

# Transformation of Digital Technology in Teaching and Learning

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Teaching and research interests: Pharmacy, Medical Education, Chemistry and Science Education

# Transformation of technology in teaching and learning

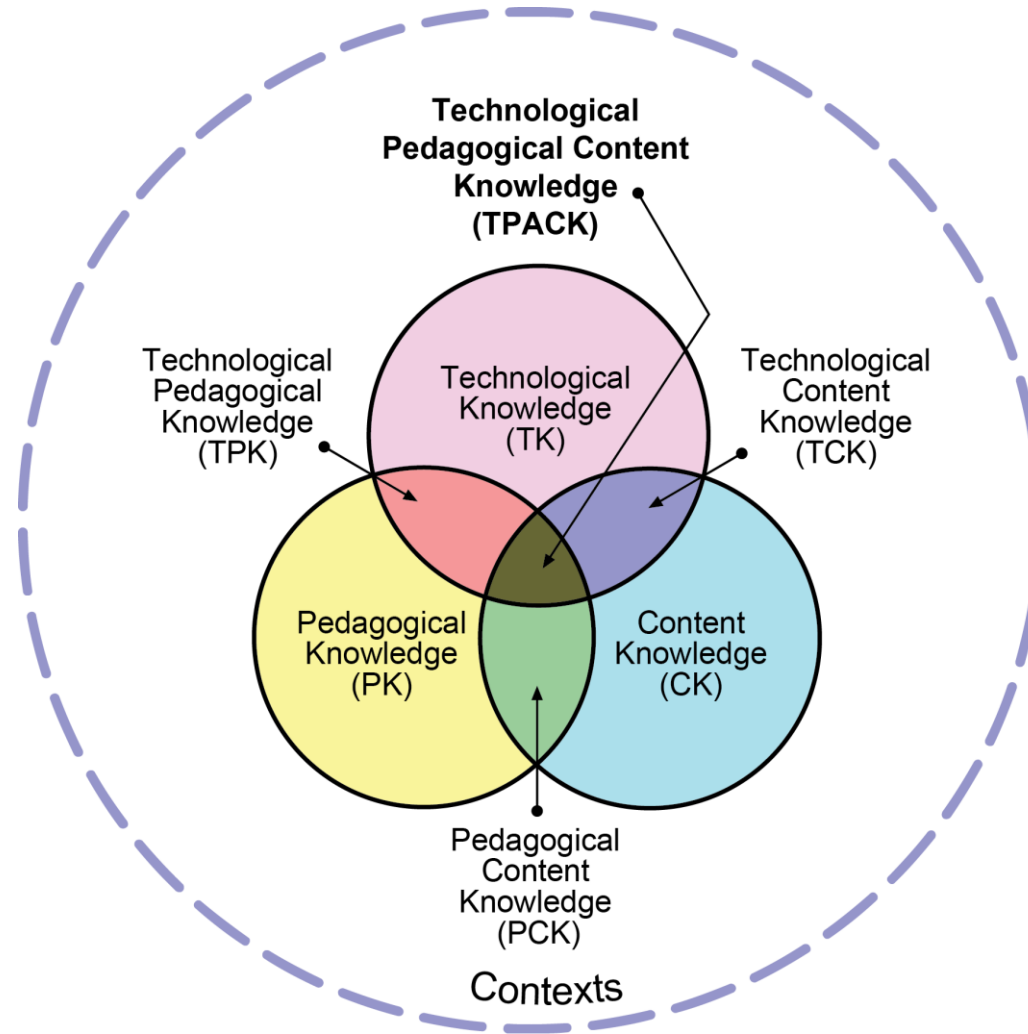
- The United Nations' sustainable development 2030 agenda emphasises quality education.
- Aim to ensure inclusive and equitable quality education.
- Digital technologies / Information and Communication Technology (ICT) have emerged as an essential tool to achieve this goal (Haleema et al., 2022)
- “ICT can impact student learning when teachers are digitally literate and understand how to integrate it into curriculum” (UNESCO, 2023)

Digital transformation in this presentation: The incorporation of ICT into classroom and curriculum design to improve students' learning outcomes.

