

Teaching in Virtual Environments

APRU Global Health Program at the University of Southern California

in collaboration with

Global STEM Education Program at the University of Oregon

November 12/13

Technology for Remote Teaching

Eleanor Vandegrift, University of Oregon

Julie Clarke, University of Melbourne

December 3/4

Equity and Access in Remote Teaching

Eleanor Vandegrift, University of Oregon

Michael Antonio Mendoza, University of the Philippines Manila

January 21/22

Authentic Online Assessment

Mona Monfared, University of California, Davis

Fung Fun Man, National University of Singapore



USC Institute on Inequalities in Global Health



APRU
Global Health



UNIVERSITY OF
OREGON

More info or to register: apru.org/our-work/pacific-rim-challenges/global-health

Welcome and Introduction

MELLISSA WITHERS,
UNIVERSITY OF SOUTHERN
CALIFORNIA

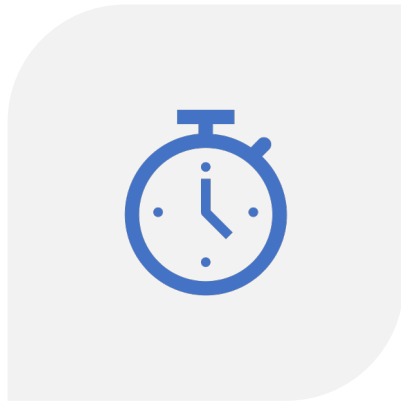
ELLY VANDEGRIFT,
UNIVERSITY OF OREGON

Goals for today:

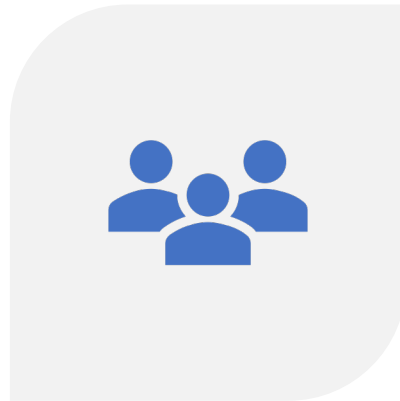
1. Provide pedagogical, technology, and peer support to faculty across the APRU network teaching remotely.
2. Create opportunities for APRU affiliated faculty to connect and share resources and experiences with creating equitable remote learning environments.

APRU Disclaimer: The views, information, or opinions expressed during the APRU Global Health Working Group Webinars: Teaching in Virtual Environments (Part II) are solely those of the individuals involved and do not necessarily represent those of The Association of Pacific Rim Universities (“APRU”) and its employees. APRU is not responsible and does not verify for accuracy any of the information contained in the series.

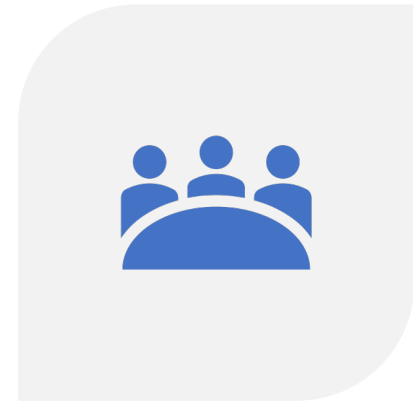
Format



20-30 MINUTES EXPERT
PANEL



30 MINUTES SMALL
GROUP DISCUSSION



30 LARGE GROUP
DISCUSSION

Mona Monfared

UNIVERSITY OF CALIFORNIA, DAVIS

Three ideas for online assessment



PUBLIC EXAMS



PARTICIPATION SURVEYS including exam wrappers



INFOGRAPHIC

Wieman, C. E., Rieger, G. W., & Heiner, C. E. (2014). Physics exams that promote collaborative learning. *The Physics Teacher*, 52(1), 51-53.

Wiggins, B. (2019). The Public Exam System: Simple Steps to More Effective Tests. <https://www.coursehero.com/faculty-club/classroom-tips/benjamin-wiggins/>

Lovett, M. C. (2013). Make exams worth more than the grade: Using exam wrappers to promote metacognition. In M. Kaplan, N. Silver, D. LaVague-Manty, & D. Meizlish (Eds.), *Using reflection and metacognition to improve student learning: Across the disciplines, across the academy* (pp. 18-52). Sterling, VA: Stylus.

Public Exams



60-70% of material



Missing key
elements



Posted for students
for one week

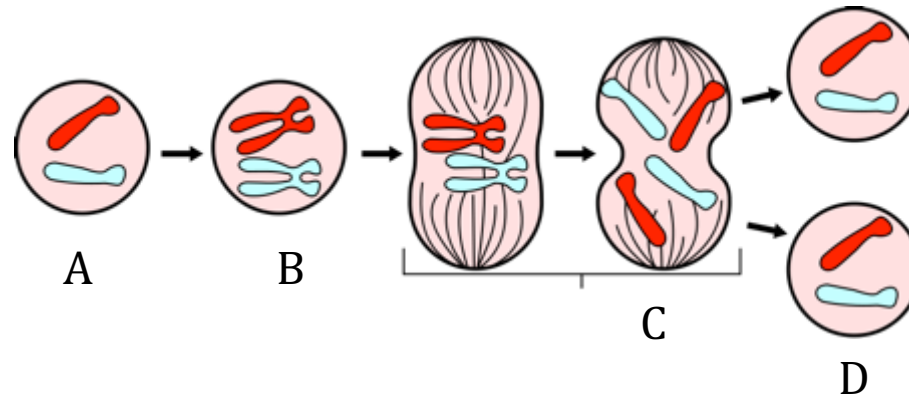


Students provide
feedback

Wiggins, B. (2019). The Public Exam System: Simple Steps to More Effective Tests.
<https://www.coursehero.com/faculty-club/classroom-tips/benjamin-wiggins/>

Full Exam Question (Multiple True/False)

For each answer, select True or False.



- ___ This diagram represent mitosis.
- ___ This process creates eggs and sperm that are ready for fertilization.
- ___ In this image, at stage D the cells are identical to the cells at stage A.
- ___ In this image, the cells at stage D are diploid.
- ___ In this image at stage C the chromosomes undergo crossing over.
- ___ In this image at stage B the cell is diploid.

