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UNIVERSITY OF Southampton
School of Chemistry

ChemEd in 2020/21:

Mitigation, Evolution or Revolution?

David Read

Outline

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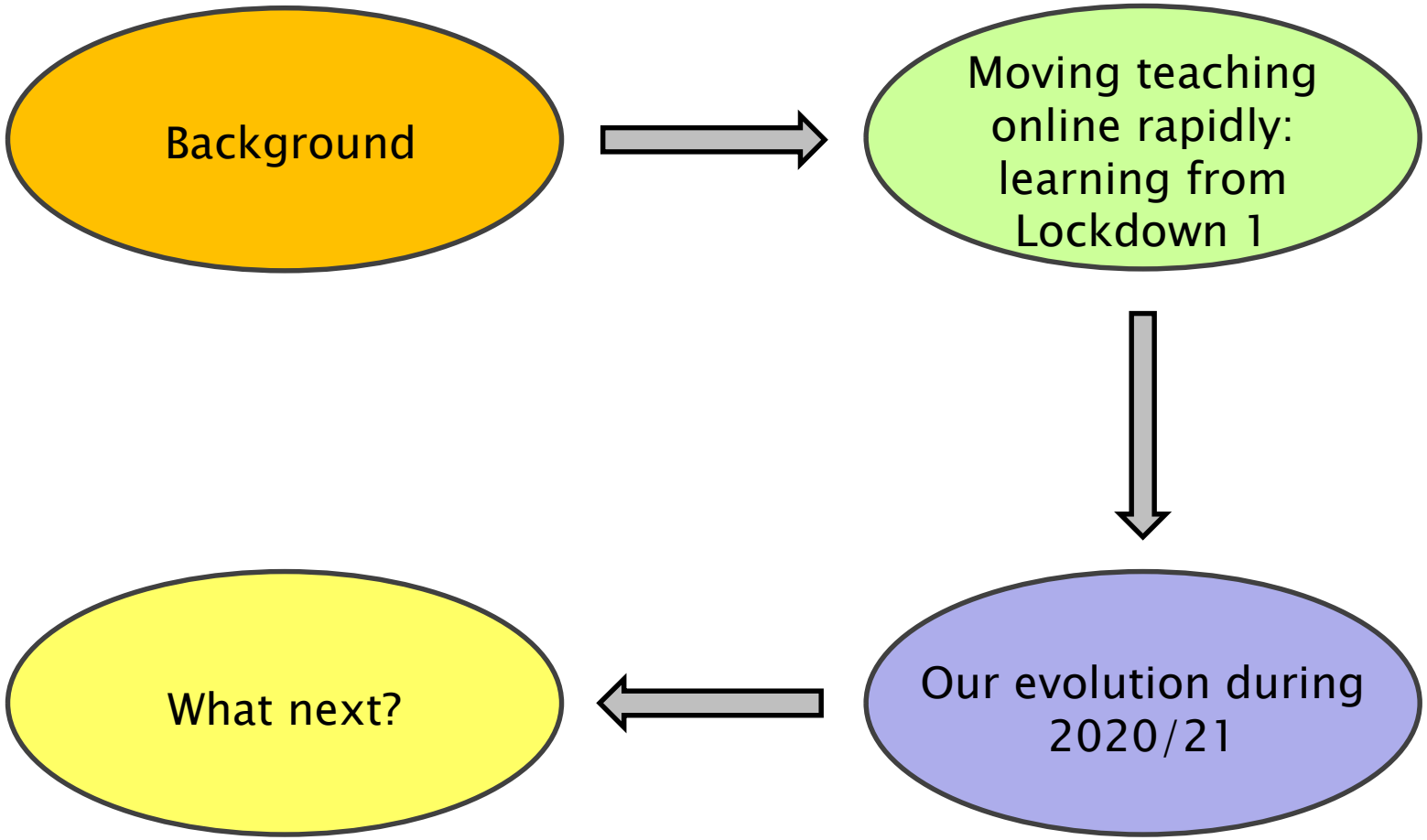


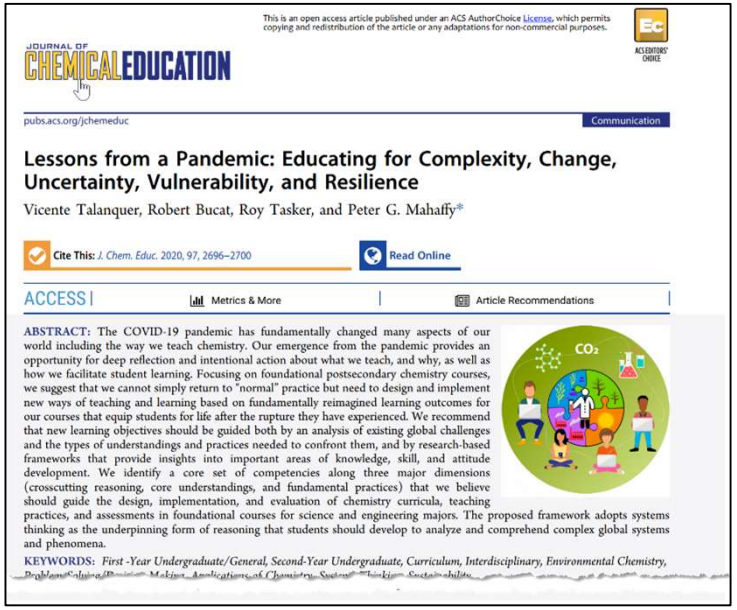
Mitigation, evolution or revolution?

Mitigation
Emergency online teaching, 'making the best of a bad job' and a return to business as usual after COVID.

Evolution
A bit more 'flipped teaching', fewer lectures and exams, and more use of online teaching.

Revolution
A complete revamp of programmes, genuine blended learning, no/few traditional exams.

Talanquer, Bucat, Tasker and Mahaffy* advocate revolution in their article from last year:



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JOURNAL OF CHEMICAL EDUCATION
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Communication

Lessons from a Pandemic: Educating for Complexity, Change, Uncertainty, Vulnerability, and Resilience

Vicente Talanquer, Robert Bucat, Roy Tasker, and Peter G. Mahaffy*

Cite This: J. Chem. Educ. 2020, 97, 2696–2700
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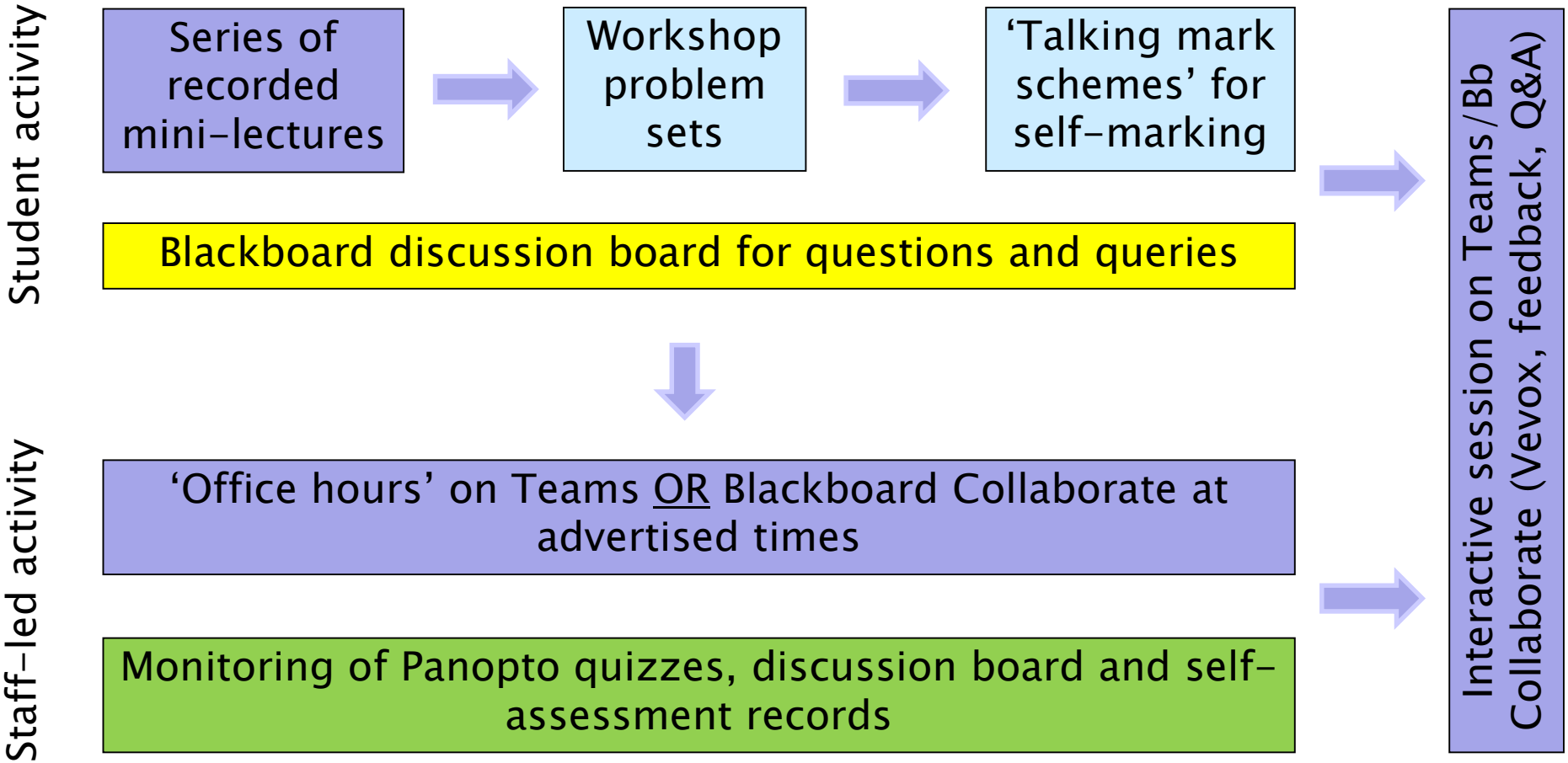
ABSTRACT: The COVID-19 pandemic has fundamentally changed many aspects of our world including the way we teach chemistry. Our emergence from the pandemic provides an opportunity for deep reflection and intentional action about what we teach, and why, as well as how we facilitate student learning. Focusing on foundational postsecondary chemistry courses, we suggest that we cannot simply return to "normal" practice but need to design and implement new ways of teaching and learning based on fundamentally reimagined learning outcomes for our courses that equip students for life after the rupture they have experienced. We recommend that new learning objectives should be guided both by an analysis of existing global challenges and the types of understandings and practices needed to confront them, and by research-based frameworks that provide insights into important areas of knowledge, skill, and attitude development. We identify a core set of competencies along three major dimensions (crosscutting reasoning, core understandings, and fundamental practices) that we believe should guide the design, implementation, and evaluation of chemistry curricula, teaching practices, and assessments in foundational courses for science and engineering majors. The proposed framework adopts systems thinking as the underpinning form of reasoning that students should develop to analyze and comprehend complex global systems and phenomena.

