



IFIP Task Force on Digital Education

Sustaining
relevant digital
inclusive
education for
young people (5-
18 years of age)

Background

- Formally, IFIP is a non-governmental, non-profit umbrella organisation for national societies working in the field of information processing, established in 1960 under the auspices of UNESCO.
- Set up by the President of IFIP in 2022, this IFIP Task Force is seeking to gain an international perspective to support the UN, UNESCO, affiliated organisations and national societies in moving forward a focus on 'Sustaining relevant digital inclusive education for young people (5-18 years of age)'.
- The IFIP Task Force has identified five key areas of concern that warrant particular attention: aspiration; diversity, inclusion, the digital divide and the under-represented; computational thinking and its links to problem-solving; developing teacher practices; and short- and long-term plans and actions.

IFIP Task Force Members

Presenting today:

- Don Passey, Chair of the IFIP Task Force, Chair of IFIP TC3, Department of Educational Research, Lancaster University, UK
- Greg Lane, CEO of CIPS (Canadian Information Processing Society)
- Admire Gwanzura, President of the Institute of Information Technology Professionals South Africa
- Luís Soares Barbosa, Chair of IFIP TC1, UNU-EGOV, United Nations University, INL & HASLab INESC TEC, Informatics Department, Universidade do Minho, Portugal
- Jo Dalvean, Deputy Chair of IP3, Vice President Australian Computer Society (ACS)

Additional members unfortunately not able to join us today:

- Adesina Sodiya, President of the Nigeria Computer Society
- Prof A Min Tjoa, Institute of Information Systems Engineering, TU Wien – Vienna University of Technology, Austria, IFIP Past Honorary Secretary of IFIP
- Damith Hettihewa, President of the Computer Society of Sri Lanka (CSSL)

Aspiration

- Aspiration is a strong desire to achieve something high or great
- How do we inspire young people to want to be a “digital” leader?
- Make more resources available to teachers, students and parents
- Careers guidance at schools with role models
- Rebrand - to ‘digital’ from ‘IT’
- Show how digital initiatives benefit society
- Digital community projects



Diversity, inclusion, the digital divide and the under-represented

Diversity

- Diversity in digital education refers to empowering humans by respecting and appreciating what makes them different, in terms of age, gender, ethnicity, religion, disability, sexual orientation, education, and national origin
- Why diversity in digital education?
 - Promoting an inclusive and equitable quality digital education for all students to improve education outcomes
 - Creating a safe and supportive learning environment free from any form of discrimination, where all students can learn and thrive
 - To expose students to different perspectives and ideas that promote critical thinking

Diversity, inclusion, the digital divide and the under-represented

Inclusion

- Digital inclusion is central to the promise of the UN 2030 Agenda for Sustainable Development to leave “No one behind”
- How do we achieve this in digital education?
 - ❖ creating a safe learning space that is free from discrimination, that promotes equal access to learning opportunities and resources
 - ❖ increase access to digital resources like broadband to all students including those with special needs and disabilities
 - ❖ utilize digital technologies such as online learning, platforms, virtual classrooms, and interactive learning tools
 - ❖ ensure digital education accessible to everyone regardless of location, financial status, or physical ability

Diversity, inclusion, the digital divide and the under-represented

○ Digital Divide

- Refers to inequality that arises due to the presence or absence of digital technologies in education. The gap between individuals, households, businesses and geographic locations with regards to both opportunities to access digital technologies and the use of internet in education.
- How can we bridge the digital divide in digital education?

Access to technology: Many students lack access to digital technologies, such as computers, tablets, and internet access, to participate in online learning

Lack of digital literacy: Many students lack the skills to use technology effectively, like navigating online learning platforms and understanding online safety

Inequitable access to resources: Students from low-income households may not have access to the same resources as students from higher-income households, such as tutoring or online classes as evidenced during the Covid19 pandemic

Limited access to quality content: Many students may not have access to quality online content, such as educational videos or interactive activities. Lack of access to technology and the internet in certain areas, leading to unequal access to digital education resources, which can be due to cost and availability

Diversity, inclusion, the digital divide and the under-represented

The under-represented

- This refers to a situation where certain groups of individuals, such as women, people of colour, individuals with disabilities, or those from low-income backgrounds, are not adequately represented in digital education system
- Under-representation in digital education can lead to limited potential advancement in technology and innovation
- What needs to be done to address under-representation?
 - Increased support for under-represented and minority students in digital learning environments
 - Increased access to digital education resources for under-represented and minority students
 - Improved access and support for digital education for under-represented and minority students in rural and remote areas



IFIP Task Force on Digital Education

Computational Thinking

Luís Soares Barbosa
UNU-EGOV



Computational Thinking

- a way to approach problem-solving,
- not proficiency in particular machines, programming languages or systems



“Computational thinking is a fundamental skill for everyone, not just for computer scientists”

(CACM, 2006)



Computational Thinking

Thinking computationally is **to think like a Computer Scientist**, i.e.