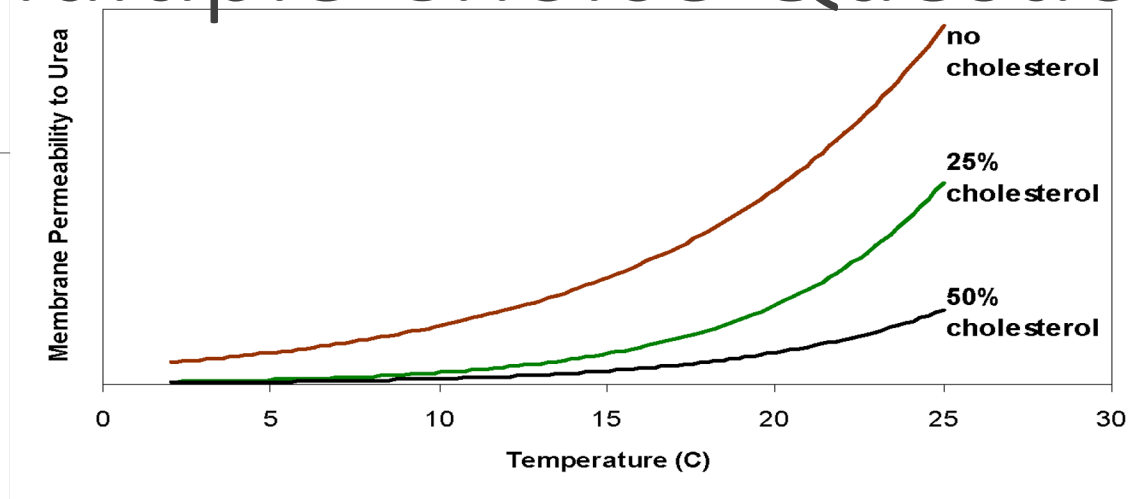
Example (questions no image)

- _____ This diagram represent mitosis.
- _____ This process creates eggs and sperm that are ready for fertilization.
- _____ In this image, at stage D the cells are identical to the cells at stage A.
- _____ In this image, the cells at stage D are diploid.
- _____ In this image at stage C the chromosomes undergo crossing over.
- _____ In this image at stage B the cell is diploid.

Elly Vandegrift, University of Oregon

Full Question: Multiple Choice Question

Review the graph at right.

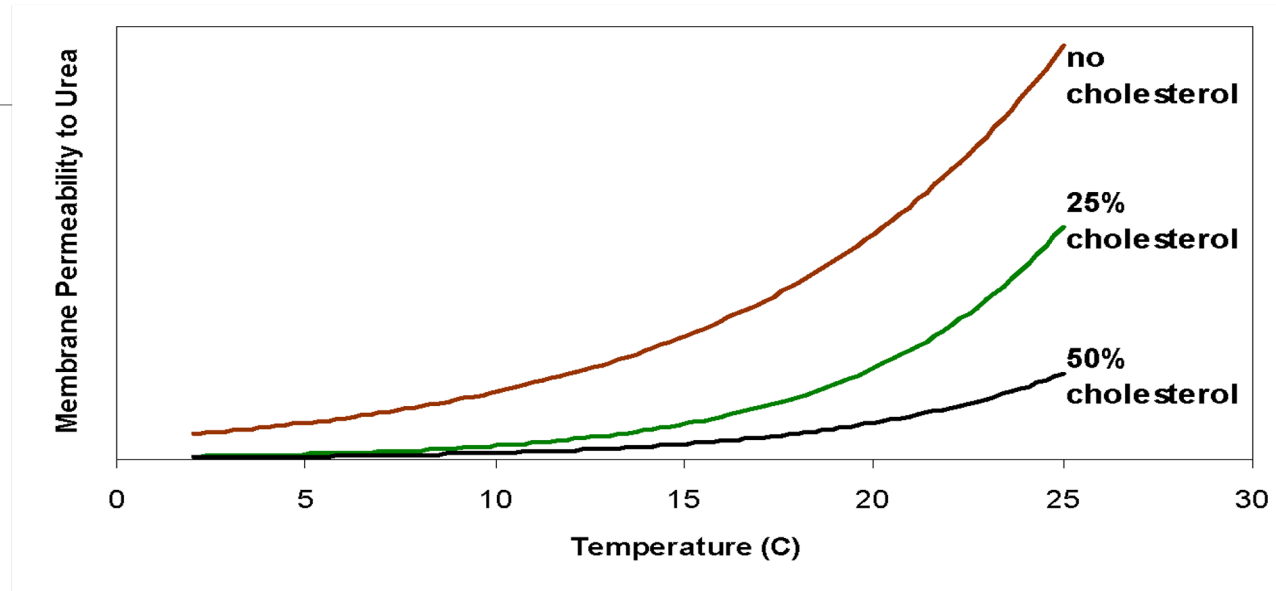


Which of the following passages describes the graph?

- A) membrane permeability to urea is only dependent on the amount of membrane cholesterol
- B) amount of membrane cholesterol is only dependent on membrane permeability to urea
- C) membrane permeability to urea is dependent on temperature and the amount of membrane cholesterol
- D) amount of membrane cholesterol and membrane permeability to urea are dependent on one another

Dirks, C., Wenderoth, M. P., & Withers, M. (2014). *Assessment in the college science classroom*. WH Freeman.

Example (figure no questions)



Dirks, C., Wenderoth, M. P., & Withers, M. (2014). *Assessment in the college science classroom*. WH Freeman.

Participation Surveys – formative assessment

Weekly “quiz” that is a combination of different types of questions

- Content questions (fill in the blank, multiple choice, True/False, short answer)
Example: In your own words, describe the difference between K_{eq} and Q
- Muddiest point/Clearest point
What was the clearest point about glycolysis? What point still needs clarification?
- Awareness/Use of resources
Have you attended any of the office hours held by the peer tutors?

Participation Surveys – formative assessment

Weekly “quiz” that is a combination of different types of questions

- Space to provide feedback

Do you have any questions or comments for me?

- Interests related to the course

What topics related to metabolism are you interested in?

- Interests not related to the course

What is your favorite food? What is a movie or TV show that you like so much you have watched it multiple times?

Participation Surveys – formative assessment

Weekly “quiz” that is a combination of different types of questions

- **Reflection**

It has been a challenge to shift to remote learning, but every challenge teaches us something. What was an important discovery you made last spring or over the summer about how to succeed in the remote learning environment? (This can be about what worked for you or what didn't work for you – both are useful things to learn about yourself)

- **Exam wrappers**

Examples: Which of the following did you do to prepare for the exam?

What do you think you will do differently in preparing for the next exam?