# Transformation of technology in teaching and learning

## TPACK

- **Technological Knowledge**
- **Content Knowledge**
- **Pedagogical Knowledge**



Components of the TPACK framework (Mishra & Koehler, 2006)

# Transformation of technology in teaching and learning

## Technology Integration Matrix

Levels of Technology Integration into the Curriculum

	Entry	Adoption	Adaptation	Infusion	Transformation
Active	Information passively received	Conventional, procedural use of tools	Conventional independent use of tools; some student choice and exploration	Choice of tools and regular, self-directed use	Extensive and unconventional use of tools
Collaborative	Individual student use of tools	Collaborative use of tools in conventional ways	Collaborative use of tools; some student choice and exploration	Choice of tools and regular use for collaboration	Collaboration with peers and outside resources in ways not possible without technology
Constructive	Information delivered to students	Guided, conventional use for building knowledge	Independent use for building knowledge; some student choice and exploration	Choice and regular use for building knowledge	Extensive and unconventional use of technology tools to build knowledge
Authentic	Use unrelated to the world outside of the instructional setting	Guided use in activities with some meaningful context	Independent use in activities connected to students' lives; some student choice and exploration	Choice of tools and regular use in meaningful activities	Innovative use for higher order learning activities in a local or global context
Goal-Directed	Directions given, step-by-step task monitoring	Conventional and procedural use of tools to plan or monitor	Purposeful use of tools to plan and monitor; some student choice and exploration	Flexible and seamless use of tools to plan and monitor	Extensive and higher order use of tools to plan and monitor

Characteristics of the Learning Environment

Technology Integration matrix, Adopted from (Poyo, 2016)

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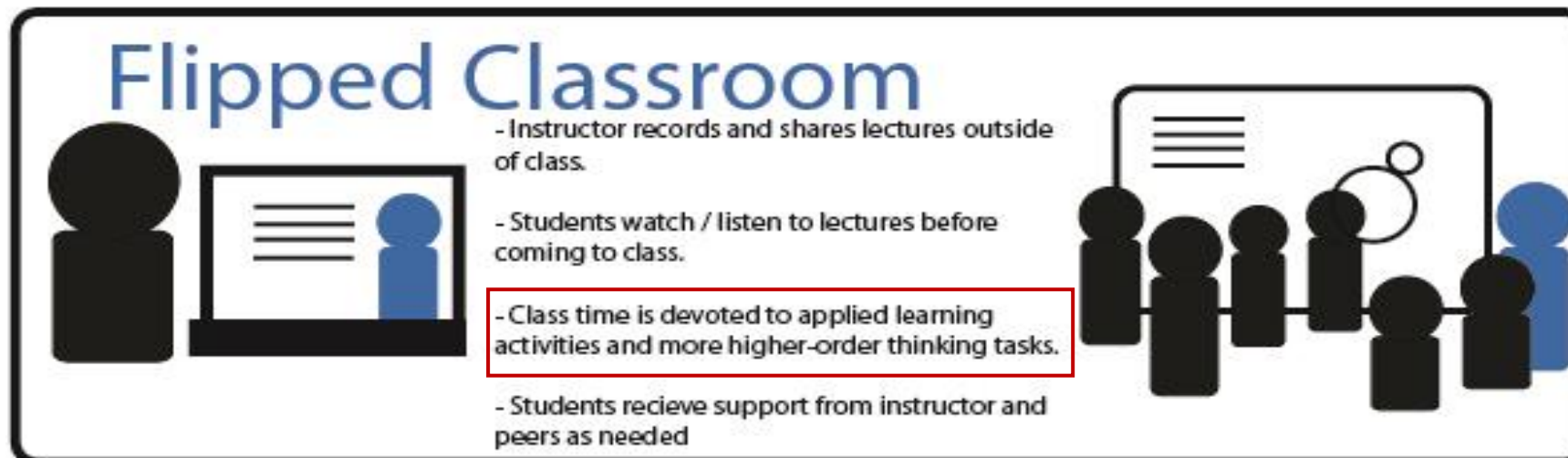
**High levels of personalization supported by artificial intelligence and virtual reality possibly change education delivery**



