Creative Digital Pedagogies for Student Engagement: Preparing students for Industry 4.0

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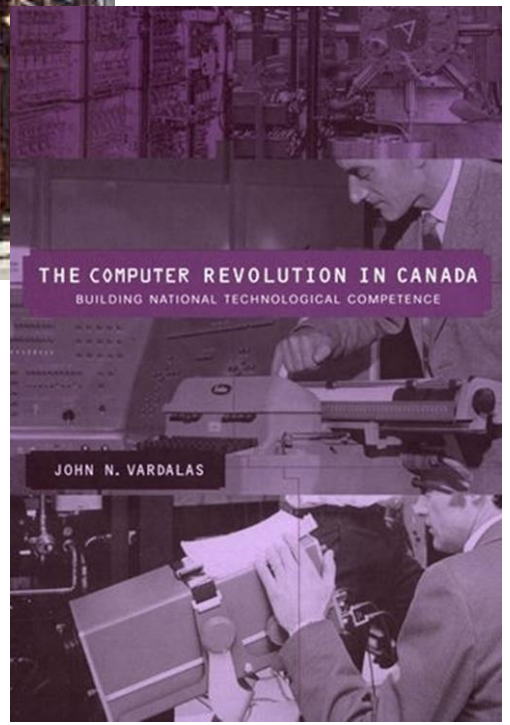
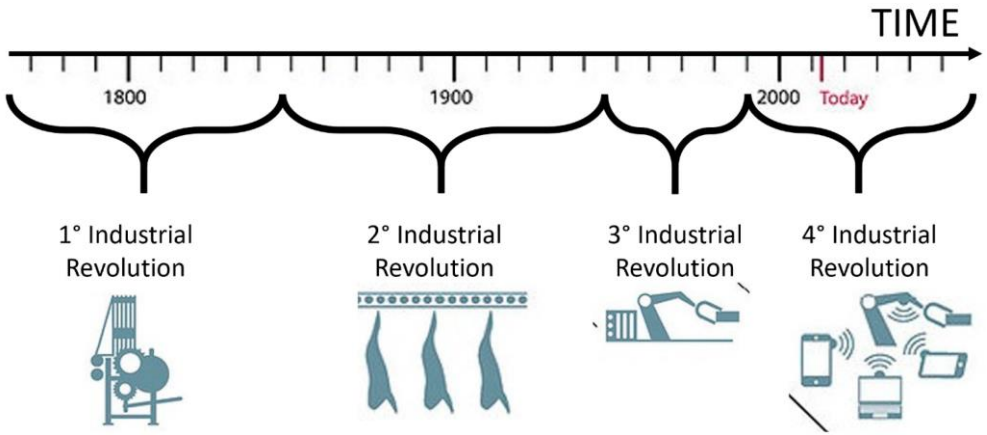
Content

- Digital Creativity
- Technology Pedagogical Content Knowledge (TPACK)
- Creative Digital pedagogies

Turbulent times and change

- The first industrial revolution (Steam)
- The second industrial revolution (Electricty
- The computer revolution
- Industrial revolution 4.0





Training for IR 4.0

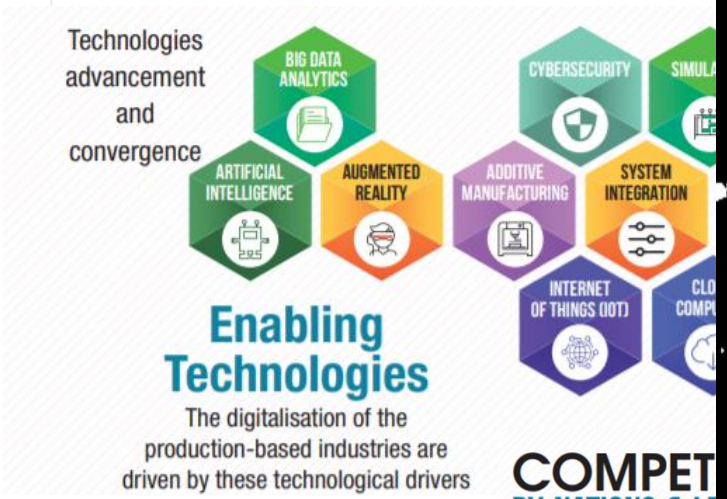
TALENTED & COMPETENT WORKFORCE (SMART PEOPLE)