Participation Surveys – formative assessment

Weekly “quiz” that is a combination of different types of questions

- Ask students for input on an assignment and/or rubric

Examples:

We will have an infographic project where you pick an enzyme and you design an infographic about it. The assignment is called "Spotlight on an Enzyme."

I want to get your ideas on what you think should be included in an infographic about an enzyme. For example, structure of the enzyme? what pathway it is a part of? what reaction it catalyzes? etc. **What you write will help me build the instructions for this assignment.**

For the infographic assignment, how do you think it should be graded? What are some of the things you think should be in the rubric? **I will build the rubric from your suggestions.**

Infographic Assignment (group or individual)

Students are asked to create an infographic for a specific audience

Examples from three different Biochemistry classes:

- Spotlight on an Enzyme
 - My Favorite Metabolite
 - Crowdsourcing questions on a general topic from class and give students a curated list to choose from. Some examples were: How does stress affect metabolism? How do cancer cells differ in metabolism from healthy cells?

Ask students what they think should be on the infographic and how it should be graded – create assignment and rubric incorporating their ideas

Infographic examples

WILSON'S DISEASE

By Wilson's Disease UK

1 What is Wilson's Disease?

Wilson's Disease is a rare genetic condition that affects the liver and brain. It is caused by a mutation in the ATP7B gene, which leads to the accumulation of copper in the liver and brain.

2 Why is copper so important?

Copper is an essential mineral for the body. It is involved in many biological processes, including the production of haemoglobin, the formation of connective tissue, and the regulation of iron metabolism.

3 What are the symptoms?

Wilson's Disease symptoms typically develop in childhood or young adulthood. They can affect the liver, brain, and other organs. Symptoms include:

- Liver disease (hepatitis, cirrhosis, liver failure)
- Neurological symptoms (tremor, personality changes, dementia)
- Kidney disease
- Eye symptoms (Kayser-Fleischer rings, sunflower cataracts)
- Bone disease
- Skin symptoms (rash, pigmentation)

4 Can it be prevented?

Wilson's Disease is a genetic condition, so it cannot be prevented. However, early diagnosis and treatment can help manage the symptoms and prevent complications.

References

Wilson's Disease UK. (2023). Wilson's Disease. <https://www.wilsonsdiseaseuk.org/>

Riboflavin B₂ Vitamin

Photo: Alamy, Ltd. via Shutterstock.com

Chemical & Physical Properties

Chemical Properties:

- Molecular Weight: 336.07 g/mol
- Melting Point: 185-190 °C
- Boiling Point: 300 °C
- Density: 1.45 g/cm³
- Solubility: Soluble in water, insoluble in alcohol
- Stability: Stable in neutral and alkaline solutions, but unstable in acidic solutions

Physical Properties:

- Appearance: Yellow-orange crystals
- Odor: Odorless
- Taste: Bitter

Structure of Riboflavin

C1=NC2=C(NC(=O)NC2=O)N(C)C=O

Discovery of Riboflavin

Who? The discovery of Riboflavin (aka Vitamin B2) began due to the efforts to find out what caused beriberi that was reported to Australia in the early 1930s. In Australia, Frederick Storer Proctor and Lester R. Young discovered that the deficiency was due to a lack of riboflavin in the diet. They called it "Beriberi Factor". Frank Taylor named them "vitamin B2".

What? The connection between nutrition and vitamin deficiency diseases had been established. Vitamin B2 deficiency was linked to beriberi, and the discovery of riboflavin was a significant milestone in the field of nutrition.

Sources of Riboflavin

1. Dairy Products: Milk, cheese, yogurt, and butter.
2. Eggs: Egg yolks.
3. Meat and Poultry: Beef, lamb, and chicken.
4. Fish: Salmon, trout, and tuna.
5. Grains: Whole grains, fortified cereals, and bread.
6. Vegetables: Spinach, asparagus, and green peas.
7. Fruits: Avocado and kiwi.
8. Nuts and Seeds: Sunflower seeds and almonds.
9. Fortified Foods: Breakfast cereals and fortified flour.

Physiological Importance of Riboflavin

Essentially it is vital in maintaining the body's energy levels. It is a precursor of the coenzyme Flavin Mononucleotide (FMN) and Nicotinamide Adenine Dinucleotide (NAD).

The above coenzymes are of essential for the following processes:

- Metabolic energy production
- Tryptophan to niacin conversion
- Carbohydrate and protein metabolism
- Oxidation-reduction mediated metabolism
- Maintenance of healthy skin, hair, and eyes

More Food

Wilson's Disease UK. (2023). Wilson's Disease. <https://www.wilsonsdiseaseuk.org/>

ATP SYNTHASE Powering the Cell

By ATP Synthesis

What is ATP?

Adenosine triphosphate (ATP) is the primary energy currency of the cell. It is used to power a wide range of biological processes, including muscle contraction, nerve conduction, and biosynthesis.

Structure of ATP

ATP is a nucleotide consisting of an adenine base, a ribose sugar, and a triphosphate group. The triphosphate group is the source of energy for the cell.

Production of ATP

ATP is produced in the mitochondria through a process called oxidative phosphorylation. This process involves the transfer of electrons from a donor to an acceptor, which drives the synthesis of ATP from ADP and inorganic phosphate (Pi).

Structure and Mechanism

The structure of ATP synthase is a complex of proteins embedded in the mitochondrial membrane. It consists of a stator, a rotor, and a catalytic domain. The stator anchors the enzyme to the membrane, while the rotor and catalytic domain are responsible for the synthesis of ATP.

Two Complexes

ATP synthase is composed of two main complexes: the F₁ complex and the F₀ complex. The F₁ complex is located in the mitochondrial matrix and is responsible for the synthesis of ATP. The F₀ complex is embedded in the membrane and is responsible for the transport of protons across the membrane.

Structure-Function Relationship

The structure of ATP synthase is closely related to its function. The stator and rotor complexes are responsible for the mechanical coupling between the two complexes, allowing the energy from the proton gradient to be used to drive the synthesis of ATP.

Regulation

ATP synthase activity is regulated by several factors, including the availability of protons and the presence of regulatory proteins. The enzyme is also regulated by the cell's energy state, with ATP synthase activity increasing when energy levels are low.

Evolution

ATP synthase is a highly conserved enzyme, with a similar structure and function found in all eukaryotes and many prokaryotes. This suggests that ATP synthase is an ancient enzyme that has been present since the early stages of life.