**The balance between the on-campus and at-home learning and teaching**

# Transformation of technology in teaching and learning

## Flipped classroom

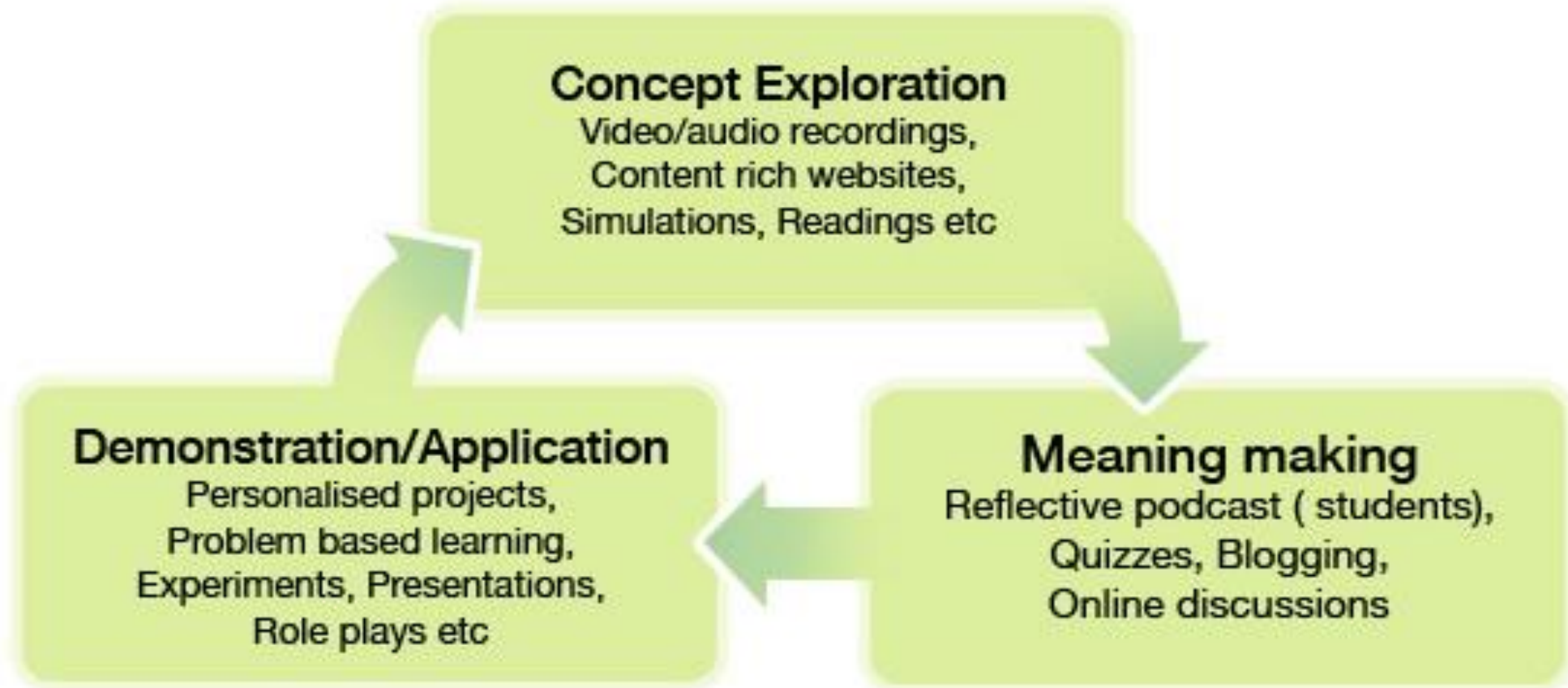


Source: <https://www.slu.edu>

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## Flipped classroom

### Learning opportunities



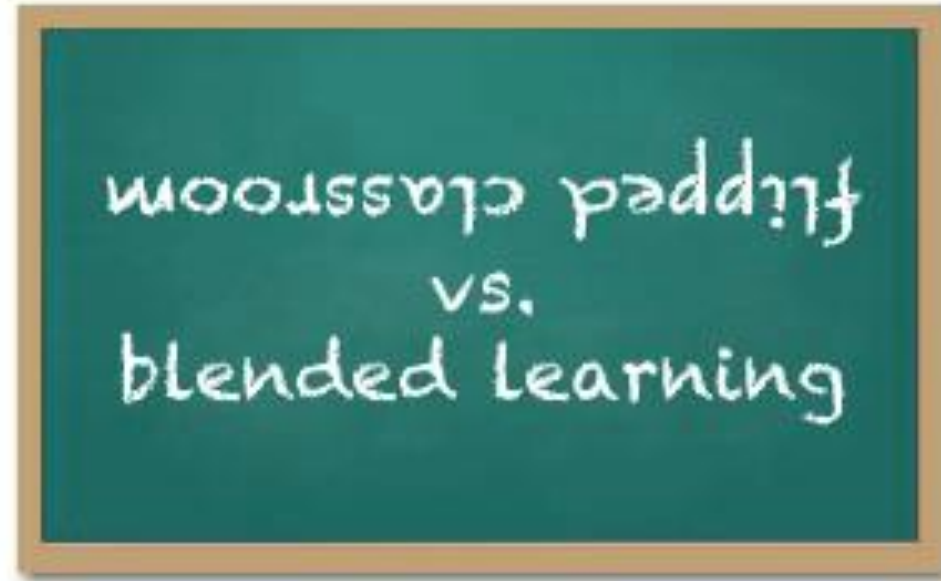
Source: <https://ivy panda.com/essays/flipped-classrooms-advantages-and-disadvantages/>