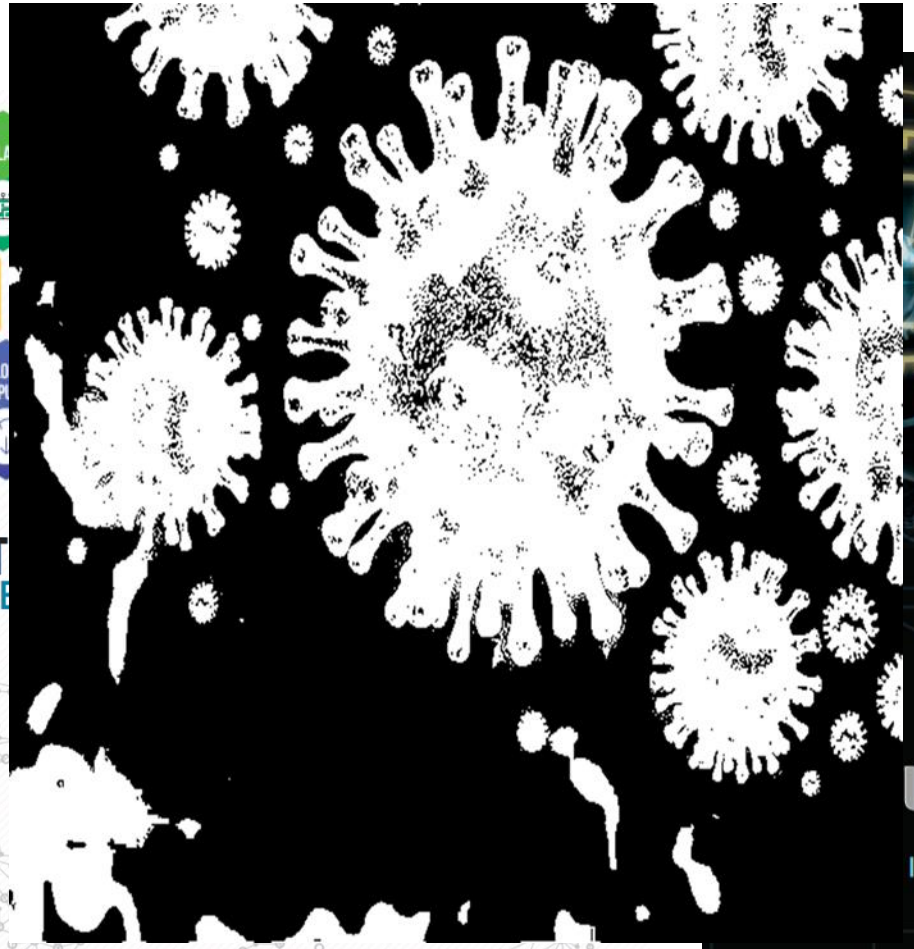
INDUSTRIES

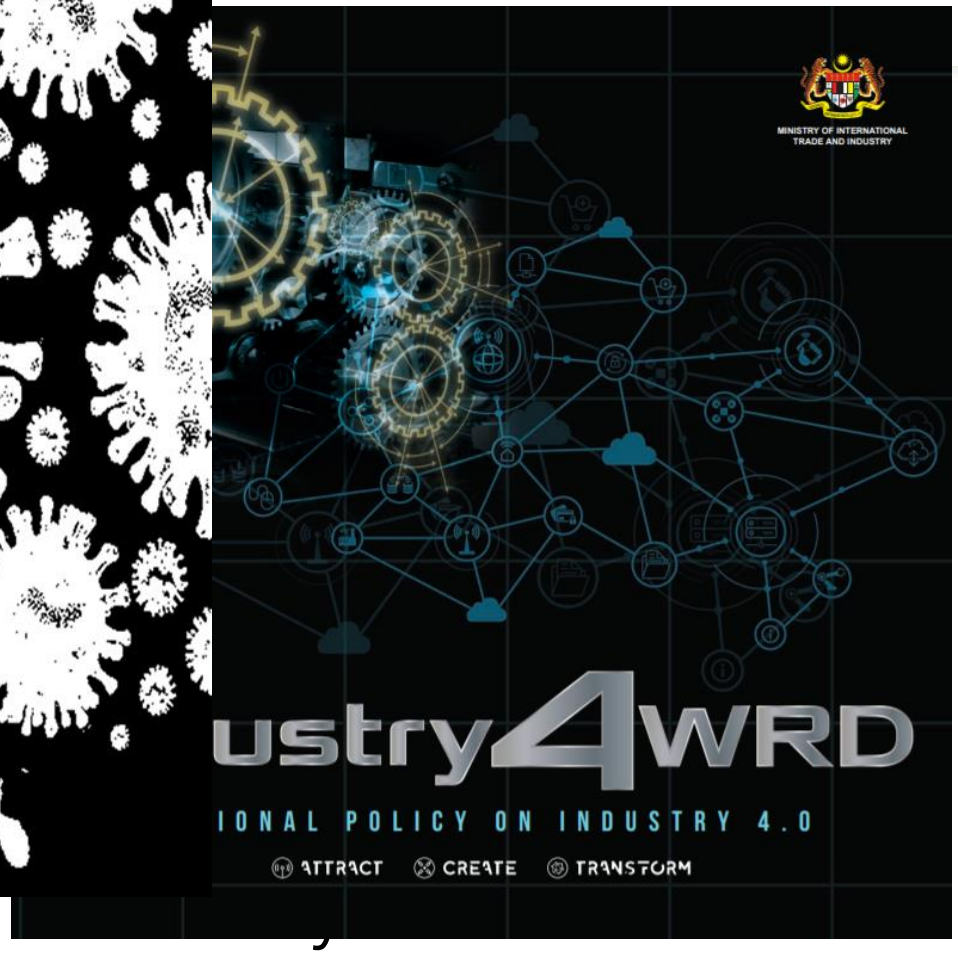
GRADUATES (UNEMPLOYED)

TERTIARY (TVET & ACADEMIC)

National Policy of Industry 4.0

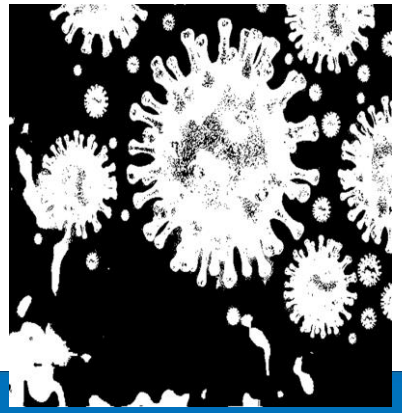






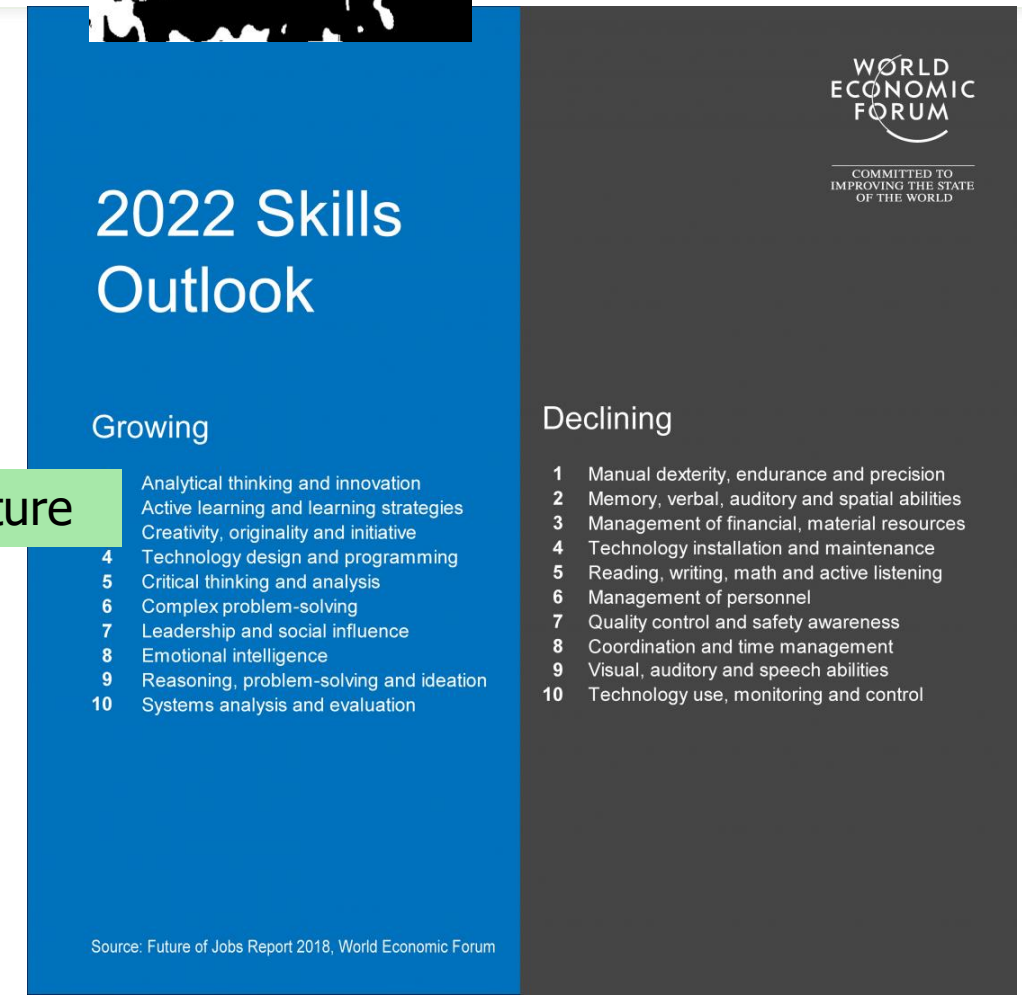
Trade and Industry (2019)

CREATIVITY



- Uncertain future of work after the COVID-19 pandemic.