Structure-Function Relationship

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Evolution

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Adapting authentic assessments in the *new normal*

FUNG FUN MAN, PH.D.

NATIONAL UNIVERSITY OF SINGAPORE
CHEMISTRY & SCIENCE OF LEARNING

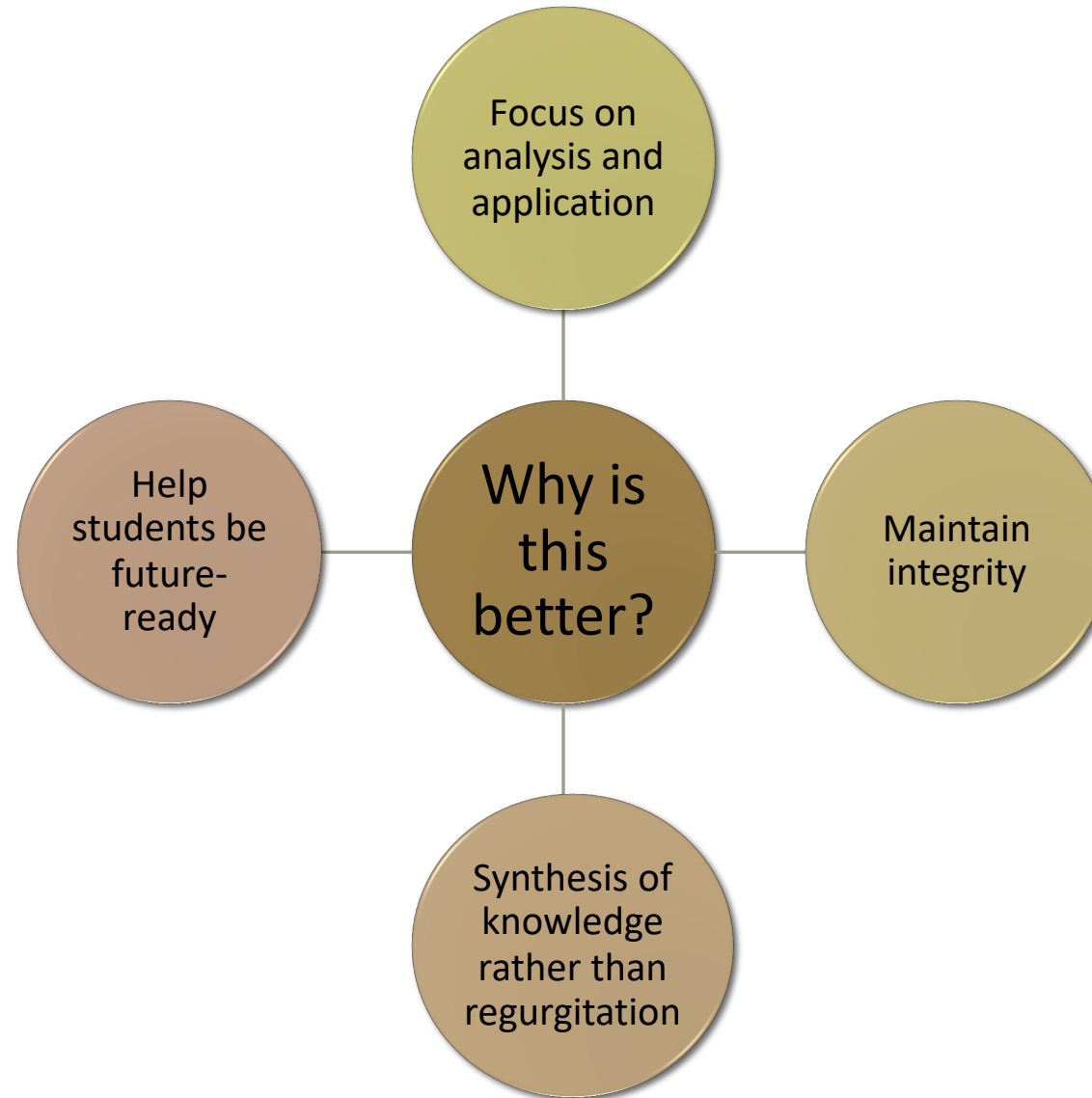


@chemfunman



National University of Singapore

Authentic Assessments



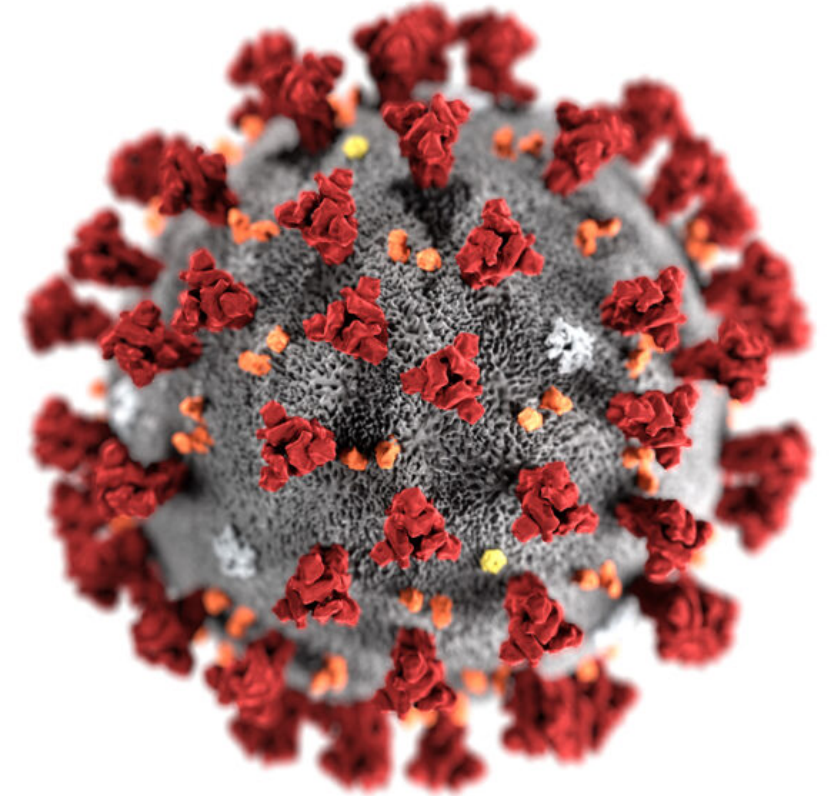
WHY would our grandchildren's generation think this is strange?



Why would the future generations think this is strange?