KEYWORDS: *First-Year Undergraduate/General, Second-Year Undergraduate, Curriculum, Interdisciplinary, Environmental Chemistry,*

Our approach to remote learning on an introductory chemistry course (1st lockdown)

Weekly schedule of activity



Problems with lectures

A question we've asked before: Do recorded lectures foster independent learning?

"Online lecture recordings are the most helpful thing I have experienced in education."

VS

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What did you do with your lectures in 2020/21?

1. I deliver(ed) lectures live online

73.33%

2. I give/gave students recordings from a previous year

6.67%

3. I record(ed) new full length lectures

0%

4. I record(ed) new lectures in short chunks

13.33%

5. Other approach

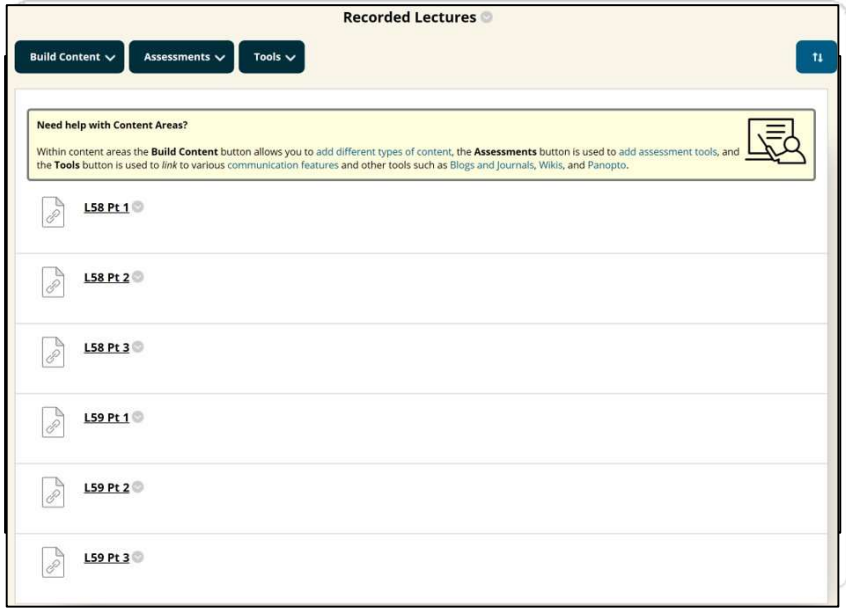
0%

6. I don’t/didn't give any lectures

6.67%

Going bite-sized: breaking lectures up into 3 parts ~15 mins in duration.

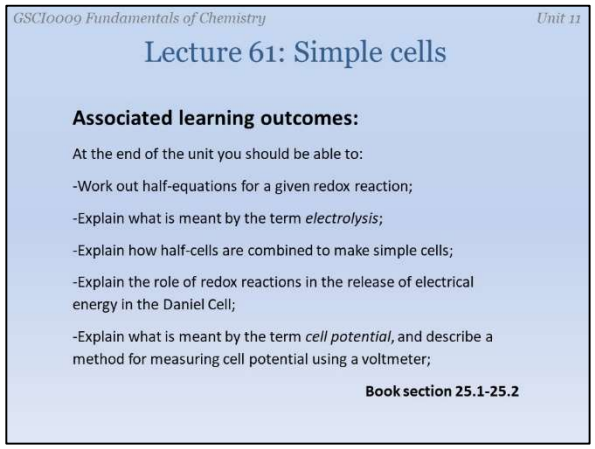
- We all know students' attention spans are limited.
- 'The 6 minute rule' arose from a study of MOOCs,[1] although caveats apply.[2]
- Segmenting is the process whereby a longer video is broken into smaller chunks.
- Much of the literature suggests ~15 mins is a good length for a video.



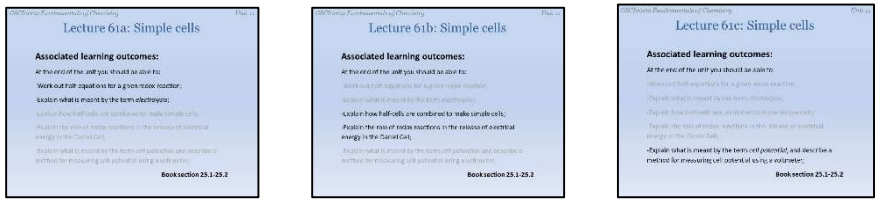
1. Guo, P. J., Kim, J., & Rubin, R. (2014, March). How video production affects student engagement: An empirical study of MOOC videos. In *Proceedings of the first ACM conference on Learning@ scale conference* (pp. 41–50).

2. Lagerstrom, L., Johanes, P., & Ponsukcharoen, M. U. (2015, June). The myth of the six-minute rule: Student engagement with online videos. In *Proceedings of the American Society for Engineering Education* (pp. 14–17).

Going bite-sized: breaking lectures up into 3 parts ~15 mins in duration.

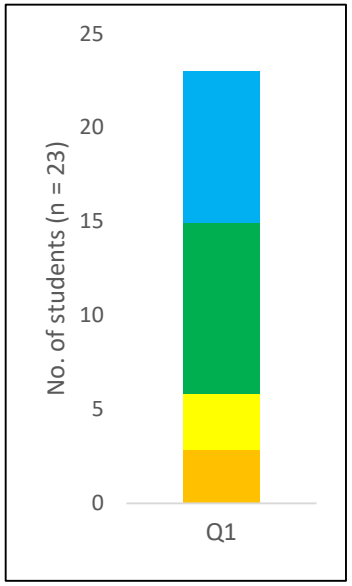


~50 min lecture (3 per week)



Broken into 3 parts (~15 mins each)

Q1: What do you feel is the impact of shorter mini-lecture recordings **on your learning** in comparison to a 50 minute face-to-face lecture?



Significant positive impact

Small positive impact

No impact

Small negative impact

Significant negative impact

Impact	Count
Sig +ve	8
Sm +ve	9
No impact	3
Sm –ve	3
Sig -ve	0

What do you feel is the impact of shorter mini-lecture recordings on your learning in comparison to a 50 minute face-to-face lecture? *Thematic analysis*

Role of mini lectures

Control and flexibility

"I can replay the recording"

"do at a time that works, when you are fully engaged"

"take a natural break"

"allows me to do this at my own pace"

Focus and consolidation

"if there are any gaps in my understanding I get to address them straight away"

"keep…focused on what i am being taught"

"think about what I had just watched. I found this aided my understanding"

"allows me to take a break and think for as long as I need about what I have just been taught "

Problems with in-person lectures

"in a one hour lecture a lot of the material can be rushed and there's not enough time to think "

"if you don't get a concept early on you could well be lost"

"less distracted than when doing longer lectures(40ish minutes) i find my self not paying as much attention"

"No chatter or distractions"

Preparation for workshop

"Useful when going to complete the workshop questions"

"understanding helps to answer the workshop material"

Augmentation & organisation

"complete a brief note… before moving on … I compile these notes together to get a deeper understanding"

"take notes in more detail than usual and spend more time on organising them which makes revision easier"

"make notes on each mini lecture in a topic which I can consolidate "

The negative responses mentioned the lack of a personal aspect and the inability to directly ask questions. One student reported the videos were still too long!

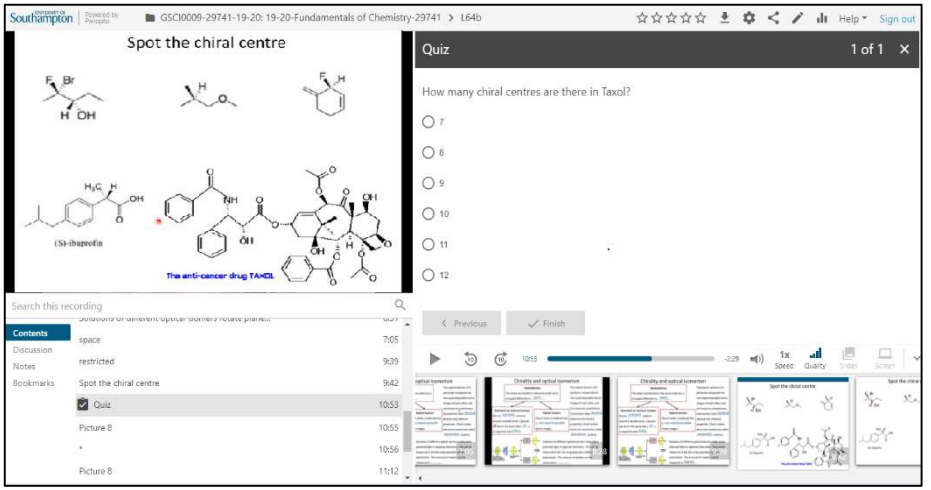
What do you feel is the impact of shorter mini-lecture recordings on your learning in comparison to a 50 minute face-to-face lecture? *Thematic analysis*

Control and flexibility	*"do at a time that works, when you are fully engaged"*
Focus and consolidation	*"allows me to take a break and think for as long as I need about what I have just been taught "*
Problems with in-person lectures	*"if you don't get a concept early on you could well be lost"*
Augmentation and organization	*"take notes in more detail than usual and spend more time on organising them which makes revision easier"*

The negative responses mentioned the lack of a personal aspect and the inability to directly ask questions. One student reported the videos were still too long!