Creativity for the future



Creativity

- This was because The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2013) identifies creativity and innovation at both the individual and group levels as the true wealth of nations in the 21st century.

https://www.magicacademy.co.uk/creativity-and-innovation-essential-for-achieving-un-global-goals/

DIGITAL CREATIVITY

- Many of the traditional approaches and work culture in the public and private sectors have been replaced with digital transactions, which benefits the users.
- Digital creativity and innovation is now an important feature of work as new solutions and ideas need to be developed from multiple perspectives, as technology will continue to evolve and disrupt work scenarios and situations (Niemi, 2018).

Hence, the ability to create new knowledge and innovative processes is an advantage and could ensure sustainability in the future (Niemi, 2018).

DIGITAL CREATIVITY

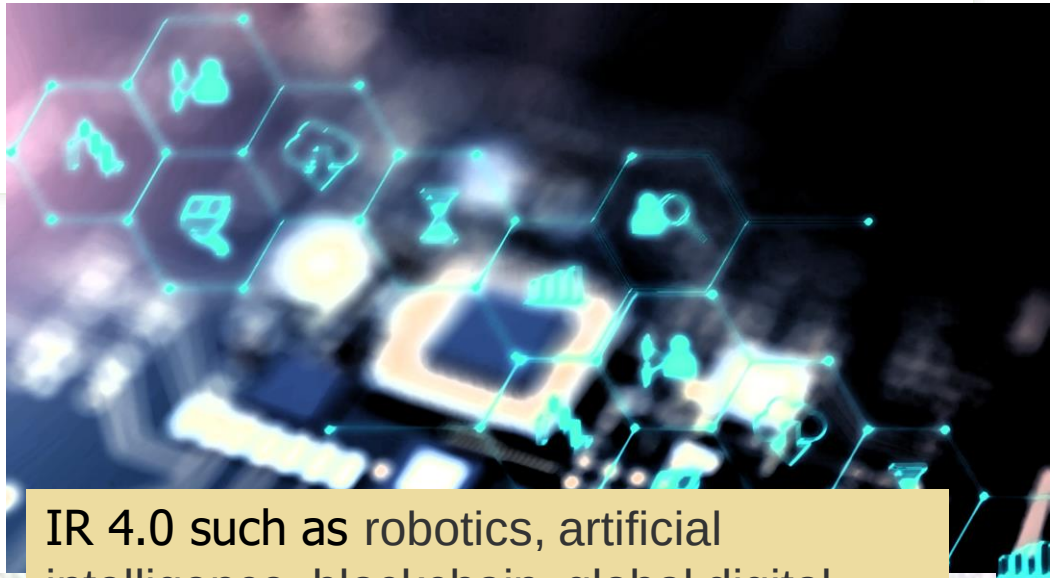
- Digital creativity is not only limited to the creative industry but is required in every field of work.

- Digital creativity covers artistic expression to problem-solving in the context of economic, social and sustainable development (United Nations, 2021) .

- Digital creativity refers to the production-based activities which makes use of digital technologies for manifesting creativity (Hendriksen, Creely, Henderson, & Mishra, 2021).

DIGITAL CREATIVITY

- In the creative economy, organizations in every sector are innovative and producing goods or services which are of value.
- The application of skills of creativity and technology for innovation (Hearn, 2020).
    - Tangible products - buildings, facilities and machinery, digital creatives
    - Non-traditional assets intangible assets - art and design, patterns, computer music, digital stories and human–computer interactions (Hendriksen et al., 2021).
- Knowledge, research, design, branding, and software are the focus of innovation as these intangible assets are investments which contribute to the value chain of companies (Hearn, 2020).

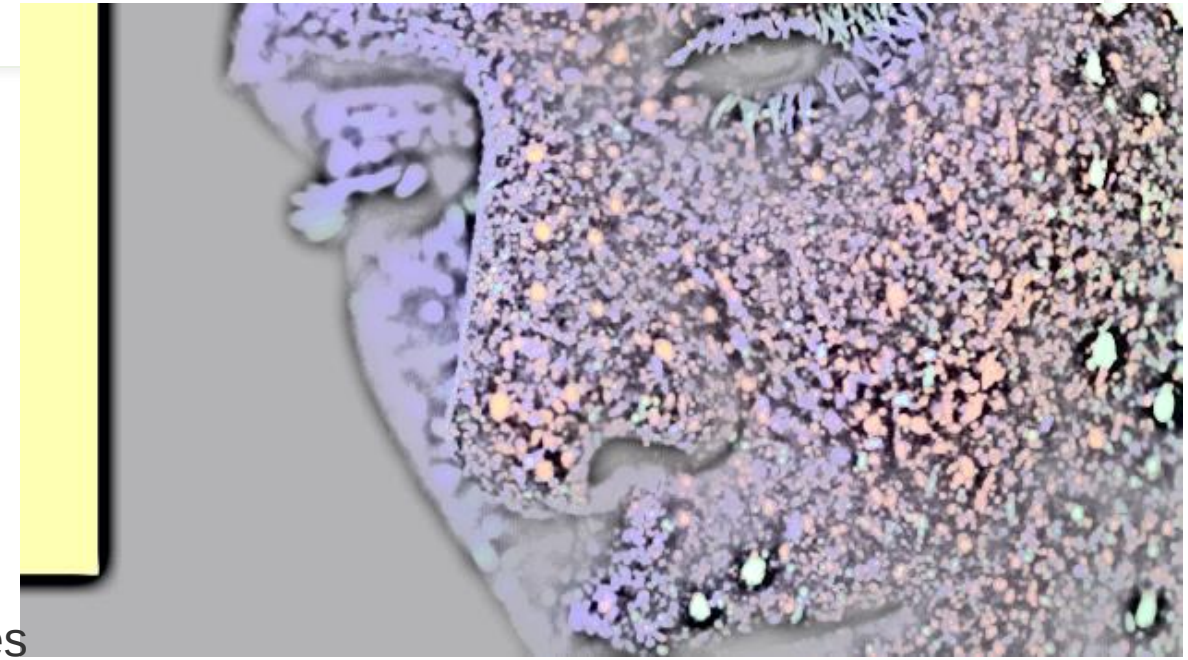


IR 4.0 such as robotics, artificial intelligence, blockchain, global digital platforms and autonomous systems

Are teachers using creative digital pedagogies to engage students for IR 4.0?