Top

NEW **Normal?**



Current assessment methods during this COVID-19 pandemic

Online / Home-based Assessments

Alternative assessment methods

Postponing / cancelling assessments



Challenges

Fung & Lam (2020) *J. Chem. Educ.* 2020, 97, 9, 2573–2580

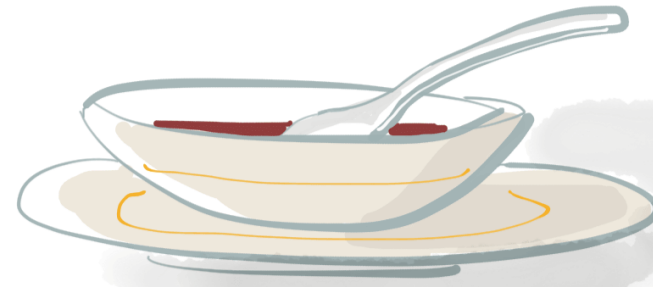
Time to Reimagine Assessments Methods?



FORMATIVE SUMMATIVE



WHEN THE **CHEF**
TASTES THE SOUP



WHEN THE **GUESTS**
TASTE THE SOUP

@bryanMMathers

FROM STEVE WHEELER'S BLOG "THE AFL TRUTH ABOUT ASSESSMENT"



Novel Assessment Methods

Apply formative assessments to simulate summative assessments (Team-based Learning).



Implementing open-ended questions (with no clear answer).



Novel Assessment Methods

Apply formative assessments to simulate summative assessments (Team-based Learning).

- Using small break out groups to discuss about application of concepts.
- Questions posed to these break-out groups have no clear answers and can simulate the summative assessments questions.

Implementing open-ended questions (with no clear answer).

- Focus on analysis and application of knowledge (Bloom's Taxonomy)
- Maintain integrity as it is harder to students to duplicate answers
- Synthesising knowledge rather than regurgitation of knowledge
student's ability and creative to apply their knowledge.



Novel Assessment Methods

Apply formative assessments to simulate summative assessments (Team-based Learning).

- Using small break out groups to discuss about application of concepts
- Questions posed to these break-out groups have no clear answer to simulate the summative assessments questions.



Implementing open-ended questions (with no clear answer).

- Focus on analysis and application of knowledge (Bloom's Taxonomy)
- Maintain integrity as it is harder to students to duplicate answers
- Synthesising knowledge rather than regurgitation of knowledge. -> tests student's ability and creative to apply their knowledge.