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## Blended classroom

- Enables teachers to use online tools to facilitate learning outside of the classroom
- Online materials do not take the place of face-to-face instruction/tutorials
- Tutorials are used to instruct / compliment / consolidate student learning in the classroom



Picture from: <https://teachwithict.weebly.com/flipped-classroom-vs-blended-classroom.html>

# Transformation of technology in teaching and learning

## Learning management system (LMS) at Deakin University

### Clouded Base e-Learning platform : CloudDeakin

The screenshot displays the CloudDeakin LMS interface. At the top, there is a navigation bar with links for Library, DeakinSync, Contact, Help, and Visit Deakin home. Below this is a teal header with the 'Cloud Deakin' logo and the Deakin University crest. A secondary navigation bar includes links for 'Enrolment, fees and money', 'Help', and 'Contact us', along with a search icon. The main content area features a breadcrumb trail: Home / Deakin / CloudDeakin. A prominent 'CloudDeakin Login' button is followed by the text 'Your online learning environment' and a link to 'Sign in as a different user?'. Below this, there are sections for 'CloudDeakin for Students' (with a 'Student Help & Guides' button) and 'CloudDeakin for Staff'. The right side of the page contains two news items: 'CloudDeakin July Release (28/7/23)' and 'CloudDeakin June Release (23/6/23)', each with a list of updates.

Library DeakinSync Contact Help Visit Deakin home →

Cloud Deakin DEAKIN UNIVERSITY

Enrolment, fees and money Help Contact us

Home / Deakin / CloudDeakin

### CloudDeakin

**CloudDeakin Login**

Your online learning environment

[Sign in as a different user?](#)

**CloudDeakin for Students**

Guides for students seeking assistance using CloudDeakin and associated applications.

**Student Help & Guides**

**CloudDeakin for Staff**

Guides for staff seeking assistance creating

#### CloudDeakin July Release (28/7/23)

1. Assignments - Teaching staff can now download a submitted file which has no filename.
2. Browser - The minimum supported browser versions are: Chrome 112+, Edge 112+, Safari 16+, and Firefox 112+. For an optimal experience that offers better performance, accessibility, and security, we recommend that all users access CloudDeakin with the latest version of their supported browser.
3. Discussion - Availability dates in the Discussions list are now displayed as a simple date range below the titles of discussion topics. Hovering over the date range text displays a tooltip that includes the information about start and end dates. Tooltips also include applied settings to explain how the discussion topic appears to students before and after these dates.
4. HTML Editor - Images edited within HTML Editor are saved with their original names followed by a date-time string.

#### CloudDeakin June Release (23/6/23)

1. Assignments - The Rubrics Confirmation dialog box heading now says Unscored Rubric Criteria in place of Confirmation, to improve the workflow clarity for all users. The text in this dialog is fully accessible to screen readers.
2. Quizzes - Staff can now use the Load More button on the Initial page load if a quiz has more than 200 questions, sections, and question pools. Besides, staff can now select multiple items and use drag and drop to rearrange the question list.

### Cloudeakin site demonstration

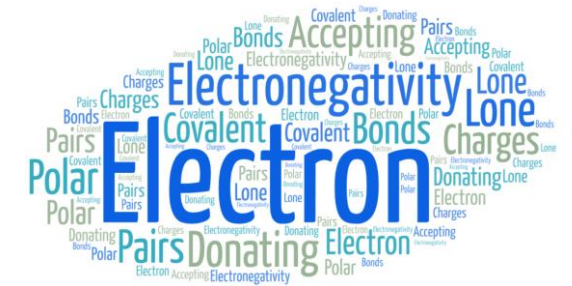
Source: <https://www.deakin.edu.au/clouddeakin>



# Transformation of technology in teaching and learning

## Teaching and Learning Science

- **Diagnostic assessments**
  - Concept maps, mind maps (create and share on Google share)
  - Kahoot
  - Quizlet live
  - Mentimeter
  - Poll Everywhere
  - Wordart



How do I implement ICT into diagnostic assessments?