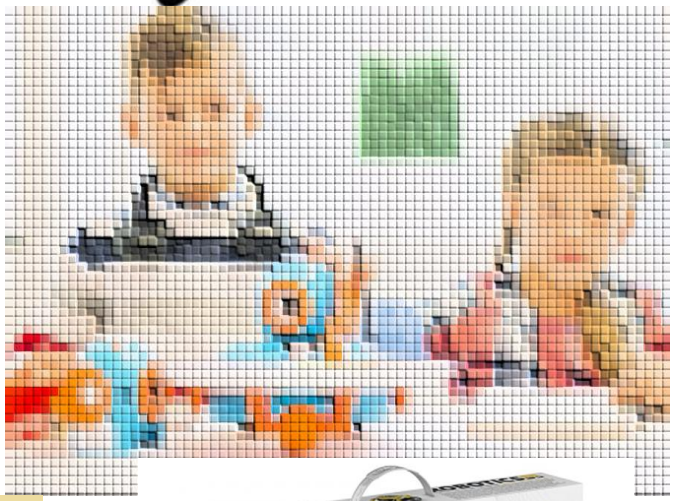
DIGITAL CREATIVITY & PEDAGOGY

- Digital creativity has a tremendous potential and digital technologies can be used for the expression of this creativity (Shin, 2010).
- Teachers' perception of creativity
  - Teachers perceive that creativity is not important
  - Teachers do not foster students' creativity (Qian & Clark, 2016).
- Malaysian students have low levels of creativity (Jamal, Ibrahim, Abdul Halim & Alias, 2020).



- Teachers who have been trained in productive pedagogies for creativity are able to perform and encourage creative efforts among their students (Amran & Rosli, 2017).
- Hence, we recommend pedagogically-sound activities be designed to foster students' creativity (Didis, Erbas, Cetinkaya, Cakiroglu, & Alacaci, 2016).

DIGITAL Awareness and skills

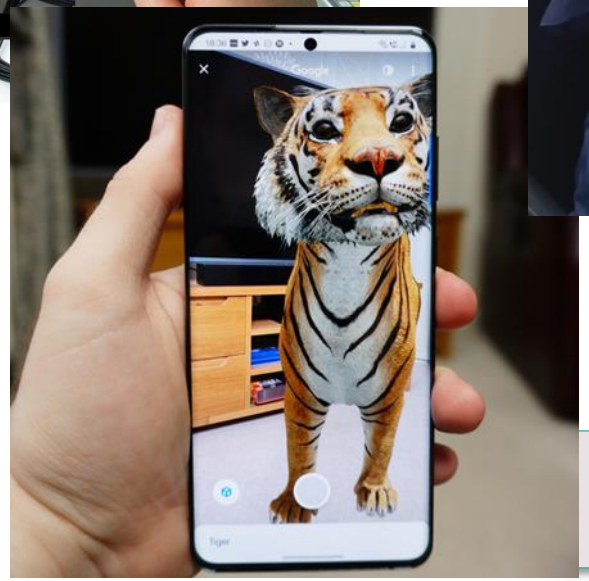


- Knowledge of the abuses and threats in technology use

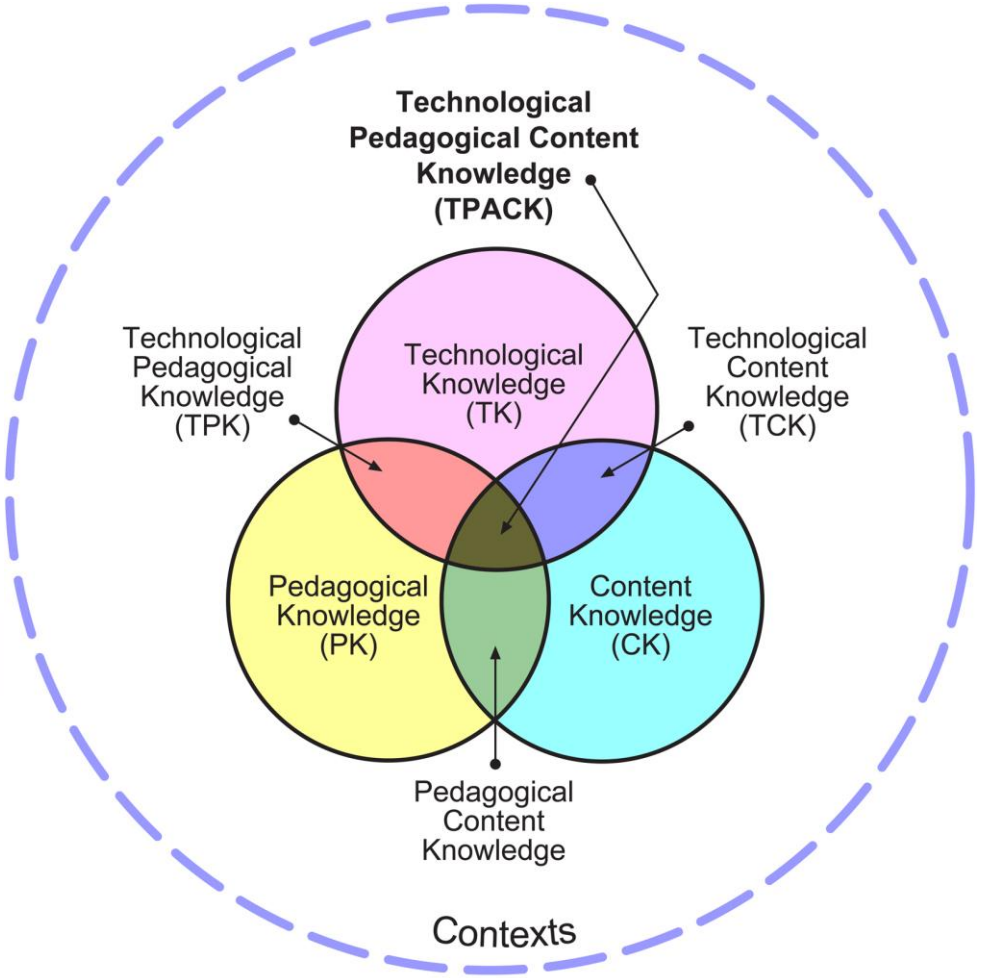
Capacity building in DIGITAL CREATIVITY

Problem solving
Computational Thinking
Creative thinking
Coding

DIGITAL Awareness and skills



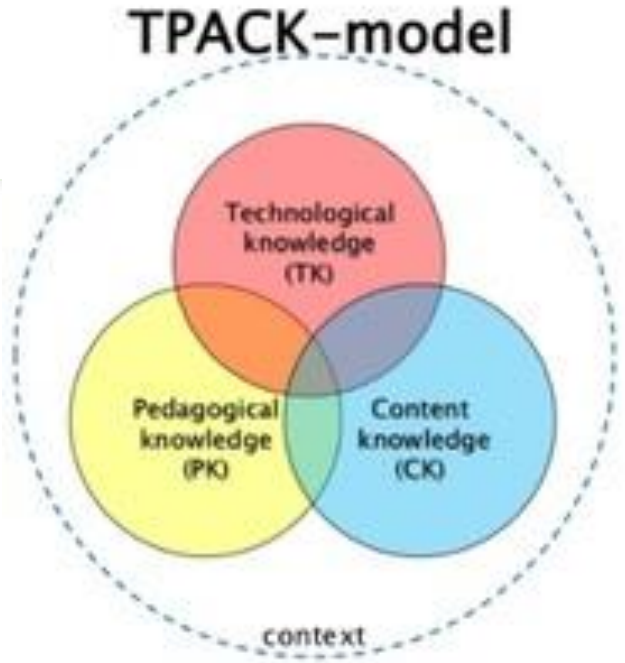
Problem solving
Creative thinking



TPACK FOR CREATIVITY

https://educationaltechnology.net/technological-pedagogical-content-knowledge-tpack-framework/