Embedding quiz questions into Panopto recordings.

- Embedded quiz questions have been shown to impact positively on learning.[1]
- Interpolated testing increases focus and improves integration of information.[2]
- Panopto has a built-in quiz tool, pausing the video to pose a question to students.
- Data relating to responses is automatically collected.

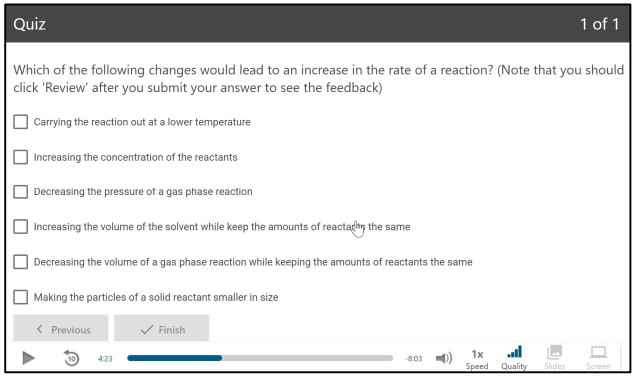


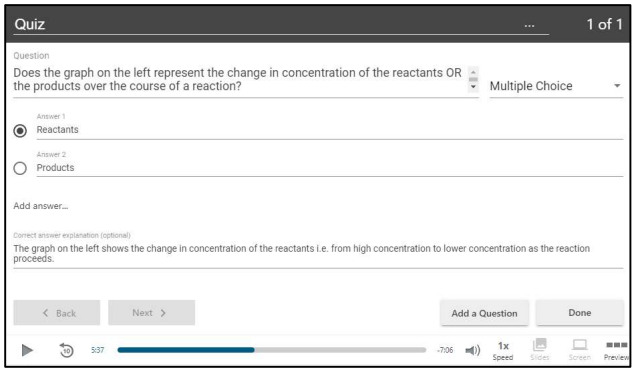
See my video guide:
https://tinyurl.com/y7bxhgve

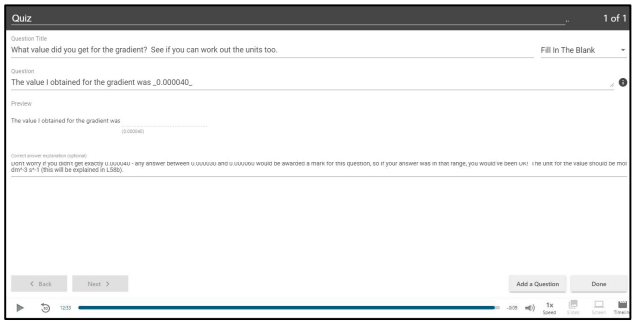
1. Vural, O. F. "The Impact of a Question-Embedded Video-Based Learning Tool on E-Learning." *Educational Sciences: Theory and Practice* 13.2 (2013): 1315-1323.

2. Jing, H. G., Szpunar, K. K., & Schacter, D. L. (2016). Interpolated testing influences focused attention and improves integration of information during a video-recorded lecture. *Journal of Experimental Psychology: Applied*, *22*(3), 305.

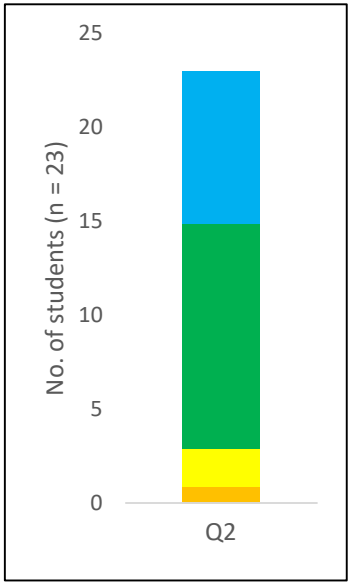
Embedding quiz questions into Panopto recordings.







Q2 What do you feel is the impact of the inclusion of Panopto quiz questions <u>on your learning</u> in comparison to recordings with no quiz questions (e.g. flipped lectures from earlier in the year)?



Significant positive impact

Small positive impact

No impact

Small negative impact

Significant negative impact

Impact	Count
Sig +ve	8
Sm +ve	12
No impact	2
Sm –ve	1
Sig -ve	0

What do you feel is the impact of the inclusion of Panopto quiz questions on your learning in comparison to recordings with no quiz questions (e.g. flipped lectures from earlier in the year)?
Thematic analysis

Engagement & focus

"think about and practice a topic during the learning. I feel it engages me more"

"these questions push me to pay attention"

"I often lose concentration in lectures where I'm not expected to do anything"

"Check that I have been paying attention."

Monitoring understanding

"to feel that I have grasped the concept or not as the case may be"

"ensures I understand the process of working out answers independently"

"make sure I am actually understanding the concept instead of just assuming"

"see when you don't understand something straight away and go back and fix that before you move on"

Motivation & achievement

"Getting the answers right also gives me a sense of achievement"

"many times I felt depressed because did not get the correct answer, but this encourages me to retry and see where i (went) wrong "

"When the questions are answered correctly this is very encouraging and provides a sense of achievement"

"the pressure of knowing that the lecturer will see the results makes me more attentive and want to do better"

Role of lecture quizzes

Problems with 'normal' recorded/ flipped lectures

"…it is easy to (lose focus) when watching pre-recorded lectures."

"With flipped lectures that didn't have questions I was never quite sure I understood the material till the following lectures."

The negative responses mentioned not liking the expectation to have understood content immediately, and that when they didn't understand they felt confused.

What do you feel is the impact of the inclusion of Panopto quiz questions on your learning in comparison to recordings with no quiz questions (e.g. flipped lectures from earlier in the year)?
Thematic analysis

Engagement and focus	*"…think about and practice a topic during the learning. I feel it engages me more"*
Monitoring understanding	*"see when you don't understand something straight away and go back and fix that before you move on"*
Problems with 'normal' recorded / flipped lectures	*"With flipped lectures that didn't have questions I was never quite sure I understood the material till the following lectures."*
Motivation & achievement	*"When the questions are answered correctly this is very encouraging and provides a sense of achievement"*

The negative responses mentioned not liking the expectation to have understood content immediately, and that when they didn't understand they felt confused.

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When you record lectures, do you include video of yourself?

1. Yes

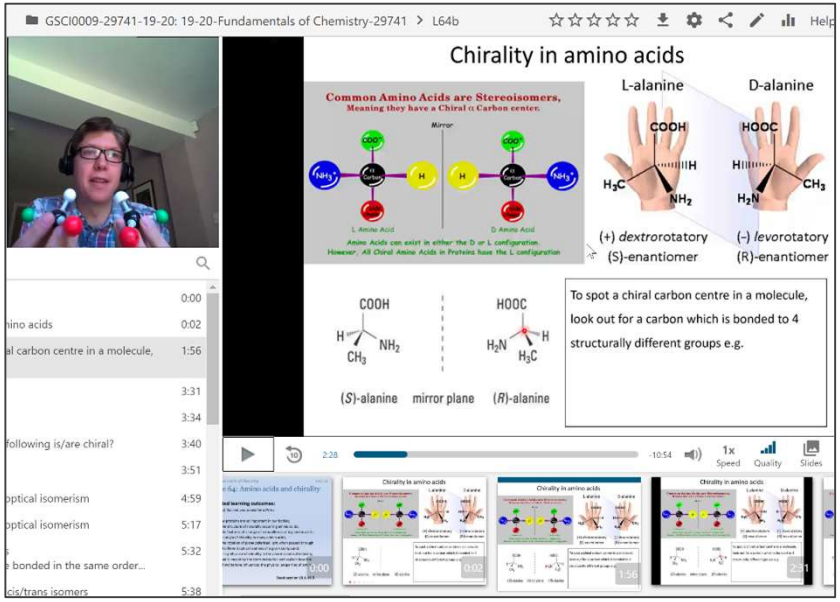
2. No

3. Sometimes

4. I don't record lectures

Visibility: putting yourself in the picture

- Research is mixed on the benefits of a ‘talking head’.
- Social cues may increase in active cognitive processing.[1]
- The ‘talking head’ may increase cognitive load.[2]
- There is limited evidence that a ‘talking head’ improves learning, but it may impact on motivation.