# Transformation of technology in teaching and learning

## Teaching and Learning Science

- **Formative assessments**

- Predict, observe and explain (POE)
- Think pair share (TPS)
- Interview about instance (IAI)
- Peer review
- Virtual experiment
- PhET simulation:

Concentration [https://phet.colorado.edu/sims/html/concentration/latest/concentration\\_all.html](https://phet.colorado.edu/sims/html/concentration/latest/concentration_all.html)

Electrolysis simulation: [https://sepuplhs.org/high/hydrogen/electrolysis\\_sim5.html](https://sepuplhs.org/high/hydrogen/electrolysis_sim5.html)

- **Summative assessments**

- Create videos, posters
- Online or face to face presentations
- Online MCQs
- Written essays



**How do I implement ICT into these assessments?**

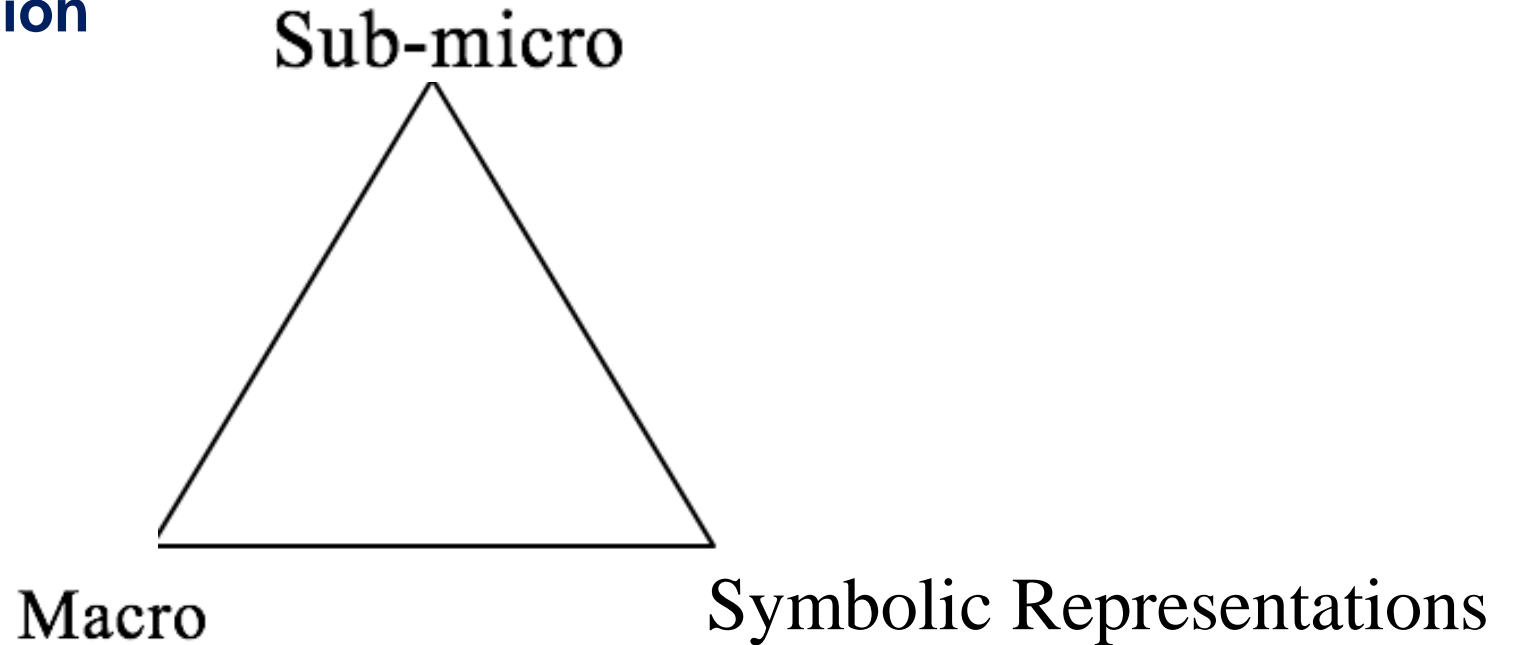
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## Teaching and Learning Chemistry