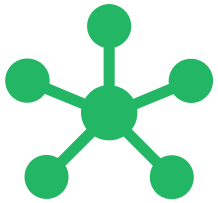
TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE



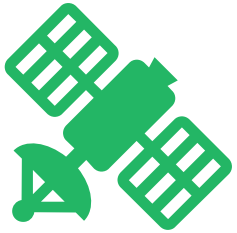
- Malaysian teachers
  - lack creativity (Abd Samad, Abd Wahab, & Lee, 2016)
  - lack the pedagogical skills for creative teaching (Chia & Lin, 2020; Sulaiman, Muniyan, Madhvan, & Ehsan, 2017).
  - lacked the pedagogical skills to integrate digital technologies in instruction and foster students' creativity (Mullet, Willerson, Lamb, & Kettler, 2016; Tee, Samuel, Norjoharudden, Renuka & Hutkemri, 2018; Wan Yusoff, & Che Seman, 2018).
- In higher education institution was assessed, instructors had low levels of TPACK and were not sure of the pedagogies for integrating technology although they had higher levels of technology knowledge (Vasodavan, DeWitt & Alias, 2019).

Digital Competencies for the Future

- A digital competency model and not only digital skills is needed (Falloon, 2020).
- Society and culture influence our digital actions (Falloon, 2020; Lund, Furberg, Bakken, & Engelien, 2014; Ottestad, Kelentrić, & Guðmundsdóttir, 2014).
- Elements such as the **ethical use** of digital technologies, **digital citizenship**, as well as the **health, wellbeing, safety issues** to be considered for building digital competences (Falloon, 2020; Foulger, Graziano, Schmidt-Crawford, & Slykhuis, 2017). **A positive attitude** towards digital creativity and innovations (Falloon, 2020; Janssen, Stoyanov, Ferrari, Punie, Pannekeet & Sloep, 2013).



Empowering learners



Creating new knowledge

Connected in a community

Designing solutions

Computational thinking

CREATIVE DIGITAL PEDAGOGIES

DIGITAL CREATIVITY FOR EMPOWERED LEARNERS

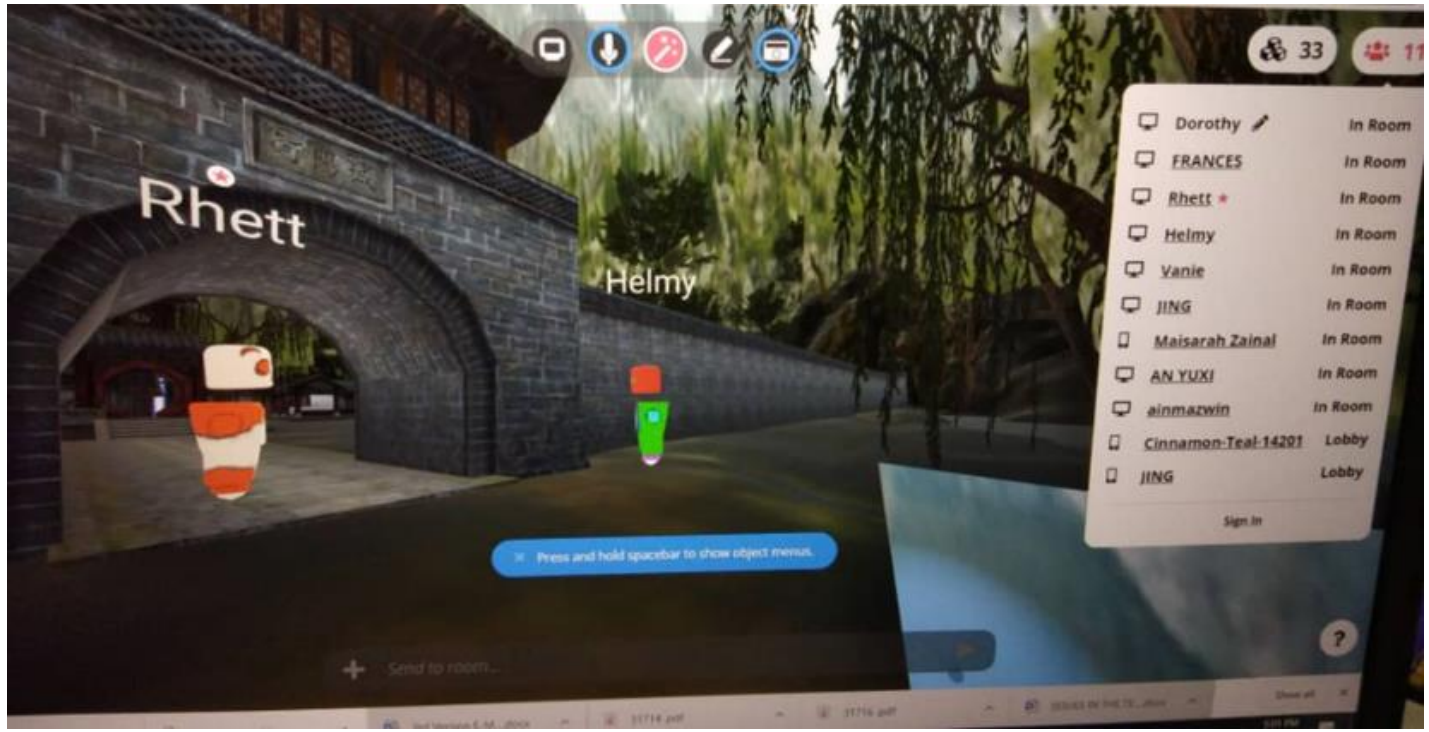
Empowering learners

- Learners have the autonomy to be flexible in their learning paths
  - Search and retrieve information from databases and platforms made accessible, with the aid of search engines.
  - Critically evaluate the information for its utility
  - Internalizing the knowledge with learners' own informal, tacit knowledge (Vasquez-Bravo et al., 2013)

DIGITAL CREATIVITY FOR EMPOWERED LEARNERS

Empowering learners

- Teachers design a learning environment which is open and flexible
  - Access to a variety of engaging resources cater to learners' different learning modalities
  - Suggestions and opportunities for the learner to pursue their interests
  - Innovative resources - augmented reality, with hotspots that trigger additional information,
  - virtual manipulatives to explore, probe and develop a better understanding of anatomical or mechanical structures



DIGITAL CREATIVITY FOR EMPOWERED LEARNERS

Empowering learners

VR is used for:

- virtual tourism (eg. VR apps such as *Within* & *YouVisit*)
- real estate viewing (eg. iProperty and Gamuda Land)
- Testing engineering materials and designs (construction materials)