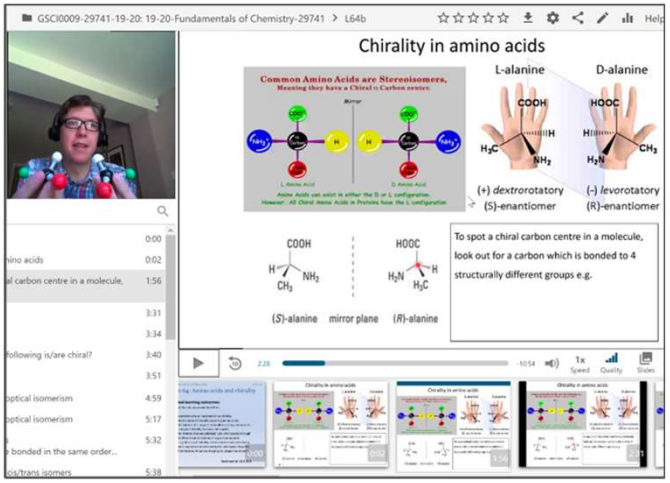


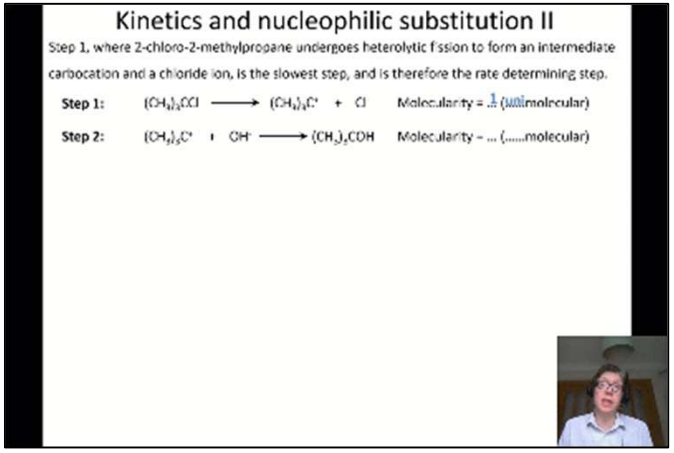
1. Mayer, R. E. (2014). Principles based on social cues in multimedia learning: Personalization, voice, image, and embodiment principles. *The Cambridge handbook of multimedia learning*, *16*, 345-370.

2. Fiorella, L., & Mayer, R. E. (2018). What works and doesn't work with instructional video, *Computers in Human Behaviour*, *89.,* 465-470.

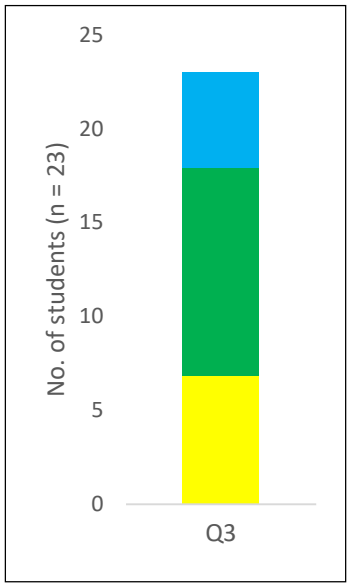
3. Kizilcec, R. F., Bailenson, J. N., & Gomez, C. J. (2015). The instructor's face in video instruction: Evidence from two large-scale field studies. *Journal of Educational Psychology, 107*(3), 724-739.

Visibility: putting yourself in the picture





Q3 What is the impact <u>on your experience</u> of providing a 'talking head' showing the lecturer in a recording in comparison to recordings with no 'talking head' (e.g. flipped lectures from earlier in the year)?



Significant positive impact

Small positive impact

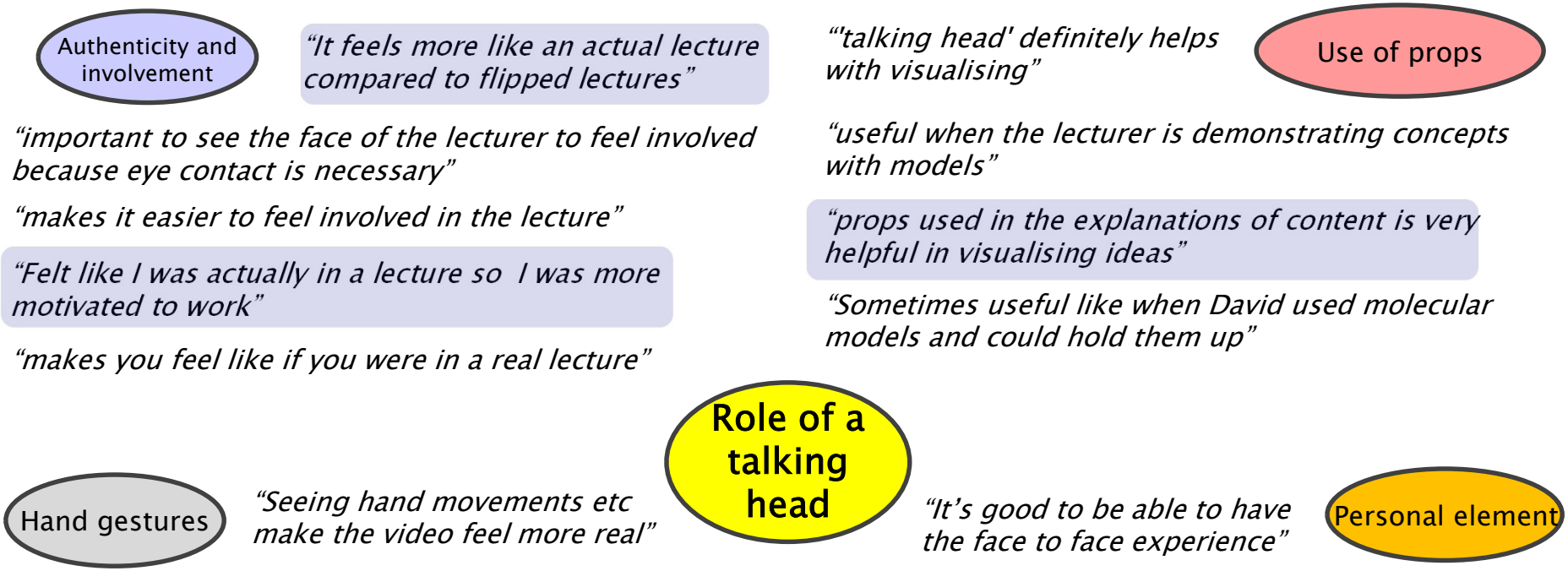
No impact

Small negative impact

Significant negative impact

Impact	Count
Sig +ve	5
Sm +ve	11
No impact	7
Sm –ve	0
Sig -ve	0

Q3 What is the impact on your experience of providing a 'talking head' showing the lecturer in a recording in comparison to recordings with no 'talking head' (e.g. flipped lectures from earlier in the year)?



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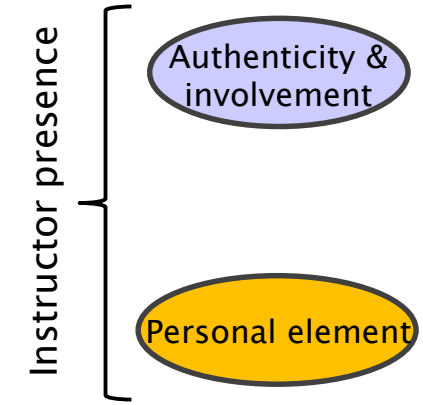
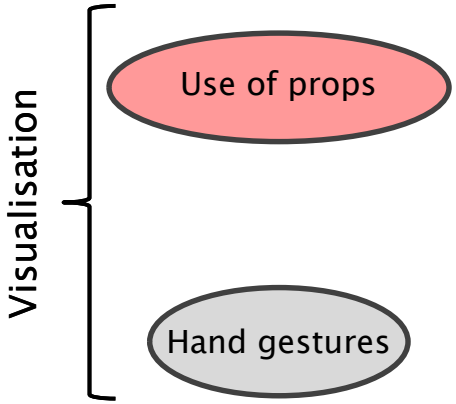


"Felt like I was actually in a lecture so I was more motivated to work"

"its nice to feel like a teacher is there"

"I found that although the 'talking head' made the lectures seem more personal, I don't think it increased my understanding of the content"

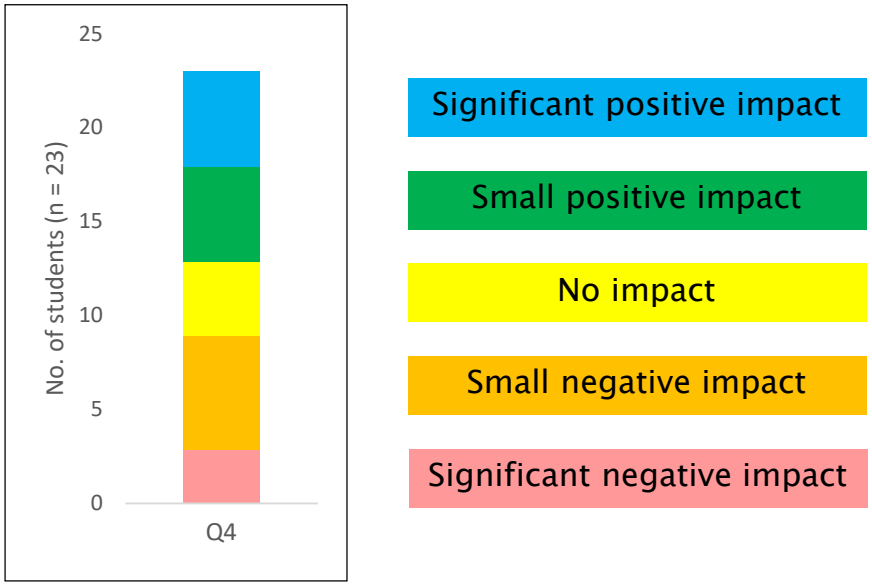


"props used in the explanations of content are very helpful in visualising ideas"

"beneficial for lecturers like David who uses his hands when explaining the collusion of molecules or transfer of electrons from one molecule to another"