Novel Assessment Methods

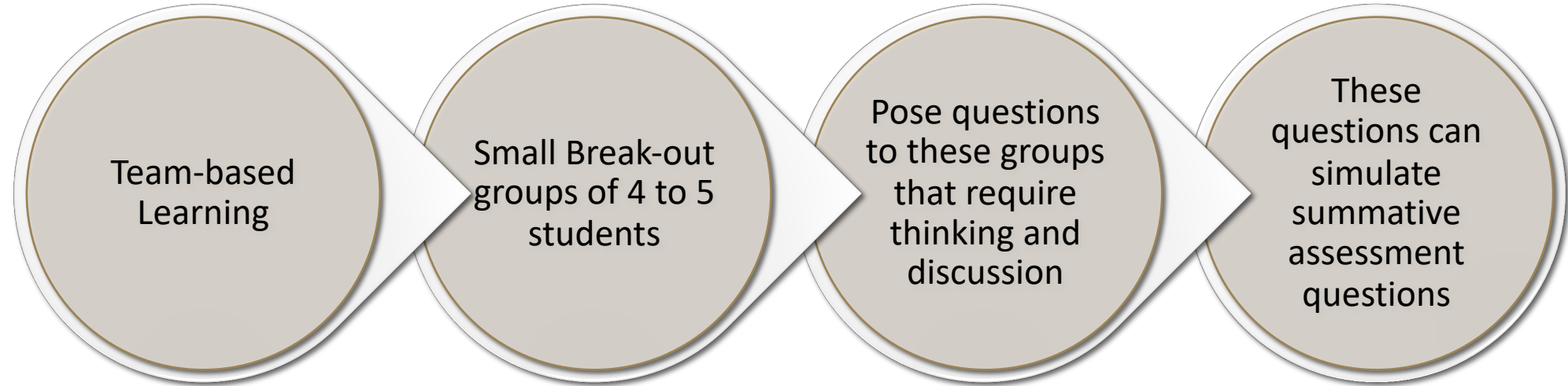
Open-ended real world questions

- Designed to achieve the UNSDG 17 goals

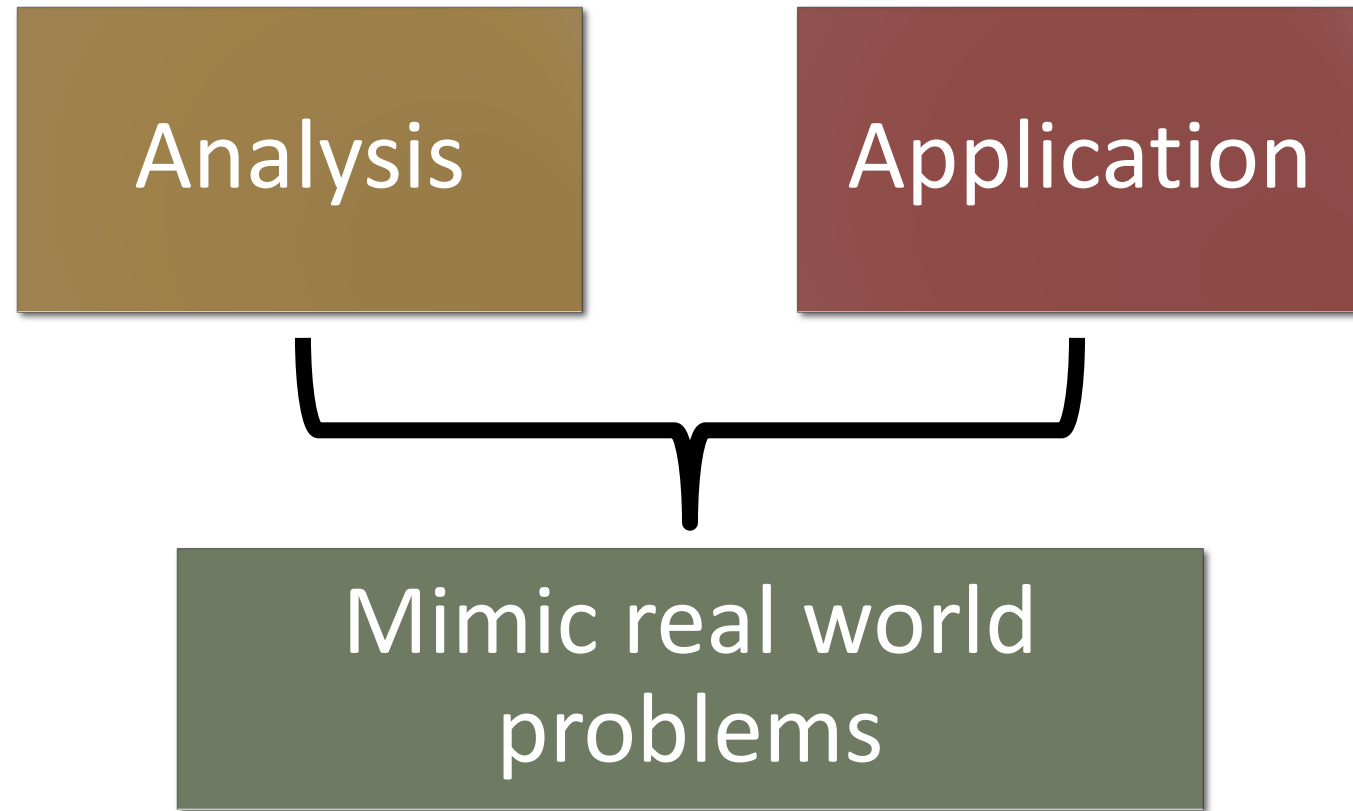


**SUSTAINABLE
DEVELOPMENT
GOALS**

How can we prepare students for these assessments



What kind of Open-ended questions?



Example 1



Use the data provided in Figure 2 (next page) to respond to the following.

- (a) Describe the change in per capita waste generation from the year 2000 to 2010 and explain two probable causes for this change.

6 marks

- (b) Pulau Semakau is located to the south of the main island of Singapore, off the Straits of Singapore. The Semakau Landfill is located on the eastern side of the island and is Singapore's first offshore landfill and is now the only remaining landfill in Singapore.

Both the Ministry of the Environment and Water Resources (MEWR) and the National Environment Agency (NEA) manage the Semakau Landfill. Suppose you are the Permanent Secretary of NEA, and you are tasked to coordinate the expansion of this landfill such that it can become gradually converted to a recreational space for Singaporeans once cells are filled. Using your knowledge in waste management, what are the considerations you would take to ensure that the Semakau Landfill can be opened safely to the public for activities such as cycling or walks?

8 marks

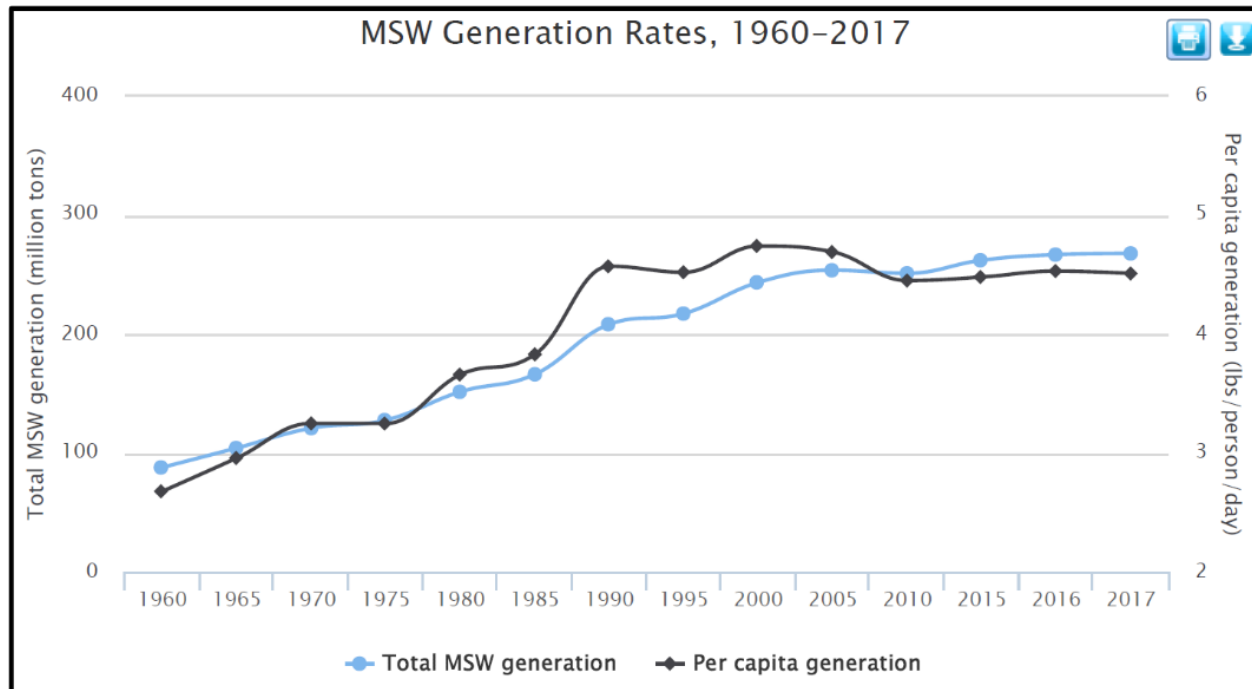


Figure 2. MSW Trends - 1960 to Today. Source: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials>



Example 2

Figure 3 and 4 on the next page show two parcels of farmland in Lim Chu Kang and Sungei Tengah that were published by the Singapore Food Agency (SFA) on September 15, 2020.

Given that you worked at SFA as the assistant director in planning the use of both land parcels, one sole for goat farming, the other solely for vegetable farming. By referring to Figure 3 and 4, and applying and integrating knowledge from the CM3261 topics in lithosphere, environmental toxicology, food chain, and waste management, what are some considerations when deciding which parcel of land is best leased for goat farming vs vegetable farming?

Please explain your answers in point form.

