Beyond students' wildest dreams

Teacher presented with the Award

Mr WAN Kin-kwok
(Years of teaching : 32 years)

School

TWGHs Kap Yan Directors' College

Subject taught

Design and Technology (S1-3)

Teaching Philosophy

"AIR (Aviation-Innovation-Robotics) is a set of learning experiences designed to foster students' development of technological literacy. AIR provides real-life contexts which give students broader opportunities to develop their capability, understanding and awareness in technology."

Interview with the Teacher

In Technology Education, it is important to include both cultural and commercial elements since Design and Technology is closely related to our daily life.

◄▲Activities designed to nurture students' creativity, problem-solving and critical thinking skills.

How technology can extend our abilities

To fly high up in the sky is the dream of many young kids. But in reality the road to becoming a pilot is not an easy one. At TWGHs Kap Yan Directors' College, students are given the chance to learn about the challenges and excitement of becoming a pilot.

Walking into the design studio of the school, the first thing that strikes you is a flight simulator; here, students can have a taste of simulated flight.

"This is one of the technology learning activities that we have introduced to students. We believe it will help students understand how technology can extend our abilities -- in this case flying high in the sky," says Mr WAN, who has spent two-third of his time focusing on the subject of Design and Technology throughout his 32-year teaching career.

Serving people's needs

Mr WAN has dedicated his career to Technology Education. He believes humans should be at the centre of Technology Education. Thus, he has put forward his vision of "Anthropocentric Technology Education" as the central tenet of his teaching. "In Anthropocentric Technology Education, we hope to cultivate students' capability and understanding of technology in order to serve people's needs, while at the same time help them develop a sense of how our use of technology has an impact on society, and hence the world," he explains.

Anchored with this principle, Mr WAN aims to give a broader definition to technology, relating it to daily life through various technology learning activities. He states that it is more important that students ask "when" and "why" than "how" to use technology.

"Engaging students to think, developing their interest and bringing in innovative ideas to keep them aware of how technology changes the world -- at the end of the day, students should appreciate how technology evolves from human activities," Mr WAN says.

Creating an authentic learning context

Emphasising the importance of activities in learning technology, Mr WAN has designed a number of problem solving challenges for students. Students are given a problem with an authentic context and led to further explore the varied possibilities of technology.

In the technology workshop, for example, students have to make 6-legged robots in small groups. Their challenge is to take part in a retrieval mission on Mars with a time constraint of two minutes. "Students are all excited about their mission," says Mr WAN. Adding an imaginative element to the task also promotes students' creativity.

Mr WAN stresses the importance of practical solutions. He introduces both cultural and commercial elements in his teaching to ensure that what students come up with is all making sense. "I asked students to split into groups where they have to play different roles in a design company, and develop a product with consideration given to cost control and operation management. With such exercises, we put students into a real situation where they learn about practicality, how to care for the needs of clients, and understand the principle of cost effectiveness," he says.

Assessment for learning is another important area Mr WAN focuses on. He claims that it is students' job to look for the answer. The role of a teacher is to give guidelines, hints and support, leaving room for students to discuss and reflect.

▲Mr WAN encourages students to join technology-related competitions.

Dreaming outside the box

Mr WAN encourages students to think out of the box. "Look at the aviation task we have brought into class. Students get to know this vocation and can consider whether to take subjects in a related discipline so that they can become pilots in the future," explains Mr WAN. "We tell students to dream big. As technology helps advance our living, it also gives us inspiration to dream bigger than before."

▲Students are working collaboratively in moulding the acrylic sheet.

In fact, some of the graduates of the school have chosen to study disciplines that are related to aviation and are preparing to become commercial pilots. "Of course, becoming pilots is one of the paths students can choose. There are many vocations related to aviation which could be considered, such as air traffic control or aircraft maintenance. As China opens more international airports in the coming years, they will need employees who can speak English. I think Hong Kong students have an advantage in this area." Among his many graduates, there are some influenced by the Design and Technology subject studied and have taken up careers in related disciplines.