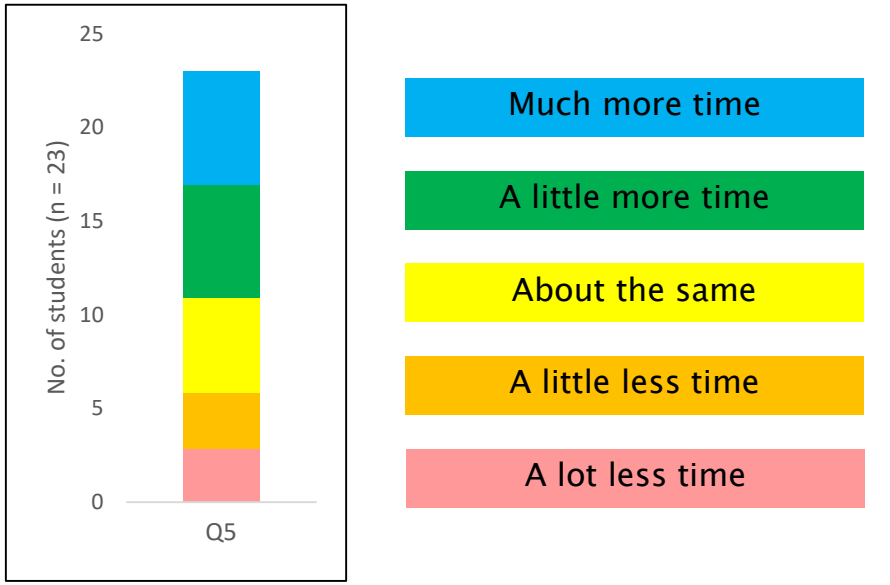
How do students experience online lectures in comparison to face-to-face?

Q4. What is the impact **on your experience** of us providing lectures in an online format in comparison to attending face-to-face lectures on campus?



Impact	Count
Sig +ve	5
Sm +ve	5
No impact	4
Sm –ve	6
Sig -ve	3

Q5. How does the time you are spending watching recorded lectures compare with the time you would normally spend in lectures on campus?



Impact	Count
Much more	6
A little more	6
About the same	5
A little less	3
Much less	3

Looking forward to the post-COVID era…

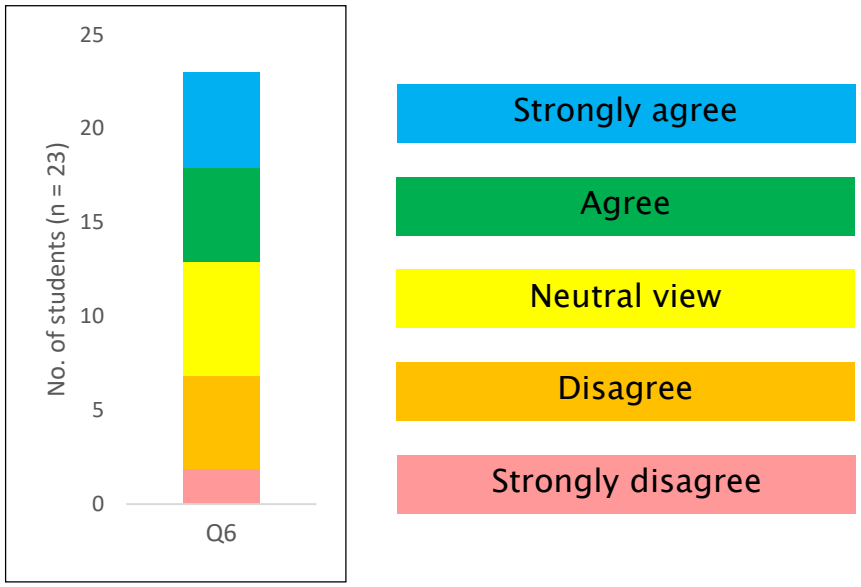
- I have been 'dabbling' with flipped teaching for several years.[1]
- During this period students experienced something akin to a 'flipped' environment.
- Students were asked:

To what extent do you agree with the following statement?

"Lecture material should continue to be provided in the current format (i.e. online mini-lectures with Panopto quiz questions) when we return to on-campus teaching"

1. Read, D., Watts, J. K., & Wilson, T. J. (2016). Partial flipping to support learning in lectures. In *The Flipped Classroom Volume 2: Results from Practice* (pp. 55-79). American Chemical Society.

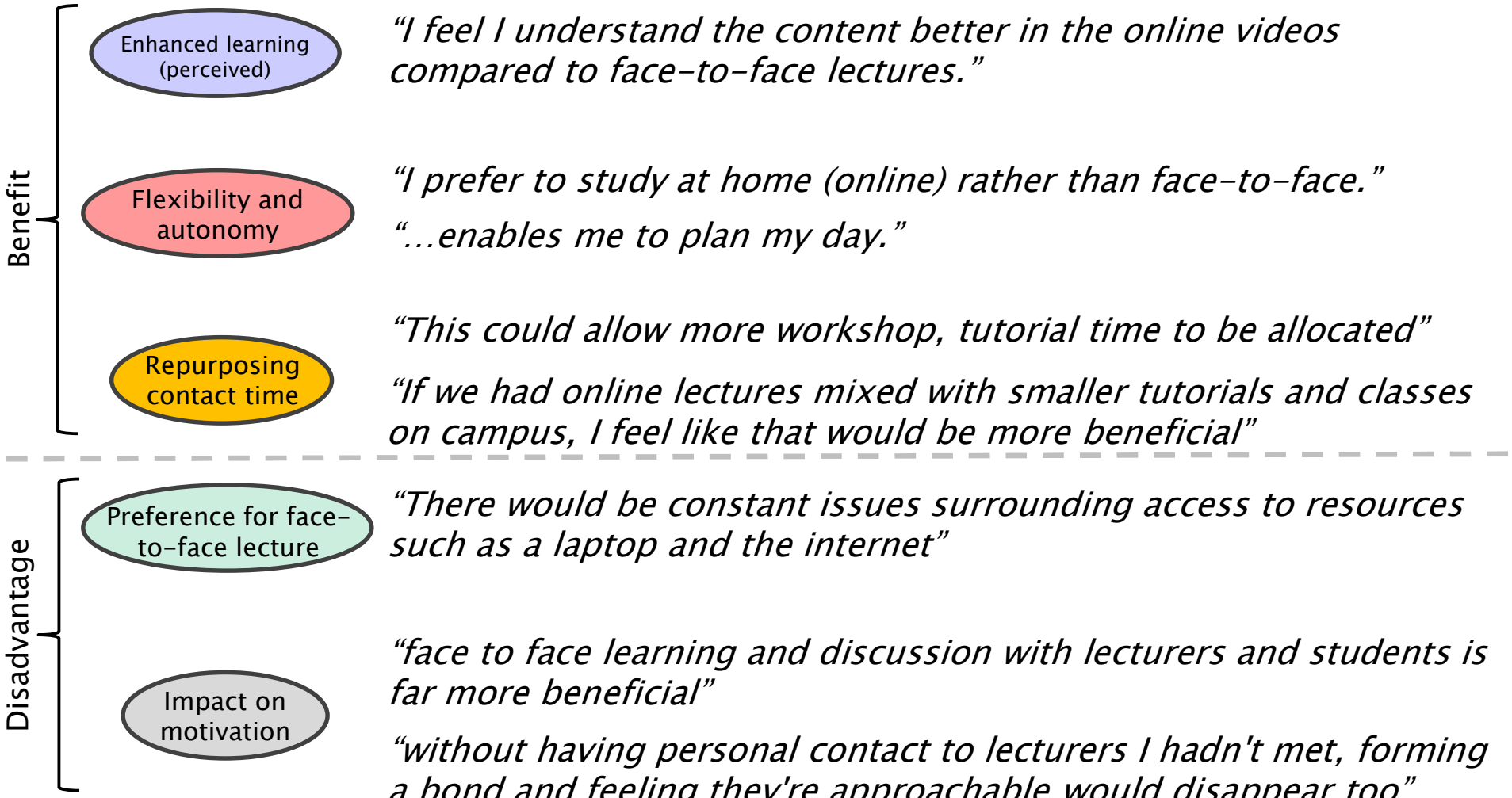
Q2 To what extent do you agree with the statement?



Response	Count
SA	5
A	5
N	6
D	5
SD	2

Q6. To what extent do you agree with the following statement?

"Lecture material should continue to be provided in the current format (i.e. online mini-lectures with Panopto quiz questions) when we return to on-campus teaching"



"I feel I understand the content better in the online videos compared to face-to-face lectures."

"I prefer to study at home (online) rather than face-to-face."

"…enables me to plan my day."

"This could allow more workshop, tutorial time to be allocated"

"If we had online lectures mixed with smaller tutorials and classes on campus, I feel like that would be more beneficial"

"There would be constant issues surrounding access to resources such as a laptop and the internet"

"face to face learning and discussion with lecturers and students is far more beneficial"

"without having personal contact to lecturers I hadn't met, forming a bond and feeling they're approachable would disappear too"

Key lessons learned:

Breaking lectures up into smaller segments, and embedding quiz questions, were very well received by students.