24 marks

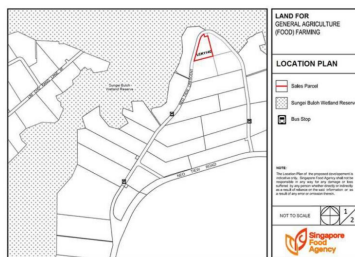


Figure 3. Map of land for farming near Sungei Buloh, Singapore. Credit: Singapore Food Agency
Source: <https://www.channelnewsasia.com/news/singapore/farmlands-tender-lim-chu-kang-sungei-tengah-singapore-food-13111802>

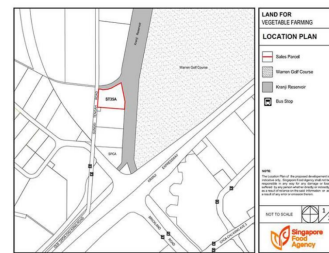


Figure 4. Map of land for farming near Kranji Reservoir, Singapore. Credit: Singapore Food Agency
Source: <https://www.channelnewsasia.com/news/singapore/farmlands-tender-lim-chu-kang-sungei-tengah-singapore-food-13111802>

Example 2 – contextualizing to current events in your country

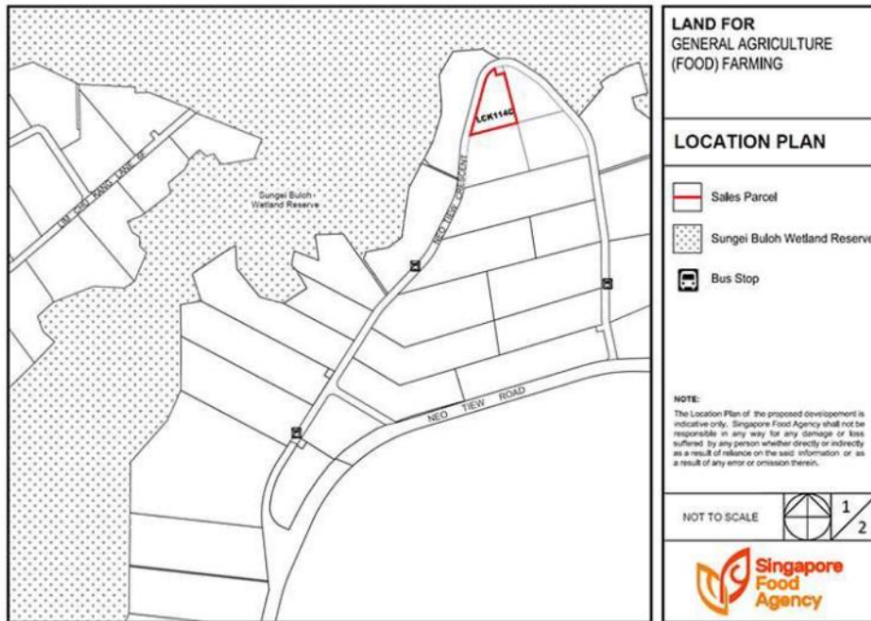


Figure 3. Map of land for farming near Sungei Buloh, Singapore. Credit: Singapore Food Agency

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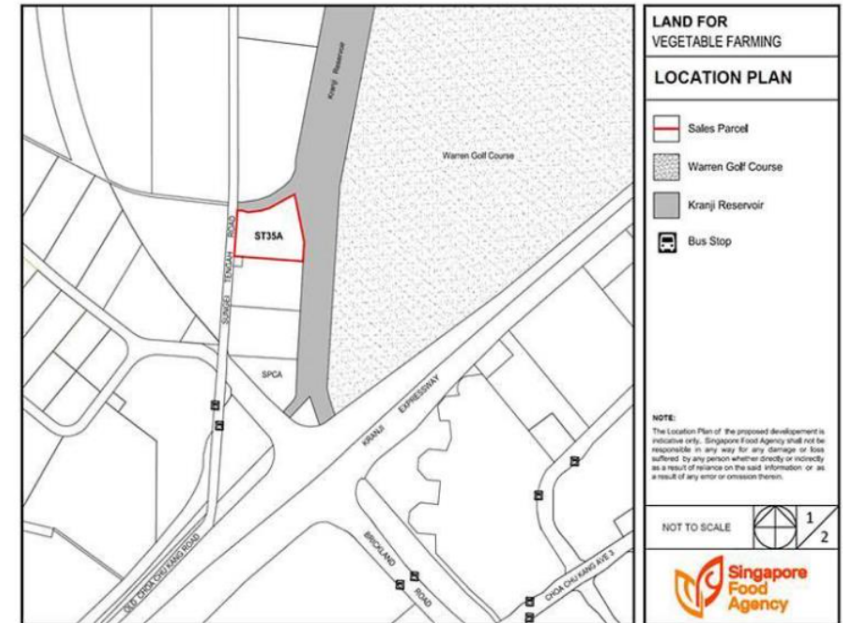
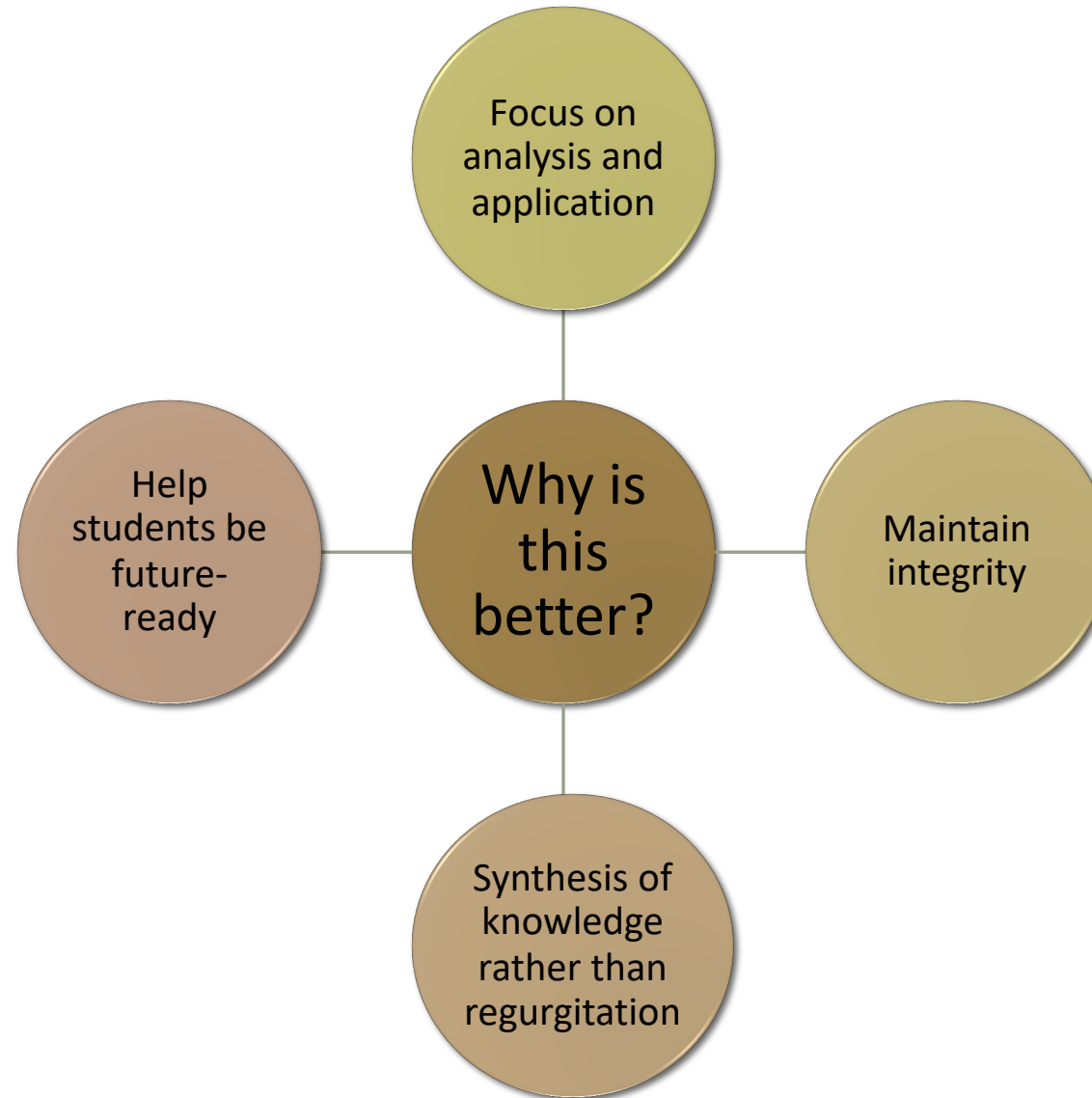