Looking ahead

As Mr WAN will retire in several years, he worries about the issue of continuity. "The resources to develop the Design and Technology subject are limited and manpower is also an issue. I only wish that the subject will not be taken away from schools and students will continue to enjoy studying the subject."

Mr WAN will continue to be involved in various organisations, such as the International Conference on Technology Education in the Asia-Pacific Region, as this sort of exposure contributes to his development of technology learning activities to support the learning and teaching of the subject.

"I will continue to promote and share with other teachers my three core tenets in Technology Education: precise teaching goals, sensible incorporation of technologies and learning technology through activities," Mr WAN concludes.

Anthropocentric Vision for Technology Education

Technology Education (TE) concerns the future and changes. Changes are generated by the rapid technological advancement which affects all aspects of our life. Hence, I have constructed the vision of "Anthropocentric Technology Education", which advocates that "humans" should be at the centre of TE. It denotes the intentions and practices that aim at developing students' capabilities to serve human needs through the utilisation of resources and conceptual understandings while promoting awareness of human impact on nature and the man-made world.

Views on learning in Technology Education with an Anthropocentric Vision

Learning in anthropocentric TE has its roots in the sociocultural tradition. It holds that students construct their knowledge through interactions with others and practices provided. Technology Learning Activities (TLAs) are recommended in the curriculum framework of Technology Education Key Learning Area to develop technological literacy. By means of the "design-and-making" learning in TLAs, anthropocentric TE provides an integrated environment for students to interact with resources, concepts and understandings to develop their creativity. Through these technological endeavours, students become more acquainted with the technological phenomena that we have created, and as a result, become aware of the consequences of our use of technology.

Apart from development in conceptual and value aspects, the learning outcomes in anthropocentric TE are discerned by the changes in the man-made world that are brought about by the products and systems students designed.

▲Mr WAN demonstrated the technique in cutting and shaping the acrylic sheet.

Pedagogical Content Knowledge and Assessment for Learning practices to enhance students' learning

Under the technological endeavours in TLAs, students have to undertake complex technological learning tasks. In supporting such complex learning, TE teachers are required to have sound Pedagogical Content Knowledge (PCK). In the "6-legged robot" TLA stated below, for example, a spectrum of technological knowledge was input to facilitate students' learning. The arrangement of the "migration" of the theme from "6-legged robot" to "Martian Rescue Robot" maintained the coherence of the objectives and continuity of activities across several lessons.

Assessment for Learning (AfL) means more than marking and tests to include learning facilitation. Teachers with effective PCK can undertake AfL practices to reflect on students' learning and provide relevant and specific feedback to inform how well they have done and what they might do next. The "Daily Record Sheet" is a commonly used AfL strategy in which students are required to reflect on learning after the lesson. With Design and Technology (D&T) specific PCK and the data obtained, teachers can intervene with precise feedback or framed questions to facilitate students in their learning and look for ways to move on towards better quality.

"AIR in action" learning experiences

The anthropocentric TE learning experiences which are offered to students through D&T in the school can be summarised as "AIR in action", which stand for "Aviation", "Innovation" and "Robotics" respectively.

A selection of the TLAs offered to students is presented below.

Design acrylic products with press-moulding technique

This TLA demonstrates how to enhance the learning outcome of a craft-based task with D&T-specific PCK. All teams were required to produce household products by press-moulding acrylic. In addition to learning the processing of plastic material, students were assigned to different duties (Chief Designer, Production Manager, Project Controller and Accountants) in the "design companies".

Under the lead of the "Chief Designer", they had to identify the needs and cultural background of the users and exercised value-judgement in designing and transforming the acrylic sheets into appealing products. As a result they became acquainted with the notion of value-adding by design.

Furthermore, the "Production Manager", the "Project Controller" and the "Accountant" of each team were required to plan the project, keep track of progress, and keep the cost low respectively. This arrangement integrated students' learning in several subjects, which helped them to understand that technology involves a multitude of inputs. In keeping track of progress, students were involved in the practices of AfL to reflect on their performance with enhancement of the quality of their work as a result. Through this project, the collaborative and communicative abilities of the students were developed.