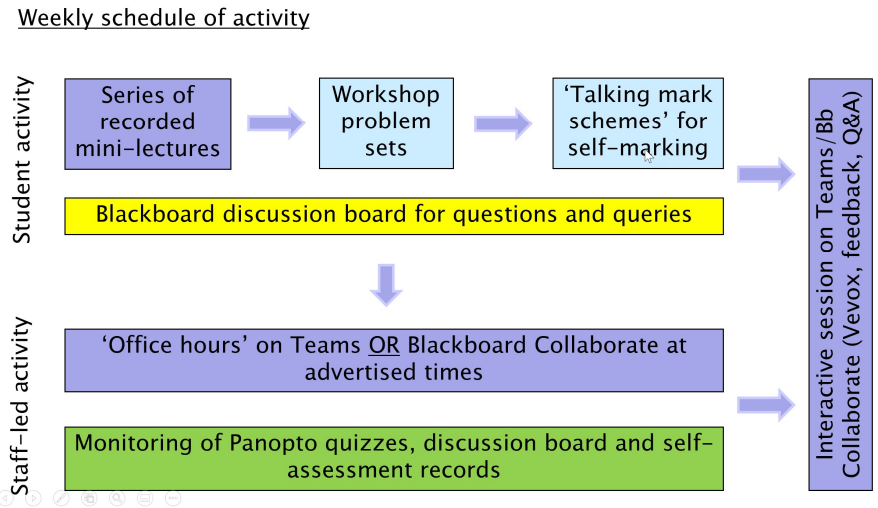
The presence of a talking head video was also strongly favoured by students, who said it made them feel more involved and that it was more like a real lecture.

Proposal: In future, explore further the possibility of moving more lecture content into a flipped model, implementing this learning into the design of the recorded material and freeing up precious face-to-face time.

Getting students collaborating during synchronous teaching sessions

Student engagement during synchronous teaching sessions: our experience

- Office hours sessions (Mon and Tues) were attended by small numbers, some of whom had specific questions.
- One hour interactive sessions were better attended (~25).
- There was v.good engagement with Vevox questions.
- Very few students were prepared to turn their microphones on.
- The feedback was that the sessions were useful, but where was the engagement?!



Some comments from our students

How could more engagement be encouraged in workshops?

"…maybe assigning small student teams to work through some discussion type tasks. It would be good is more students felt able to get involved more."

"… creating teams meeting for the workshops in smaller groups…would help if students preferred being able to ask question."

"timetabled sessions for groups of students would help..."

"More enforcement of attending workshops"

"smaller and more personal teams meetings to raise engagement levels for workshops"

"Maybe a small group is assigned at the beginning of term and each week the the chair role rotates, it is then up to the students to organise themselves and complete the tasks."

Making use of breakout groups

- Many online platforms have a built-in breakout group feature.
- To achieve the benefits of peer learning instructors must create a structure for teamwork.[1]
- Working on a set activity together can encourage student interaction and peer support.[2]
- Attention needs to be paid to the structures used to prepare students.[3]
- Shared documents can be used to structure activities.

Blackboard collaborate

Breakout

1. Saltz, J., & Heckman, R. (2020). Using Structured Pair Activities in a Distributed Online Breakout Room. *Online Learning*, *24*(1), 227-244.

2. Chandler, K. (2016). Using Breakout Rooms in Synchronous Online Tutorials. *Journal of Perspectives in Applied Academic Practice*, *4*(3), 16-23.

3. Kuhn, D. (2015). Thinking together and alone. *Educational Researcher*, *44*(1), 46-53.

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POLL OPEN

Have you used breakout rooms with students in synchronous online sessions?