- using **abstraction** and **separation of concerns**;
- **model** the relevant aspects of a problem to make it tractable;
- **calculate** (i.e. derive rather than guessing) solutions;
- **resort to Computer Science conceptual tools** like
*reduction, recursion, type-checking, modular decomposition, simulation,
logical reasoning, transformation between different levels of abstraction, etc.*
when engaging in problem-solving in any domain of the human experience.



Computational Thinking

But **education for the coming decades** entails the need

- not only for a way of thinking,
- certainly **not** for a technology
- ... but for **Computing** as an entire **core subject in pre-university education**, a scientific syllabus (not just a technology) along with Maths, Physics, ...

Computer science is the **formal study of computation**, inquiring on **what** can be computed, or not, and **how** to compute it.

It is a mathematical, **highly conceptual discipline**, which goes far beyond computer construction or programming.

**"Computer Science is no more about computers
than astronomy is about telescopes"**

(E. Dijkstra)



The old and new trivium



- ◉ **Grammar** (Language)
- ◉ **Logic** (Reasoning)
- ◉ **Rhetoric** (Communication)

Mother language



Mathematics

Computing



Educating to think computationally

i.e. establish **Computer Science as proper, rigorous, fundamental** domain of knowledge



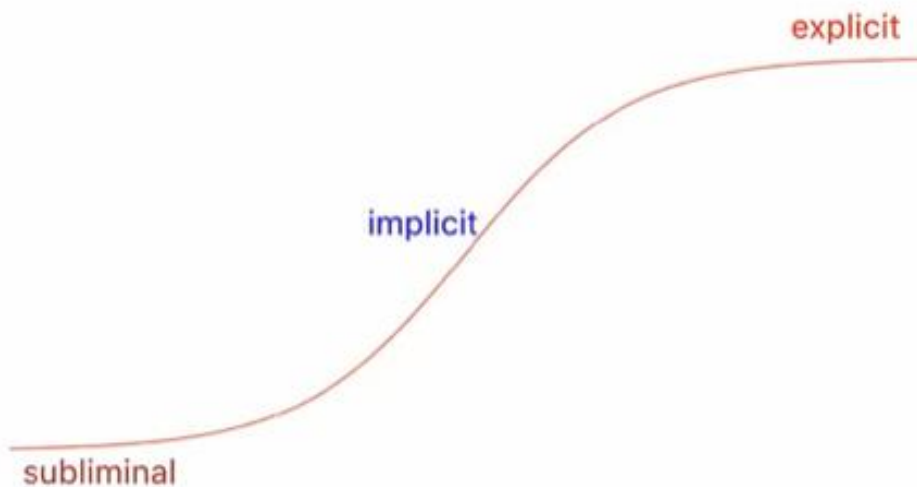
Concept-first approach:

Understanding computation is way more important than mastering the technology



Technologies fade away, concepts remain

Knowledge acquisition "wave" to modulate the teaching style:



- Unplugged
- Pseudo-plugged
- Plugged

TALE

GAME

GUIDED



2023

Projects worldwide



computingatschool.org.uk

UK: www.computingatschool.org.uk

Portugal: www.facebook.com/ensico.pt

New Zealand: www.csunplugged.org



Creativity, multidisciplinary, reasoning discipline

Teaching computing may also be a vehicle for

- equity and **promotion of scientific and technological literacy.**
- stimulating **creativity**
- learning in a **multidisciplinary** way
- develop **oral and written communication skills,**
- master **mathematical arguments** and **logical reasoning**



