



IFIP TC3 Zanzibar Declaration – Panel at the WCCE 2022 (Hiroshima): Sustainable Education in a Digital Age of rapidly Emerging Technologies

Panel Session 14B

23 August 2022, 16.00 -18.00 p.m. (7.00 – 9.00 a.m. GMT)

- Outcomes -

IFIP Technical Committee 3 (TC3) agreed in its Annual General Meeting in April 2019, held in Zanzibar, Tanzania, to initiate the development of a declaration on 'Sustainable Education in a Digital Age of rapidly Emerging Technologies'. This 'Zanzibar Declaration' (ZD) focuses on future educational challenges that arise from rapidly emerging technologies impacting societies and communities and is closely related to the UN's Sustainable Development Goal 4 (SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all). A matrix was initially developed, which defined various emerging IT technologies positioned against social areas in which these technologies are applied.

IFIP TC3 has taken forward the Zanzibar Declaration (ZD) through a series of four webinars, a summary webinar as part of the IFIP60 Events series, as a contribution to an IFIP-UNESCO event in 2021. In the four webinars in 2021, experts from different disciplines and from across TCs of IFIP covered four thematic clusters of IT technologies and social impact areas derived from the grid. Details of that part of the ZD process, outcomes of the four webinars and the ZD grid, can be found on the ZD website: <https://zanzibardeclaration.cicei.org>.

The WCCE 2022 online panel was another stage of gathering expert contributions, on some of the remaining key topics of the matrix:

- Recognition (Tracking), Enduring Information and Quality of Information
- Virtual and Augmented Reality
- 3D/4D Printing and Energy
- Humanoids and Digital Equity

Accompanied by four co-moderators (online/on-site), six short expert presentations (videos; slides, partly spoken over by Don Passey) offered expert views on the current situation in each topic, and likely future issues and challenges. The six experts from different countries (Poland, Tasmania, New Zealand, Australia, Portugal, and the UK) contributed to the topics from different perspectives and from their respective cultural and working contexts.

The expert presentations were followed by a roundtable discussion among all participants on the questions and issues raised in the contributions.

Other important topic areas of the grid not yet discussed in the panel and in previous workshops are to be addressed in a subsequent call to TC3 members and experts from other IFIP TCs. This includes the following main topics:

- Computer Networks and Communication and Mobility
- Robotics and Decent Work
- Cloud Computing, Privacy and Social Surveillance

Following feedback the final ZD will be developed, for international release.

Further information on the panellists and the content and discussion of the panel can be found on the ZD website: <https://zanzibardeclaration.cicei.org>

The panel was recorded and the video can be viewed asynchronously:
<https://vimeo.com/cicei/zdhiroshima>

Examples of statements and questions discussed in the panel were:

Topic: Readability and Quality of Information

- Accessibility and readability are essential categories for the quality of information. Individuals should be enabled to recognise the quality of the information provided by a computer system, e.g. on a website. They should be able to make their own views and judgments when they gather details accessible via computer systems.
- Legal aspects can provide a basis for readability and quality of information. The European Accessibility Act and the Web Content Accessibility Guidelines (WCAG) can be considered as legal bases to ensure the readability and quality of information. The WCAG contain four principles (perceptibility, usability, comprehensibility, and robustness), 13 guidelines, and 78 success criteria as key characteristics to make information accessible.
- Information quality also includes equal and barrier-free access to information and should disclose tracking techniques used on the website for the user (e.g. user-controlled management of cookies, access to hidden alternative text on a website).
- Quality of information should consider the trustworthiness and credibility of the source of information and its correspondence with reality. The ability of individuals to critically evaluate the information provided is an essential aspect of information literacy.
- Important criteria of formal and content-related information quality should be the subject of teacher training.

Topic: Virtual and Augmented reality: (3 Sub-topics)

Sub-topic: Student-created mixed reality artefacts for learning across the curriculum

- The use of digital technologies during lessons, especially virtual and augmented reality learning environments, enables student-motivating learning from early ages upwards and empowers them to use mixed reality to create their own experiences and fosters a better understanding of their subject area.
- Virtual and augmented reality learning environments refocus from consumption to creation. They blend two environments (virtual and real) but learning should be located in a physical learning environment and in a specific context.
- The application of these learning environments in the classroom means that there is new knowledge that goes beyond existing technology pedagogy and content knowledge (cf. Mishra and Koehler's TPACK model); teachers need specific digital technology knowledge to support students to build their programming and digital artefacts.