1. Yes, very successfully

38.89%

2. Yes, quite successfully

27.78%

3. Yes, with limited success

0%

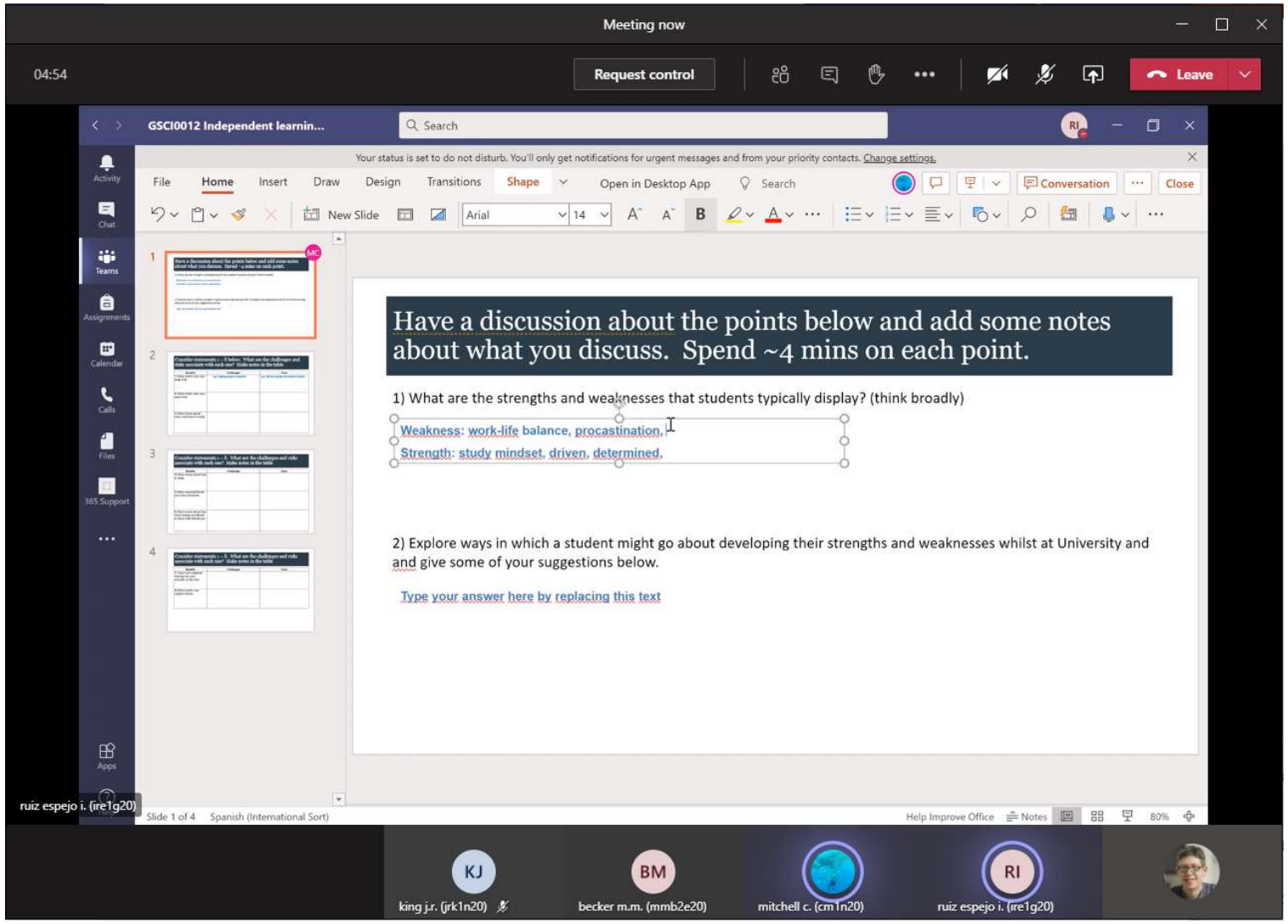
4. Yes, unsuccessfully

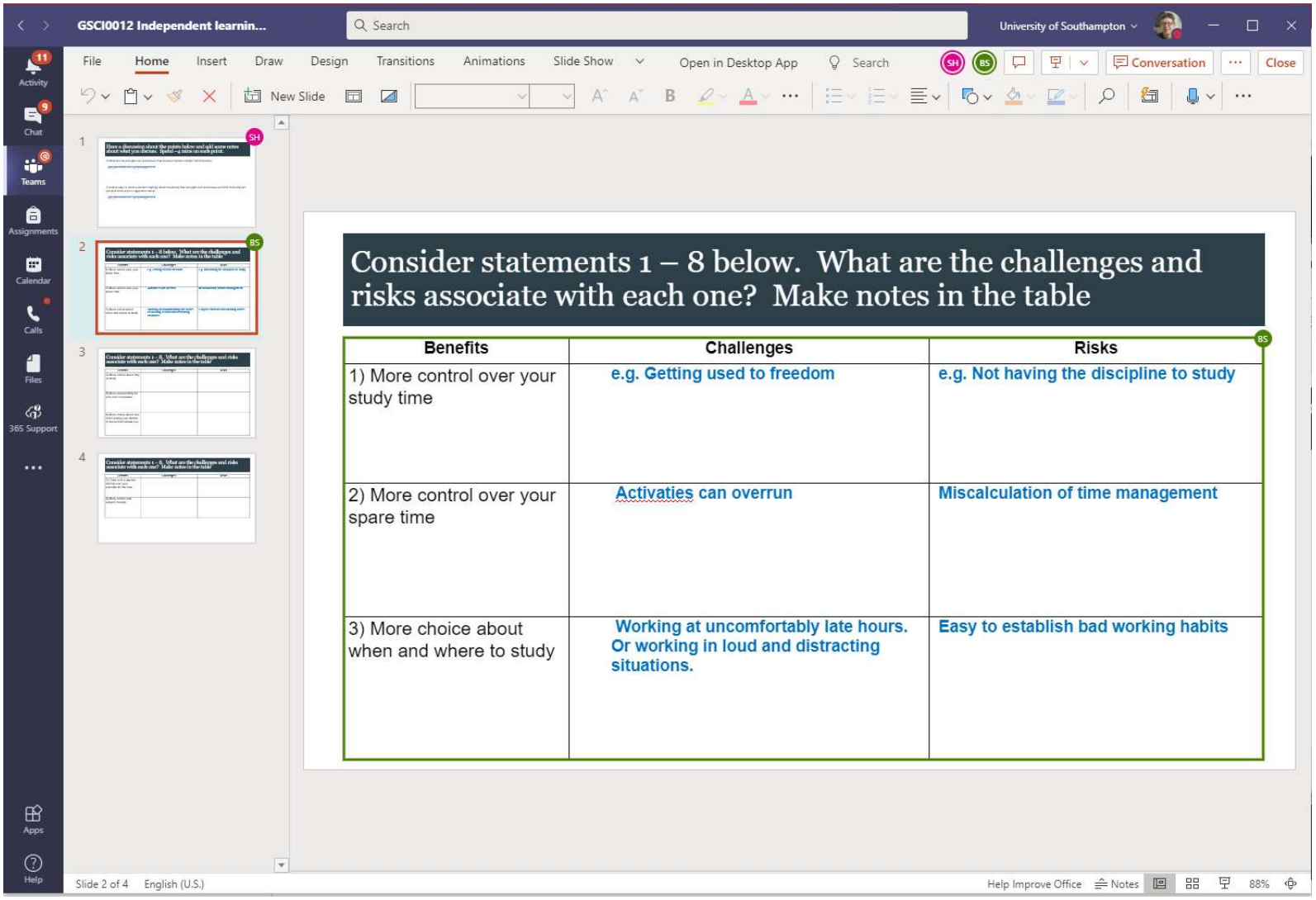
0%

5. No

33.33%

Examples of student collaboration in Teams breakout groups


Meeting now
04:54
Request control
Leave
GSCI0012 Independent learnin...
Search
Your status is set to do not disturb. You'll only get notifications for urgent messages and from your priority contacts. Change settings.
File
Home
Insert
Draw
Design
Transitions
Shape
Open in Desktop App
Search
Conversation
Close
New Slide
Arial
14
Have a discussion about the points below and add some notes about what you discuss. Spend ~4 mins on each point.
1) What are the strengths and weaknesses that students typically display? (think broadly)
Weakness: work-life balance, procastination,
Strength: study mindset, driven, determined,
2) Explore ways in which a student might go about developing their strengths and weaknesses whilst at University and and give some of your suggestions below.
Type your answer here by replacing this text
Slide 1 of 4
Spanish (International Sort)
Help Improve Office
Notes
80%
ruiz espejo i. (ire1g20)
king j.r. (jrk1n20)
becker m.m. (mmb2e20)
mitchell c. (cm1n20)
ruiz espejo i. (ire1g20)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Consider statements 1 – 8 below. What are the challenges and risks associate with each one? Make notes in the table
Benefits
Challenges
Risks
1) More control over your study time
e.g. Getting used to freedom
e.g. Not having the discipline to study
2) More control over your spare time
Activaties can overrun
Miscalculation of time management
3) More choice about when and where to study
Working at uncomfortably late hours. Or working in loud and distracting situations.
Easy to establish bad working habits
Slide 2 of 4
English (U.S.)
Help Improve Office
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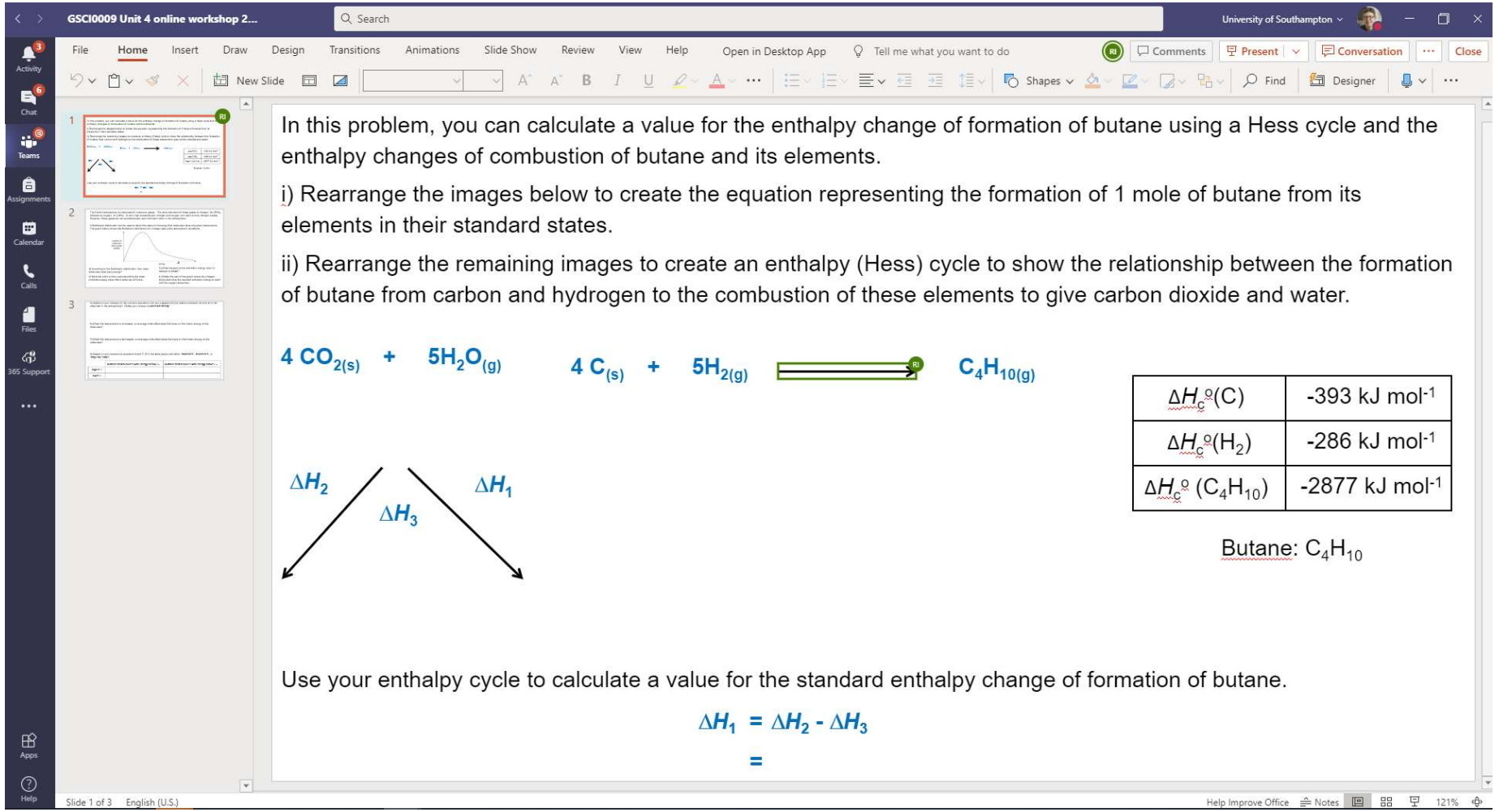
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In this problem, you can calculate a value for the enthalpy change of formation of butane using a Hess cycle and the enthalpy changes of combustion of butane and its elements.
i) Rearrange the images below to create the equation representing the formation of 1 mole of butane from its elements in their standard states.
ii) Rearrange the remaining images to create an enthalpy (Hess) cycle to show the relationship between the formation of butane from carbon and hydrogen to the combustion of these elements to give carbon dioxide and water.
4 CO2(s) + 5H2O(g)
4 C(s) + 5H2(g)
C4H10(g)
ΔH2
ΔH3
ΔH1
ΔHc⦵(C) -393 kJ mol-1
ΔHc⦵(H2) -286 kJ mol-1
ΔHc⦵ (C4H10) -2877 kJ mol-1
Butane: C4H10
Use your enthalpy cycle to calculate a value for the standard enthalpy change of formation of butane.
ΔH1 = ΔH2 - ΔH3
=
Slide 1 of 3 English (U.S.)
Help Improve Office Notes 121%

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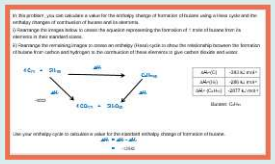

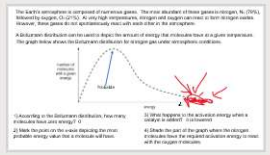

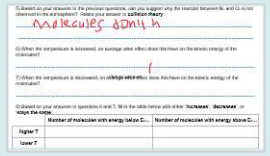

In this problem, you can calculate a value for the enthalpy change of formation of butane using a Hess cycle and the enthalpy changes of combustion of butane and its elements.

i) Rearrange the images below to create the equation representing the formation of 1 mole of butane from its elements in their standard states.

