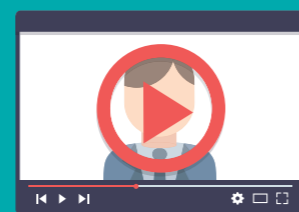
"The teams arrived at their results through well-designed tests that make green living possible," Tse said.

Lam added that the contestants explored interesting aspects of daily life and considered the practical application of their tests.

"The videos showed they had acquired in-depth academic knowledge of the related scientific topics through thorough research," she said.



Members of the Hong Kong Council for Testing and Certification, Ms Pearl Tse (left) and Ms Stephanie Lam.



Cheung Sha Wan Catholic Secondary School:
Lee Chin-yat, Ip Chit-long, Li Chun-kit
Project: Reusable Wastewater

Junior Division Champion

Phosphate in chemical fertilisers may be beneficial for plant growth, but it can cause water pollution if discharged into rivers or the sea in excessive amounts. Therefore, the winning team aimed to discover the phosphate concentration in wastewater after watering plants. "We were able to prove that the wastewater from potted plants does contain phosphate. If such water flows into the sea, it will cause algal blooms and red tides," the team said. In view of this, they suggested that the wastewater be reused to irrigate potted plants, thereby minimising the amount of phosphate that will ultimately be discharged into the sea.

The team conducted a lot of research to find a suitable chemical reagent that could react with the chemical fertilisers, and is detectable and quantifiable in water. Being unfamiliar with video shooting and editing, they sought help from a teacher and fellow students, which proved to be a good team-building exercise. Overall, they cherished the experience and learned a lot during the process.



St. Paul's Convent School:
Hui Sin-kiu Cherry, Woo Wing-hin Peony
Project: REVEALED - Mercury behind the Masks

Senior Division Champion

Noting reports revealing that some cosmetics and beauty products might contain harmful chemicals, the winning team developed a reliable method to test for the presence of mercury in whitening masks. In line with the competition's theme on green living, the method primarily used extracts from lemon peel to produce silver nanoparticles, which can be used to test for the presence of mercury(II) ions in whitening masks.

"The most difficult part was repeating the tests many times to ensure accuracy," the team said. "We then had to compress a lot of data and information into a two-minute video with a storyline that appealed to viewers. By taking part in this contest, we came to appreciate the importance of conducting tests meticulously to ensure samples are free of any contaminants. We also realised that, by applying what we have learnt in science, we can develop low-cost and effective testing methods to tackle problems in our daily lives."

HKCTC Special Award

The "HKCTC Special Award for Outstanding Project in Testing" has been part of the Hong Kong Youth Science and Technology Innovation Competition since 2016. The award is presented by the HKCTC.

The competition, organised by the Hong Kong New Generation Cultural Association and supported by the HKCTC, is one of the largest of its kind in Hong Kong and features a number of categories. This year, student teams were invited to submit original research projects or inventions under one of several headings including mathematics, physics and engineering, chemistry and materials, biology and health, energy and environmental science, and computer science and information technology. Ten finalist teams with testing-related projects were then chosen to compete for the HKCTC Special Award. On the day of final judging, the judges visited each team's booth to assess their projects, listen to their presentations and ask follow-up questions.

The HKCTC Chairman, Prof. Albert Yu, and Members, Dr Crystal Fok, Dr Li Hung-wing, Ms Stephanie Lam and Ms Pearl Tse, formed the judging panel for the Special Award. They looked for entries that combined practicality and viability, paying particular attention to the methodology and sample sizes used.

The judges noted that the finalists all gave careful consideration to the practical application of the solutions they proposed. "Students have taken inspiration from outside the school environment, and some had been motivated to study tertiary-level reference materials," they said.

The judges were also impressed by how the finalists took due account of the cost-effectiveness and practicality of their entries. "In developing their projects, the students considered practicality from multiple perspectives and saw that cost-effectiveness had an impact on how widely their solutions could be adopted in future," the panel said.

The winning project, "Methanal Terminator", was developed by students from King's College, and it stood out thanks to the team's excellent presentation. "They demonstrated a thorough understanding of the theories and potential applications of their solution. Their simple yet practical scientific methods were substantiated with a lot of data. Their solution is highly usable," the judges said.



Chairman of the Hong Kong Council for Testing and Certification, Prof. Albert Yu (centre), and Members, Dr Li Hung-wing (first left), Dr Crystal Fok (second left), Ms Stephanie Lam (second right) and Ms Pearl Tse, formed the judging panel for the "HKCTC Special Award for Outstanding Project in Testing".

CHAMPION TEAM

The champion team's project featured titanium dioxide (TiO₂), which is a photo-catalyst used to remove HCHO (also known as methanal or formaldehyde) under UV light. Since UV light only occupies a minor portion of the solar spectrum, the team, by making use of the solar absorption properties of chlorophyll in the visible light region of sunlight, developed a method of using chlorophyll-sensitised TiO₂ to remove HCHO under normal sunlight or indoor lighting.

"We wanted to focus on formaldehyde because a horrible smell lingered in my home after some renovation work there," said a team member. "That prompted us to develop an easy and practical solution to tackle the problem. The biggest challenge was that the experiments were time-consuming."

To ensure the accuracy and reliability of test results, the team spent a lot of time in the laboratory after school. Through that process, they realised meticulous testing requires patience and diligence. "We had to take due care of every step of the experiments and avoid making mistakes. Otherwise, we would not have achieved our goal."



King's College: Wong Sonny, Lau Kit-fai
Project: Methanal Terminator

1st runner-up team

The first runner-up team demonstrated their ability to keep abreast of the latest global trends in green living, such as the use of aquaponics, by developing a cost-effective and eco-friendly filtering system to remove copper from water. With the use of recombinant DNA technology, photospectrometry and 3D printing, they developed an "MT E.coli" with increased copper absorbing capacity. The team also designed a device to be used with the "MT E.coli", which can lower the copper level in water by 40 per cent.

The project showed how synthetic biology can reduce pollution. "Heavy metal pollution is a global issue. That is why we chose this biotech theme," said the team. By showing that the E.coli can be grown as a culture at a low cost, the team hopes their invention can be widely used in homes and factories to reduce the copper level in drinking or waste water.



Po Leung Kuk Celine Ho Yam Tong College:
Kwok Kin-ming, Leung Hoi-ying,
Tran Do Giang My
Project: Bacterial Copper Absorption Device



S.K.H. Li Ping Secondary School:
Lyu Baocan, Lee Hiu-wai, Tsoi Hung-ngon
Project: I2Phone

2nd runner-up team

Recent incidents of food poisoning prompted the second runner-up team to propose a simple method to identify the amount of sulphur dioxide, a common food preservative, in food samples. The project made use of a mobile app to check the light absorbance of iodine in different concentrations of sulphur dioxide, leading to the conclusion that the higher the concentration of sulphur dioxide, the lower the light absorbance of iodine. With this finding, the team suggested that members of the public could test for the amount of sulphur dioxide in various food samples at home simply by using a few drops of iodine and the mobile app.

"This competition helped us understand the importance of testing and certification and increased our interest in coming up with new testing methods," they said. "We showed that there is a simple way to do food testing at home and to be assured of the safety of what we eat."