### Three levels of representation



How do I implement ICT in teaching chemistry? (e.g., hands-on /practical experiment lesson)



Example depicting triplet nature of chemistry modified from Johnstone's model (Johnstone, 1991)

Frameworks: The Johnstone's triangle model (Johnstone, 1991)

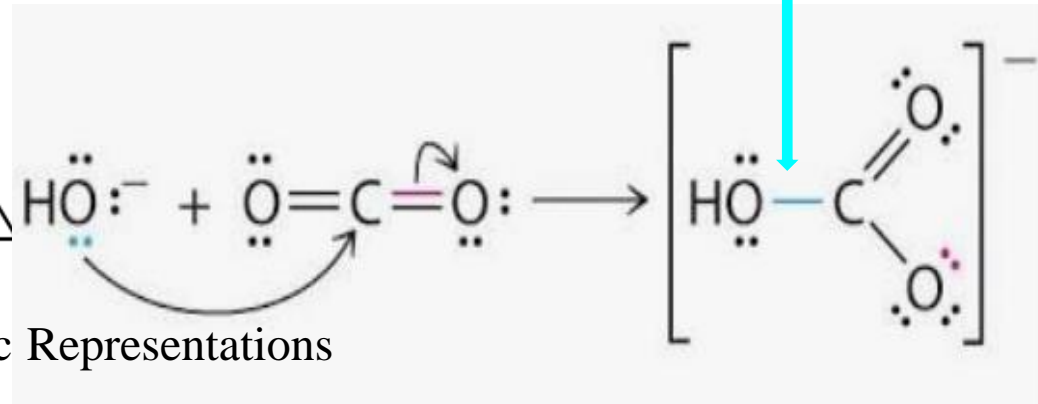
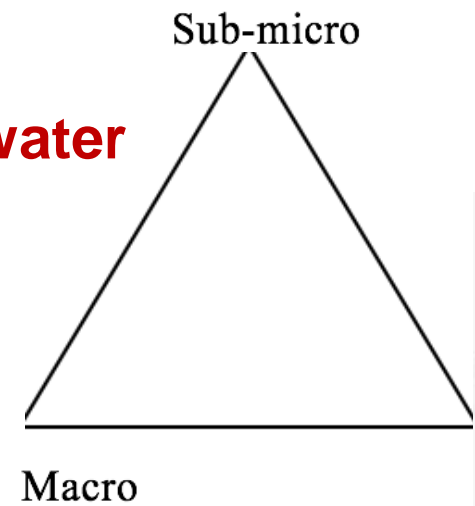
The Student Representation Construction Approach (Prain & Tytler, 2012)

# Teaching and Learning Chemistry

Particulate interaction of molecules



## Carbon Dioxide in water



Interpret the electron sharing process?

Oxygen atom of Hydroxide ion  
**Electron Donor**

Carbon atom of Carbon dioxide  
**Electron Acceptor**

**Nucleophile**

**Electrophile**



# Transformation of technology in teaching and learning

## A brief teaching sequence in chemistry

Topic: Nucleophiles and Electrophiles

Teaching duration: 50 minutes, tutorial

1. Probe students' prerequisite knowledge (MCQ questions as diagnostic assessment)
2. Introduce the topic of Nucleophiles and Electrophiles and the learning intention.
3. The Johnstone triangle model and the Student Representation Construction Approach as the teaching frameworks.
4. Activities leads to the concepts (including formative assessment)
  - ✓ *Macroscopic Activity: Practical experiment / Virtual experiment*
  - ✓ *Sub-microscopic Activities: Ball and Stick Model, Animation, Simulation etc.*
  - ✓ *Symbolic Activity: Lewis structures and equation*
5. Link the activities to the concepts
6. Unpack the concepts
  - ✓ *Definition of Nucleophiles and Electrophiles*
  - ✓ *Characteristics and examples of Nucleophiles and Electrophiles*
7. Application of students' understandings
  - ✓ *Online or in-class exercise as a form of summative assessment.*
8. Close the lesson

# Transformation of technology in teaching and learning





# References

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THANK YOU



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