Transformative Education in Computing: Nurturing Talent with CARES

Albert Einstein once remarked - "Education is not the learning of facts but the training of minds to think." This insightful piece of wisdom captures the essence of transformative education, particularly in the field of computing. The primary objective of education should extend beyond the mere dissemination of information; it should aim to develop critical thinking, problem-solving, and decision-making abilities.

The educational philosophy of COMP comprises four pillars — *Career, Application, Research, and Entrepreneurship*. It exemplifies our dedication to fostering well-rounded individuals who are equipped to excel in various domains, a reflection of our care for students. This philosophy not only emphasises knowledge acquisition but also underscores our commitment to the comprehensive development of our students.

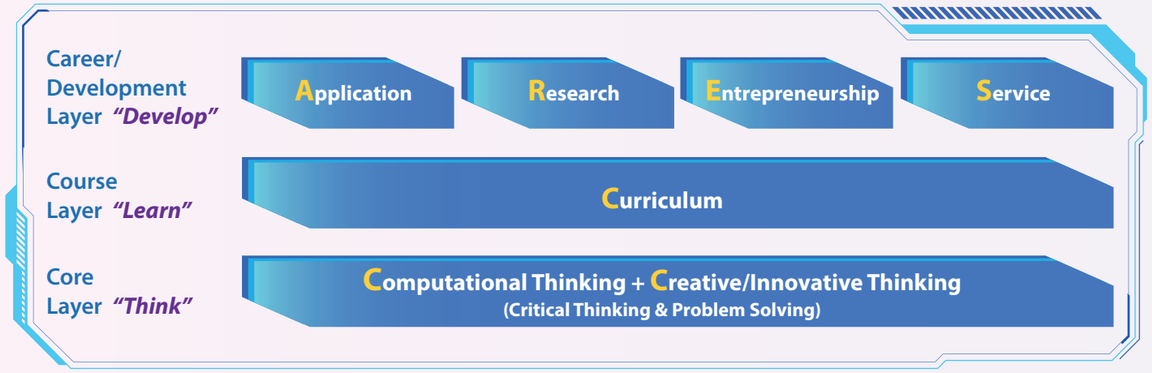

Fig. 1: CARES Model: Computing for Application, Research, Entrepreneurship and Service

From a wider perspective, our educational approach is exemplified by the CARES model shown in Fig. 1. This model comprises an innovative 3-layer framework with the core layer ("Think"), the course layer ("Learn"), and the career/development layer ("Develop").

The core layer of the CARES model cultivates two essential thinking skills: computational and creative to shape students' futures. Computational thinking involves solving problems logically, incorporating skills like algorithmic thinking and abstraction. Creative thinking focuses on generating new and innovative ideas.

The course layer of the CARES model centres on the curriculum or programmes related to knowledge and skills for computing education. Our unique 4-year undergraduate programmes comprise a common fundamental year, a broadening year, a strengthening year and a specialising year. Students can select suitable programmes at the end of the first year, followed by an internship option in their 3rd year to gain eight months of full-time work experience while studying in the evening.

The career/development layer of the CARES model has four major areas: Application, Research, Entrepreneurship, and Service, representing potential career trajectories for students post-graduation. Application involves applying computing knowledge in specific domains, such as working as a software developer. Research focuses on advancing knowledge through investigation, including pursuing a PhD or conducting research. Entrepreneurship focuses on opening a business or joining a startup as well as leveraging computing skills to develop innovative products or services. Service involves the use of computing knowledge to benefit society, such as working for an NGO to develop software for individuals with disabilities.

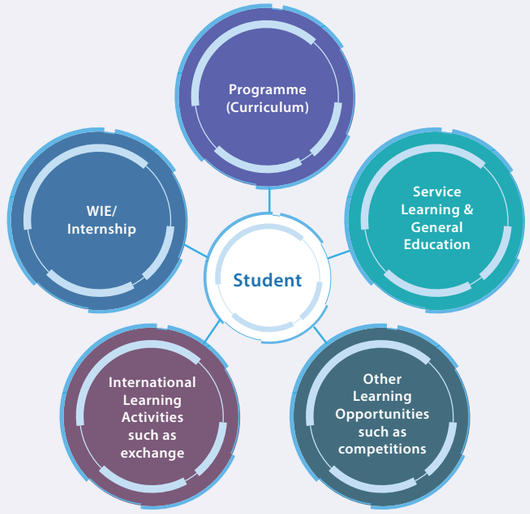

Fig. 2: Student-centred Model with Integrative Learning Elements (SMILE)

To promote holistic student learning, COMP also embraces the SMILE model (Student-centred Model with Integrated Learning Elements)

Five key learning elements include:

1. **Programme or Curriculum**: A comprehensive, up-to-date curriculum that covers essential computing knowledge and skills.
2. **Work Integrated Education (WIE) / Internship for Experiential Learning**: Provides opportunities for students to gain practical experience through internships, allowing them to apply their knowledge in real-world settings.
3. **Service Learning and General Education**: Initiatives that support a multi-faceted education and encourage use of skills for the betterment of society.
4. **International Learning**: Allows students to participate in exchange programmes and other international learning experiences to broaden their perspectives and enhance their global outlook.
5. **Other Learning Opportunities**: To encourage and guide students to participate in other learning activities such as competitions, which help develop their skills, gain greater recognition, and build confidence.

COMP has been providing transformative education through our unique philosophy and programmes over the past 50 years. Our holistic learning approach encourages students to:

- **Learn with your brain**: Think critically, innovatively, and creatively.
- **Learn with your eyes**: Read and see new things and technologies.
- **Learn with your ears**: Listen to advice and comments.
- **Learn with your hands**: Develop and build computing systems, applications, and more.
- **Learn with your feet**: Go overseas, live, and work in new places.
- **Learn with your heart**: Learn to serve and serve to learn.

While the above mainly covers undergraduate education, COMP also provides postgraduate education following a similar education approach. We are fully committed to continuing our transformative education to nurture talent in the years to come.