Sub-topic: Virtual reality technology in screening preclinical Alzheimer's disease

- One specific example of the application of VR technologies in a health area is the screening and early detection of preclinical Alzheimer's disease. There is a need to achieve early dementia detection, so that the treatment could be started early, or the trajectory of the disease may be altered.
- Instead of applying current medical tests for early dementia detection, like a cerebral spinal fluid test, which are invasive and expensive, the application of VR-technologies offers an effective alternative diagnosis tool. In a VR-environment, the distance estimation capacity of individuals in multiple virtual environment geometries is the cognitive marker to be assessed for preclinical screening.

Sub-topic: Accessibility as a foundation of VR and AR technologies

- Similar design principles apply to the design of virtual learning environments using VR and AR techniques as they apply to the design of websites. In particular, Web Content Accessibility Guidelines (see above) should be observed.
- Since mixed teams of experts from different fields often work together to design such learning environments, compliance with such rules is particularly important.
- For example, the orientation of individuals in such environments should be facilitated by providing an adequate colour contrast ratio and a well-structured navigation system. This should consider the needs of individuals with visual impairments especially, as they should be given barrier-free access to such learning environments.



Topic: 3D-Printing and Energy

- 3D-technologies are becoming more and more pervasive in our everyday life, and with more accessible prices. Customised products can be produced applying this rapid manufacturing technology. 3D printing presents a new way to potentiate services and interventions, not only on health areas (surgery planning, building different kinds of prosthetics and orthotics), but also on education and training, e.g. of health professionals.
- 3D-technologies are also applied to reverse engineering where products are deconstructed to extract the design information from them. Using this process, we can determine how a part was designed to recreate it. This process is very useful for reproducing with 3D printing parts and products that we need, but which are no longer available on the market.
- In education, 3D printing can be used by teachers to construct customised learning materials. As a learning subject in the classroom, students can use 3D printing (especially in vocational education) to learn about CAD/CAM production methods and their possible impact on future jobs.

Topic: Humanoids and Digital Equity

- The use of digital technology in education or even in other areas of society, which also applies to AI-based hybrid technologies such as humanoids, must not only focus on technology, so that sight of the underlying economic, social, and educational problems of digital equity are not lost.
- Employing appropriate user interfaces and a user-centred design of application contexts and learning environments, this technology can contribute to the successful design of learning processes, not least for disadvantaged user groups. However, to assess the effectiveness of such technologies, a wealth of data is needed that enables a careful scientific analysis of the interrelationships and relevant variables.
- In such studies, in a top-down approach, not only global and international data can be used, which are provided, for example, by the World Bank, OECD, UNESCO or by data-collecting national institutions. In order to obtain a holistic, realistic picture of the educational situation in connection with the use of IT technologies, it is also necessary to examine in detail the specific learning and interaction processes in their respective context. Top-down and bottom-up approaches must be combined in a meaningful way.
- In this context, teacher education is once again of particular importance. Teachers should be able to use this kind of IT technology in learning situations in a way that is conducive to learning. This also requires the development of appropriate learning materials and meaningful integration of IT-supported learning methods across the curriculum.

Please contribute to the Zanzibar Declaration

To contribute to the Zanzibar Declaration and to the discussion on the impact of ICT on education and society please enter short contributions in the ZD-grid:

<https://jsilab.ch/zdApp/>

Event organisers of the panel

Co-moderator (online): Prof Don Passey
Co-moderator (online): Prof Johannes Magenheim
Co-moderator (on-site): Prof Javier Osorio
Co-moderator (on-site): Dr Christophe Reffay

Panellists/Contributors

Dr Izabela Mrochen (Poland)
Dr Kathryn MacCallum (New Zealand)
Dr Soonya Yeom (Australia)
Yuan Tian (Tasmania)
Dr Marcelo Brites-Pereira (Portugal)
Dave Donaghy (UK)