Figure 4. Map of land for farming near Kranji Reservoir, Singapore. Credit: Singapore Food Agency

Source: <https://www.channelnewsasia.com/news/singapore/farmlands-tender-lim-chu-kang-sungei-tengah-singapore-food-13111802>


Authentic Assessments



Read more here


How COVID-19 Disrupted Our “Flipped” Freshman Organic Chemistry Course: Insights Gained from Singapore

Fun Man Fung* and Yulin Lam*


 Cite This: *J. Chem. Educ.* 2020, 97, 2573–2580

 Read Online

ACCESS |

 Metrics & More

 Article Recommendations

 Supporting Information




ABSTRACT: COVID-19 has besieged academic institutions worldwide. As countries closed their international borders and imposed lockdowns, faculty have faced unprecedented challenges in finding alternative modes of teaching and assessment as replacements for the traditional face-to-face classes. In this piece, we describe the journey of the chemistry instructors in managing and overcoming the disruptions we faced teaching a freshman organic course in the time of tight safety measures. We describe the change in assessment modes in our course and the impacts of such changes to our students' academic performance and to our faculty's teaching feedback ratings.

KEYWORDS: First-Year Undergraduate/General, Organic Chemistry, Curriculum, Hands-On Learning/Manipulatives, Computer-Based Learning, Multimedia-Based Learning, Aldehydes/Ketones, Chirality/Optical Activity, Internet/Web-Based Learning

How Chemists Achieve Active Learning Online During the COVID-19 Pandemic: Using the Community of Inquiry (CoI) Framework to Support Remote Teaching

Hui Ru Tan, Wei Heng Chng, Christian Chonardo, Magdeline Tao Tao Ng, and Fun Man Fung*

 Cite This: *J. Chem. Educ.* 2020, 97, 2512–2518

 Read Online

ACCESS |

 Metrics & More

 Article Recommendations

 Supporting Information

ABSTRACT: As numerous varsity campuses remain closed during the coronavirus disease 2019 pandemic, educators must look for suitable digital tools to conduct lessons and engage learners online. In this report, we discuss how to structure the online lessons using the Community of Inquiry framework (CoI). The CoI was applied to the university elective course “Learning to Choose Better”, taught by chemistry faculty. By using the appropriate digital tools in our course, we found success in achieving engagement, active learning, and team teaching. Until the world finds a resolution to the pandemic, online teaching will continue to be the new normal. Educators could view this time as a prime opportunity to experiment, innovate, and break new grounds in the realm of remote online teaching.

KEYWORDS: General Public, Continuing Education, Interdisciplinary/Multidisciplinary, Computer-Based Learning, Distance Learning/Self Instruction, Internet/Web-Based Learning, Multimedia-Based Learning, TA Training/Orientation



Thank you!

stay connected

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Fun Man

Breakout Rooms (30 min)

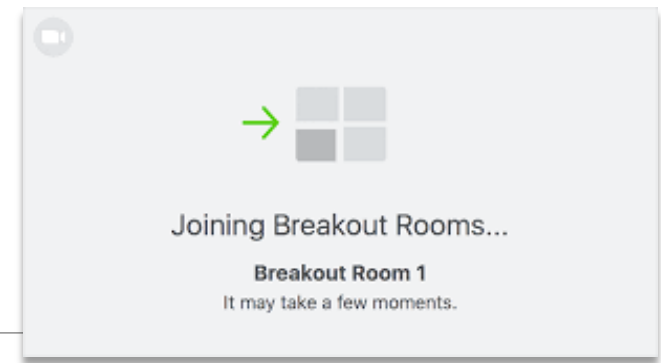
Introductions (30 seconds per person):

Name, Institution, Discipline, last podcast/TV show/movie/book

Select a reporter, recorder, time keeper, discussion leader.

Questions:

- 1 - What types of assessments (formative and summative) do you already use online? What works well? Where do you have challenges?
- 2 - What's your dream (formative or summative) assessment to measure student learning?
- 3 - How can you adapt your assessment or dream assessments for online learning?



Report out group discussion (+ #chat)

Questions:

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- 2 - What's your dream (formative or summative) assessment to measure student learning?
- 3 - How can you adapt your assessment or dream assessments for online learning?

Which of the ideas from the discussion today would you like to try in your teaching?
(Chat)

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November 12/13

Technology for Remote Teaching

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Julie Clarke, University of Melbourne

December 3/4

Equity and Access in Remote Teaching

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January 21/22

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