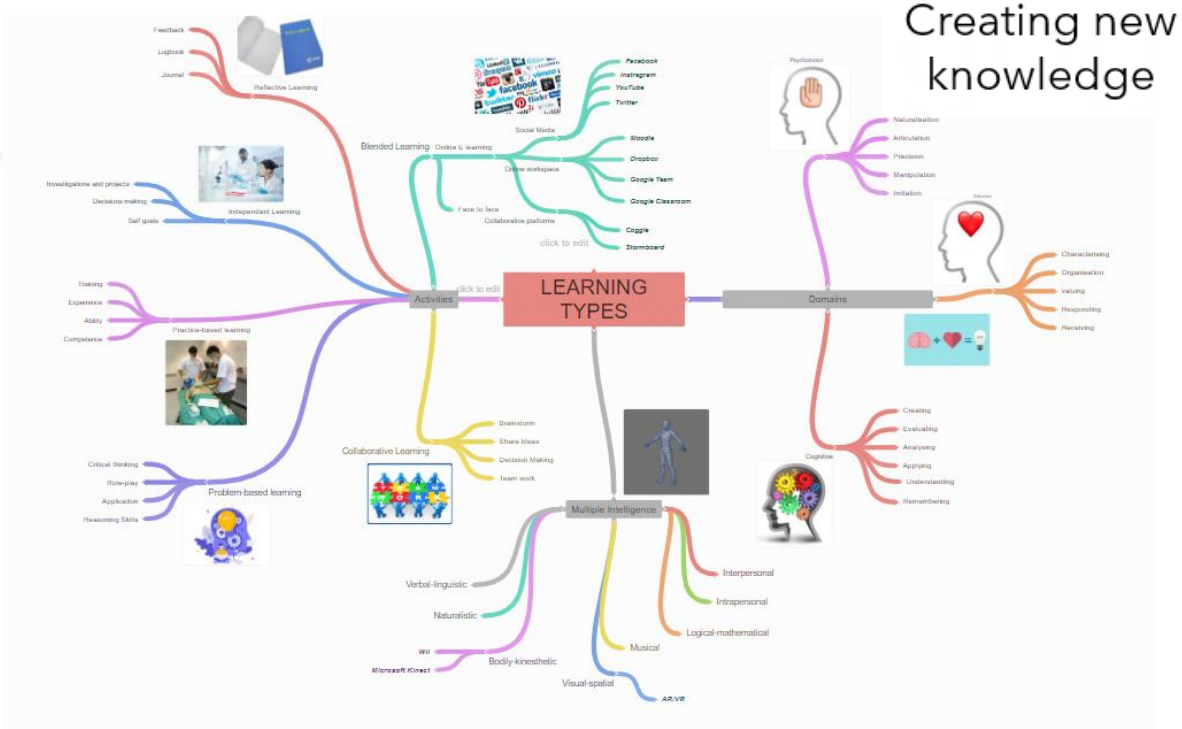
In education

- training in the automotive industry
- evoking emotions and engagement in learning
  - learning games (eg. VR apps for learning Biology, *InCell* and *InMind*
  - environmental education
  - Intercultural communication

An empowered learner personalizes his learning and is engaged. An engaged learner is a creative learner. Empowerment can then enhance digital creativity.

Digital creativity for creation of new knowledge

- Creating new knowledge: Knowledge acquired made explicit and shared publicly
- Knowledge is personally articulated with digital technologies
  - Visualizations in a formal and systematic manner - graphics, mental maps or other means.
- Generate new knowledge creatively.
  - Processes such as socialization and argumentation to create and verify the new knowledge



Digital creativity for creation of new knowledge

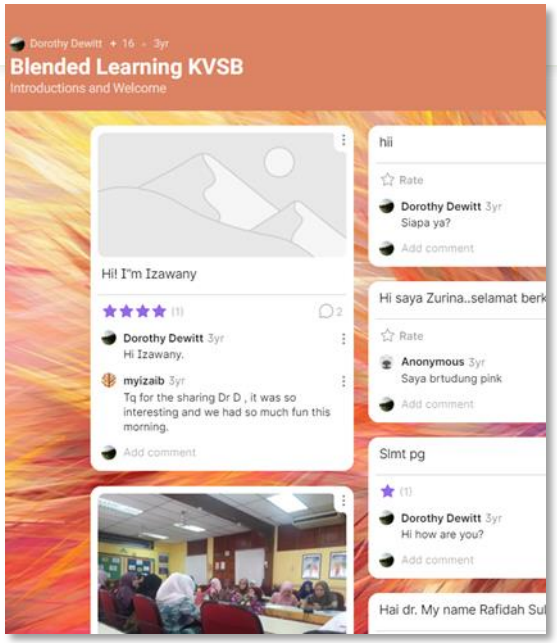
Creating new knowledge

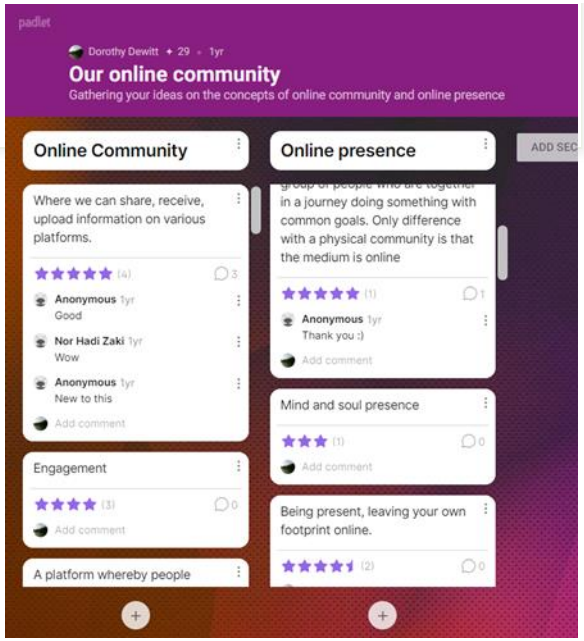
- Collaborative problem solving, for interactions within a community to achieve a specific goal.
- Argumentation - for inquiries, debates, and justifications (Vasodavan et al. 2019). Hence, collaborative learning is enabled when interactions within a community is employed
- Technologies: wikis (DeWitt, Alias, & Siraj, 2014), discussion forums (Vasodavan, DeWitt, Alias, 2020), and interactive virtual walls (*Padlet*) (DeWitt & Koh, 2020). Collaborative learning apps, such as Coggle (https://coggle.it/) for mindmapping, Miro (https://miro.com), Stormboard (https://stormboard.com/) for brainstorming

Digital creativity in a connected world

Connected in a community

- In a connected world, networking on social media to communicate and share information in a variety of ways.
  - extensive sharing possibilities
  - new forms of interactions
  - more possibilities for better communication and collaboration.
- Learning creatively with a shared purpose and interacting.
  - Identify and follow experts in their field of expertise on social media .
  - Learners publish their own content- text, graphics and videos.
  - Sharing and making the thinking processes explicit to enable discussions.