Developing teacher practices

Background

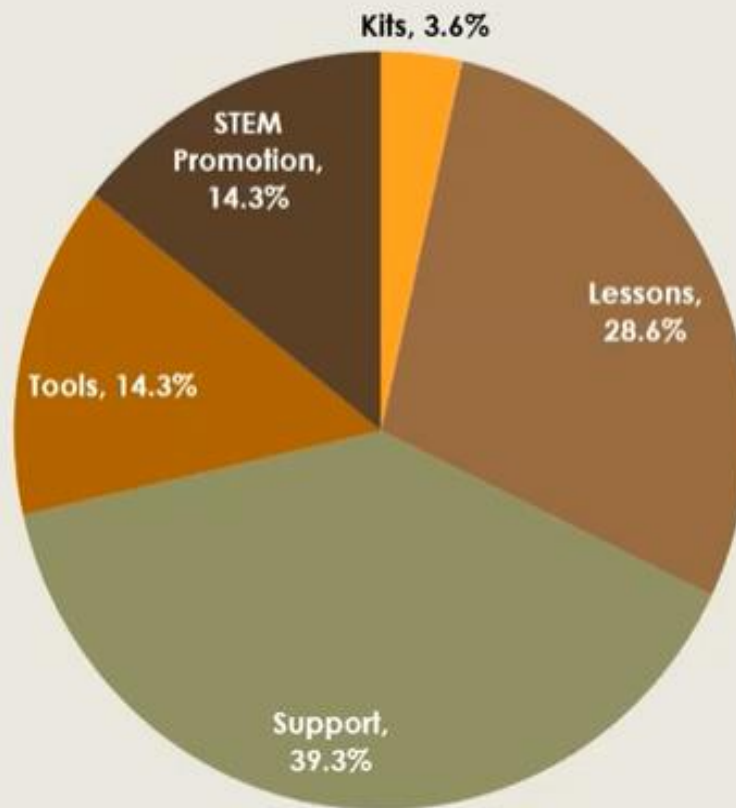
- Across the globe, technology is taught through a wide variety of innovative pedagogies, with a need to maintain relevance in a rapidly changing discipline.
- Teachers of technology should be supported by established and new resources, including case studies, question banks, lesson plans and contact with peers.
- Teachers are increasingly aware of the need for inclusive practice, to ensure a diverse range of students is inspired to pursue further studies and careers in ICT.
- Responses to the challenges of online teaching of ICT, and reducing reliance on face-to-face classes, are also emerging.

The Task

- We asked our team members to source suitable examples of best practice teaching of ICT. The results are collated here

Developing teacher practices

Themes



- **Support**
 Collaboration, Networking, Mentoring, Training, Professional Development
- **Lessons**
 Lesson plans, instructions, examples, online training, curricula
- **Tools**
 Software (excl lesson plans), games
- **STEM Promotion**
 Tech as a career, Promoting Women, Schools programs, Internships
- **Kits**
 Robots and Electronics, including lesson plans

Developing teacher practices

Themes

- Tools
 - Teaching with games
 - South African school: LEGO tools to support teaching
 - Google Classroom
 - Blackboard LMS
- Support, Collaboration, Mentoring,
 - Buddy systems for teachers with computer science faculty or IT leaders
 - Teacher ICT workshops - Teach the teacher initiatives
 - Teacher mentorship programmes
 - Having coach and stimulate intervision practice among teachers to share their experiences
 - Provide opportunities to teachers for professional development
 - Encourage collaboration
 - Provide onsite support for staff in schools to train and assist understand and utilise available resources
 - Professional learning and conferences to keep teachers updated
 - South Africa's Department of Basic Education has a Professional Development Framework for Digital Learning, focused on empowering teachers to utilise digital resources in their teaching practices
 - Stimulate the inclusion of own research and vision in a course, not forcing a fixed teaching path
 - ACS ICT Educators – Community Networking
- Lesson plans, real world examples (Links on next slides)
 - Provide a curriculum and the resource for teachers to deliver effectively their lessons (broad internet access, enough server power, laptop for who can't have one...)
 - Provide courses and materials for teachers to use in schools
 - Australian Computer Society ICT Educators

Developing teacher practices

Links to Teaching Support – Lesson Plans

- ACS ICT Educators
<https://www.youtube.com/watch?v=yIn7PomdDTY>
Lesson plans, professional learning resources, etc.
<https://www.acs.org.au/ict-educators.html>
- Digital Learning and Teaching Victoria (DLTV)
<https://dltv.vic.edu.au/teaching-digitech>
- Digital Technologies Hub: lesson plans, case studies, etc.
<https://www.digitaltechnologieshub.edu.au/>
- Grok Learning
<https://groklearning.com/>
(For students, teachers, and parents)
e.g. Quantum Computing
<https://groklearning.com/course/quantum-computing/>