▲Students' press-moulding products

6-Legged Robot and Martian Rescue Robot (MRR)

S3 students worked in groups to build robots to compete in a splinting race, incoporating previous robotics knowledge learnt in S2. This provided opportunities for them to compare and contrast current experiences with previous ones. Meanwhile, it helped students further develop their competence and concepts in robotics.

In the MRR TLA, students had to re-design their 6-legged robots to rescue the Beagle 2 Space Probe that had been sent to Mars in 2003. The context was set to arouse students' interest in aerospace technologies. The re-designing process involved the selection of appropriate mechanical design to attain enough strength for the robots. The MRRs were required to pass a series of checkpoints. Students had to exercise decision-making abilities to determine the best mission route in considering the competence of their robots, their controlling skills and the difficulties of the checkpoints. The MRR also had to carry a cup of marbles representing water and to give signals to attract the attention of the Beagle 2. The intention here was to incorporate fun and challenge in learning as well as the concepts in robotics motion and motion transmission.

"Pilot in the cockpit" - Flight Simulation

The purpose of this TLA is to encourage students to understand how technology can extend our ability to perform certain tasks, e.g. fly up in the sky. Students were introduced to the physical principles related to the motion of the aeroplane before having the hands-on experience of flight simulation.

Students also learnt about the entry requirements and opportunities in aviation careers. This helped in developing their career aspirations for aviation.

▲Flight Simulation

Conclusion

Students' development in D&T with an anthropocentric vision is discerned by their capabilities in tackling open-ended design problems. They utilise conceptual understandings and the resources available, exercise their intelligence and value judgements to produce the solution, resulting in value-addedness in the product and a positive change in the man-made world.

Assessment Summary

Through diversified technology learning activities, students are inspired to serve human needs by applying technological knowledge and skills.

Mr WAN is a strong supporter of "Anthropocentric Technology Education", which advocates that "human" should be at the centre of Technology Education (TE). He has developed a coherent and systematic school-based Design and Technology (D&T) curriculum. It comprises the tripartite of Aviation, Innovation and Robotics (AIR in action) and emphasises offering technology learning activities (TLAs) that aim at inspiring students of different backgrounds and abilities, motivating them to learn and developing their technological literacy to serve human needs through the application of technological knowledge and skills. Mr WAN also provides multifarious scenarios to foster students' integrated learning through the design of TLAs that require them to apply learning elements acquired in different subjects to solve complicated issues relating to technology.

Mr WAN's lessons are well planned. He uses effective teaching strategies and activities to develop students' technological capability, enhance their collaborative and self-management skills, as well as cultivate their creativity. For example, he asked students to form "design companies" of 4 members each to design client-oriented acrylic products with press-moulding techniques. Mr WAN uses classroom language skillfully; he provides clear instructions to students and asks good focal and probing questions to stimulate their thinking and facilitate exploratory learning. Goal-directed, descriptive feedback and appropriate intervention is given to students to promote their active learning and make sure they achieve expected outcomes. There is a very good teacher-student rapport.

Mr WAN provides students with diverse interactive learning opportunities and promotes their interest in learning by encouraging them to join open competitions and exhibitions related to TE. His students expressed appreciation for his profound knowledge and amiable qualities. They enjoyed participating in problem solving activities such as "Packing Design" and "Egg Protection Design Competition", which helped build their creativity and confidence in dealing with problems in everyday life. The learning of different knowledge areas in technology also helped prepare them for future studies and careers.

Mr WAN has fostered the development of a professional learning community at school through promoting a sharing and collaborative culture among colleagues. He proved himself a reflective practitioner and demonstrated his passion for TE through presenting his views and research findings in education journals on issues related to the subject. He also served as a member of the CDC Committee on TE and a seconded teacher in EDB, making significant contribution to the development of the TE curriculum framework. Mr WAN's professionalism and contributions to the teaching community were commendable.

▲Mr WAN enables students to learn in an orderly environment and to acquire safe and healthy work habits.

Way of Obtaining Information of the Teaching Practice

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