Digital creativity in a connected world

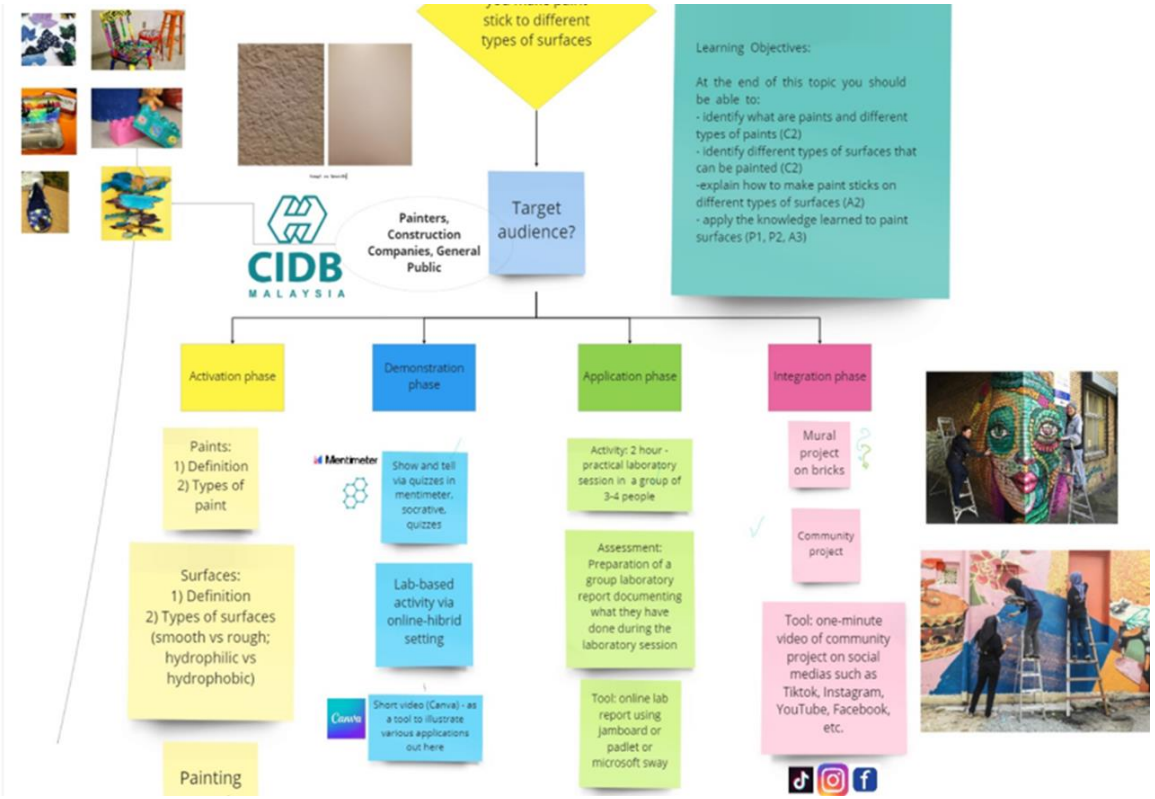
Connected in a community

- Teachers and instructors may sometimes want "safe spaces" for learners to share and interact within their communities, and may not be ready for a global audience.
- Digital technologies be used for these safe spaces where members of the community only, are invited to join the groups.
- Collaborative applications:, *Padlet* (opportunities for reactions (eg. likes and stars for voting) and comments to the posts). (DeWitt, Alias & Siraj, 2015), *FlipGrid,* sharing videos (interactions through likes and comments on the video posts.

Digital creativity for students as designers

Designing solutions

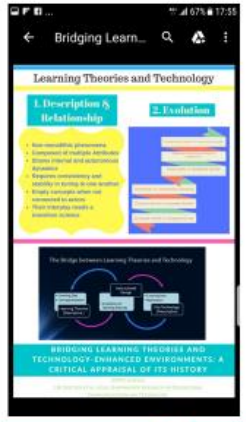
- The design processes where solutions to human-centric problems are identified and solutions, designed encourages creativity.
- Ideas are created through brainstorming, followed by prototyping and testing (Foster, 2019).
- During the design process, users and consumers needs are considered important and their feedback is constantly needed.
- Then, new ideas emerging with the brainstorming process are developed and tested. Collaboration during the process helps in idea generation and in developing solutions because ideas are discussed, challenged, defended and new ideas emerge (Liedtka, 2018).



Digital creativity for students as designers

Designing solutions

- A diverse variety of artifacts in the design process: flowcharts, storyboards, structures with aesthetic value or a digital device, posters and videos using ***Canva*** to arouse emotional responses. A physical 3D object could be designed using *Sketchup*), and a plastic version of the object could be produced with a 3D printer.
- .
- Hence, a **makerspace** for solutions can be safely prototyped and tested, would encourage collaboration and creative digital solutions



Participant A: A school teacher in her 20s, eagar to use technology, but lacked opportunities to do so in school.

Participant G: A lecturer in a private university college who is a little unsure on use of technologies for learning, in his late 30s.

Participant R: A trainer in a private technical and vocational college, who uses technology in his instruction, in his 30s.

Digital creativity for computational thinking

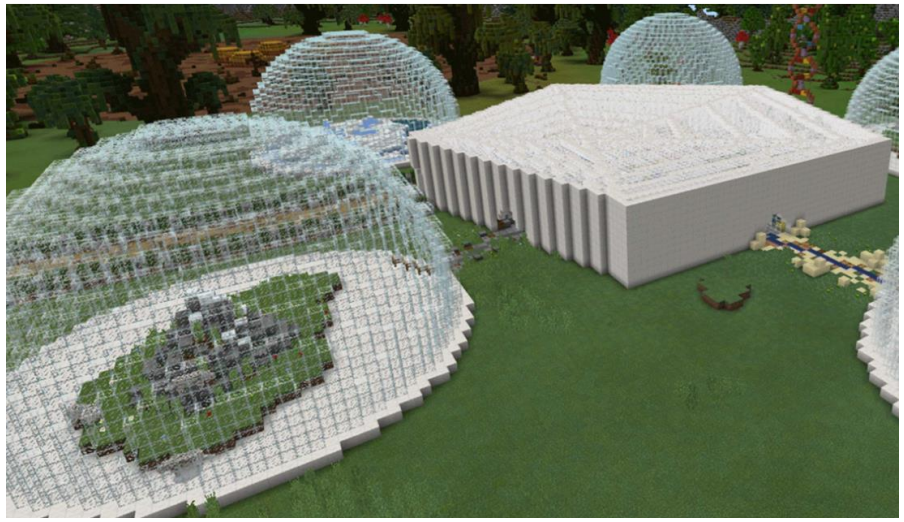
Computational thinking

- Abstract models and algorithmic thinking require computational thinking strategies, to explore solutions.
- The potential of digital media can be enhanced when designing interactions with basic coding "visual coding programming" to design interactions with a 'robot' (Kong, 2019).
- Projects where learners collect data, analyse and represent the data in a suitable manner with digital tools, optimizes the thinking process.