Developing teacher practices

Links to Teaching Support – Kits

- Digital Technologies Institute
Buy a kit and download instructions, lesson plans
Cybersecurity
<https://www.digital-technologies.institute/cyber>
Artificial Intelligence
<https://www.digital-technologies.institute/artificial-intelligence>
- Ozobot- The purpose of this product is to get children interested in coding and teach them the basics
<https://ozobot.com/>

Developing teacher practices

Links to tech career initiatives and school support services

- Google Classroom for Teachers. Classroom makes it easy for learners and instructors to connect—inside and outside of schools
<https://www.youtube.com/watch?v=u-8nJj1EXhw>
- CSIRO* STEM in Schools Professionals (Australia-wide mentoring program)
<https://www.csiro.au/en/education/programs/stem-professionals-in-schools>
- CSIRO Generation STEM
<https://bit.ly/40u3l8y>
- ACS** Queensland Gateway to Industry Schools Program
<https://qldictgisp.acs.org.au>
- ACS Foundation
STEM Career Wheel
<https://www.careersfoundation.com.au/>
Internships
<https://www.acsfoundation.com.au/internships>
- Women of STEM Scholarships
<https://www.womenofstem.com.au/>

* Commonwealth Scientific and Industrial Research Organisation

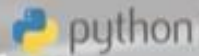
** Australian Computer Society

2023

Developing teacher practices



WHAT IS OBJECT-ORIENTED AND WHY?



JS

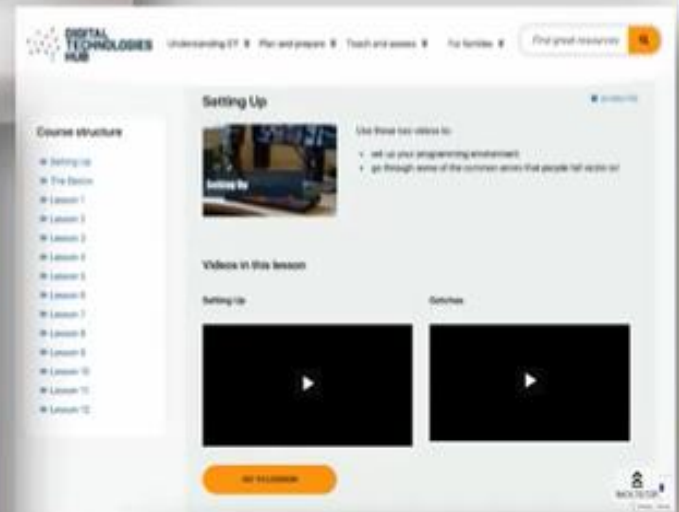


Introduction to Databases (SQL)

An introduction to databases and Structured Query Language (SQL).

Try it out!

[More info](#)



Short- and long-term plans and actions

- ◉ Accommodating systemic change is vital; taking a systemic approach, with who is involved and how
- ◉ Enabling evolutionary rather than transformational approaches
- ◉ Digital education as mandatory and an integrated element of at least K9-K12 education
- ◉ Focusing on inclusion (gender and special needs)
- ◉ Ensuring schools have infrastructures to support learning; the most urgent action for the developing world is narrowing the digital gap/digital divide
- ◉ Considering the importance of parent views
- ◉ Making IT more human(e)
- ◉ Addressing digital versus IT perceptions; the soft versus the hard; the intelligent versus 'the nerd'
- ◉ Agreeing to using the same language and terminologies worldwide

Short- and long-term plans and actions

- Are there more girls entering the 'digital field' in some countries than in others?
- Are there examples of long-term plans and actions?
 - A 30-year endeavour
 - Initially focusing on infrastructure
 - Building the 'digital' in creative industries
 - Linking this to the curriculum
 - Providing guidance; supporting schools in change and development
 - Continuous innovation and monitoring
 - Sharing and working across the system

Short- and long-term plans and actions



Short- and long-term plans and actions



Aspiration – creative industries, linked through Nerve Centres and examinations

Digital divide – complete cross-nation managed service networking infrastructure begun in 2000, using radio connectivity in parts

Diversity – is still an issue

Computational thinking – developed and integrated across the curriculum since 2014
Teacher development – a continuous focus since 2000, through professional learning, advisory and inspection services

Thank you for listening

Do please contact us and keep in touch:

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