Digital creativity for computational thinking

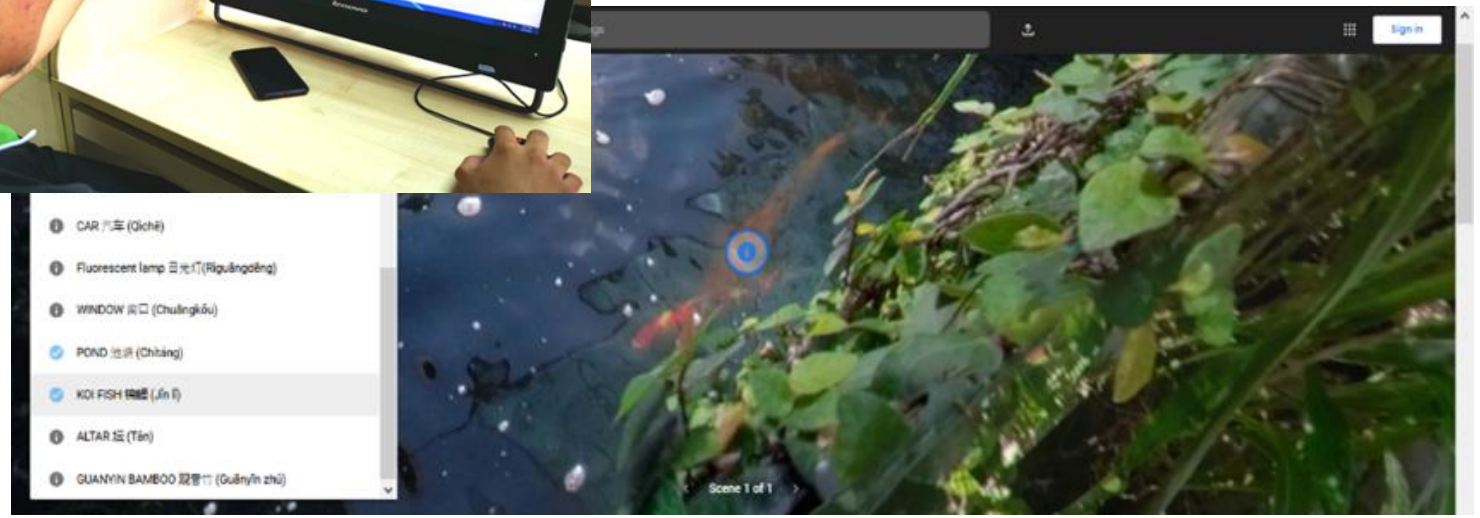
Computational thinking

- Learners should be allowed the freedom of designing their own unique solutions to problems, and this can be done in 3-D virtual worlds such as *Minecraft*.
- Visual programming for designing interactions in virtual environments is *CospacesEdu* using visual coding tool, *Coblocks* develop computational thinking strategies among learners.
- Hence, animations and movements can be designed as the learner solves problem in design a virtual environment and applies computational thinking strategies.



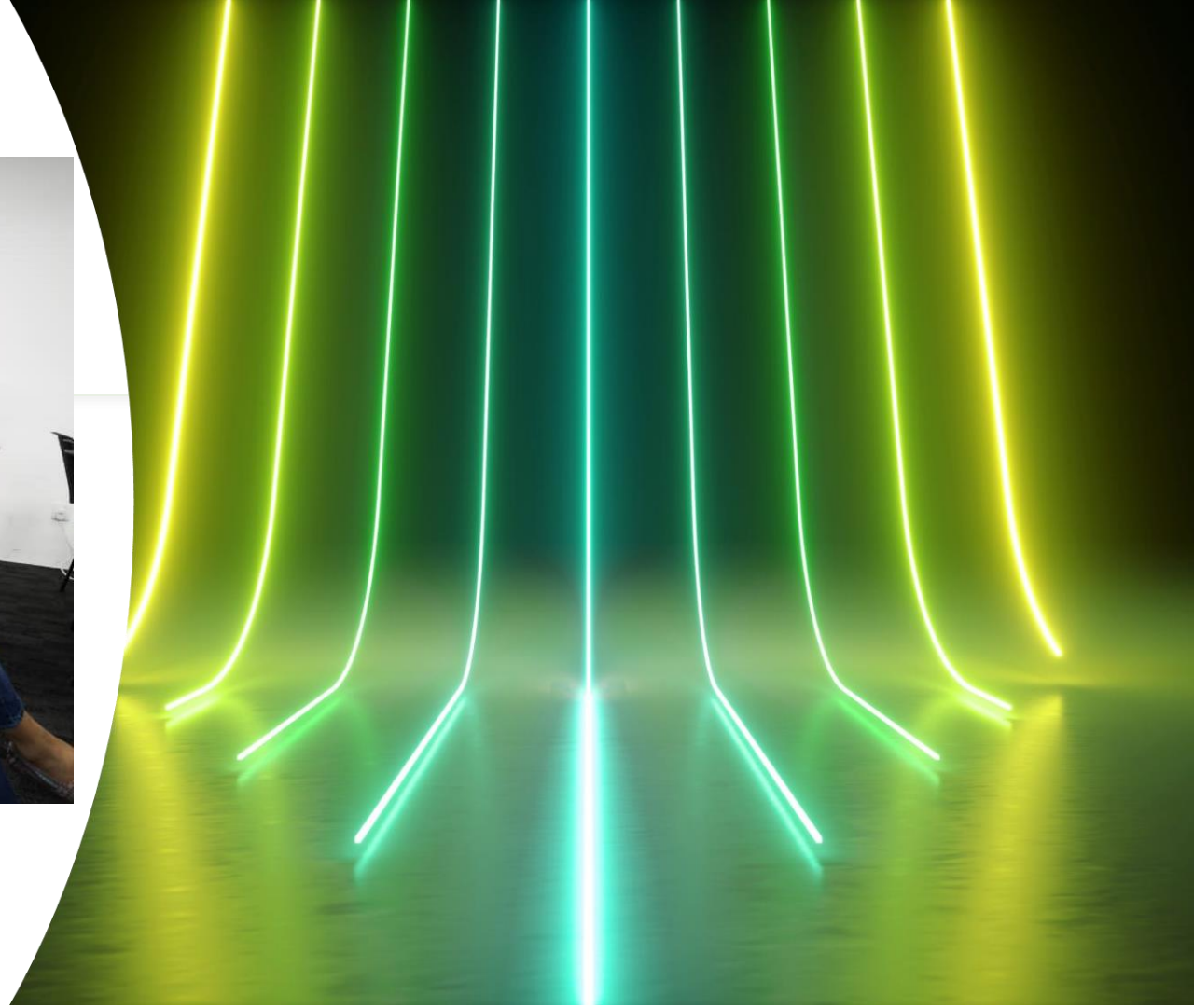
Exploring new roles, relationships and pedagogies

- New learning environments
- New collaborative work and learning spaces



BE FLEXIBLE

The Future



- Exploring
  - New pedagogies
  - New learning environments
- Acceptance of different hybrid models and support required
  - Lecturers
  - Students
  - Parents

BEST OF LUCK!