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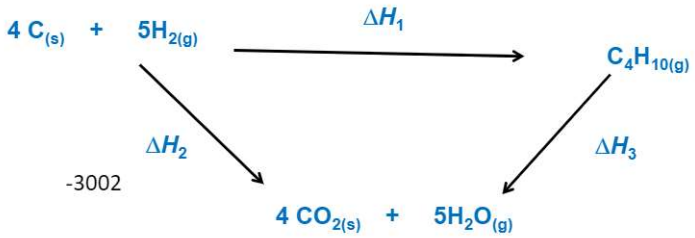

ΔH_c°(C)	-393 kJ mol^{-1}
ΔH_c°(H_2)	-286 kJ mol^{-1}
ΔH_c° (C_4H_{10})	-2877 kJ mol^{-1}

Butane: C_4H_{10}

Use your enthalpy cycle to calculate a value for the standard enthalpy change of formation of butane.

$$\Delta H_1 = \Delta H_2 - \Delta H_3$$

$$= \quad -125\text{KJ}$$

Slide 1 of 3 | English (U.S.) | Help Improve Office | Notes | 70%

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1 2 3

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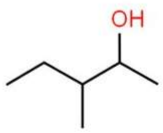
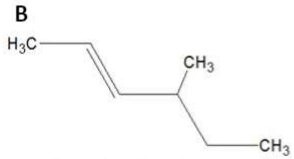


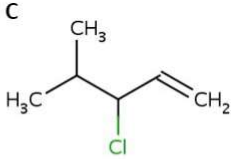
3-Methylpentan-2-ol

B



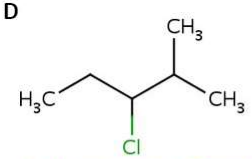
4-methylhex-2-ene

C



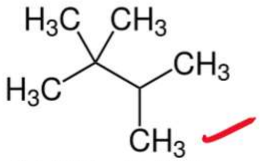
3-chloro-4-methylpent-1-ene

D

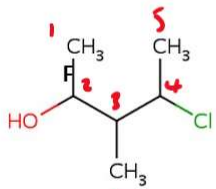


3-chloro-2-methylpentane

E



2,2,3-trimethylbutane



2-chloro-3-methylpentan-4-ol

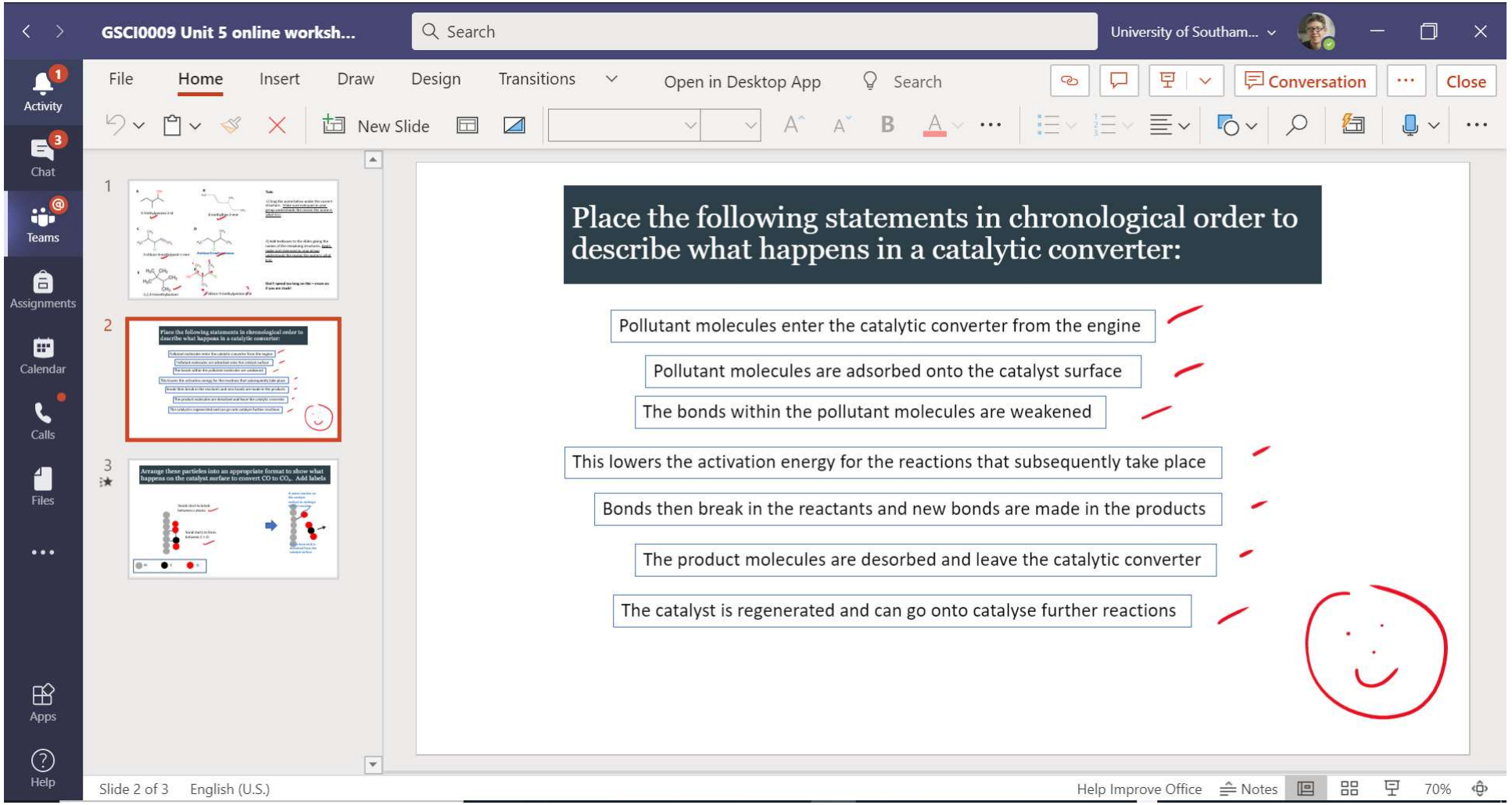
Task:

1) Drag the name below under the correct structure. Make sure everyone in your group understands the reason the name is what it is!

2) Add textboxes to the slides giving the names of the remaining structures. Again, make sure everyone in your group understands the reason the name is what it is!

Don't spend too long on this – move on if you are stuck!

Slide 1 of 3 | English (U.S.) | Help Improve Office | Notes | 70%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3
Place the following statements in chronological order to describe what happens in a catalytic converter:
Pollutant molecules enter the catalytic converter from the engine
Pollutant molecules are adsorbed onto the catalyst surface
The bonds within the pollutant molecules are weakened
This lowers the activation energy for the reactions that subsequently take place
Bonds then break in the reactants and new bonds are made in the products
The product molecules are desorbed and leave the catalytic converter
The catalyst is regenerated and can go onto catalyse further reactions
Slide 2 of 3
English (U.S.)
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Arrange these particles into an appropriate format to show what happens on the catalyst surface to convert CO to CO_2. Add labels

Bonds start to break between o atoms

Bond starts to form between C + O

O atom remains on the catalyst surface to undergo further reaction

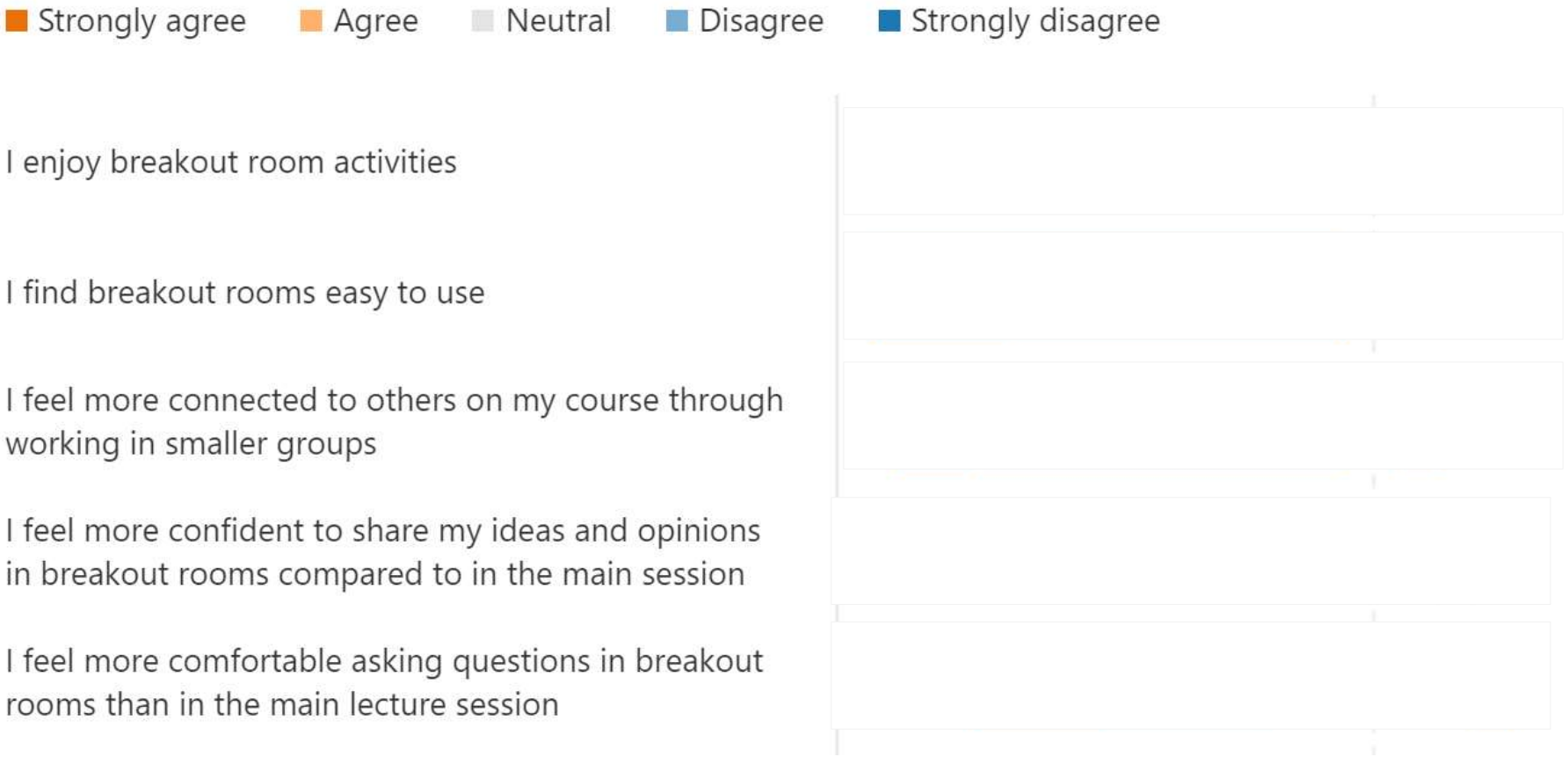
CO_2 is formed & is desorbed from the catalyst surface

Pt C O

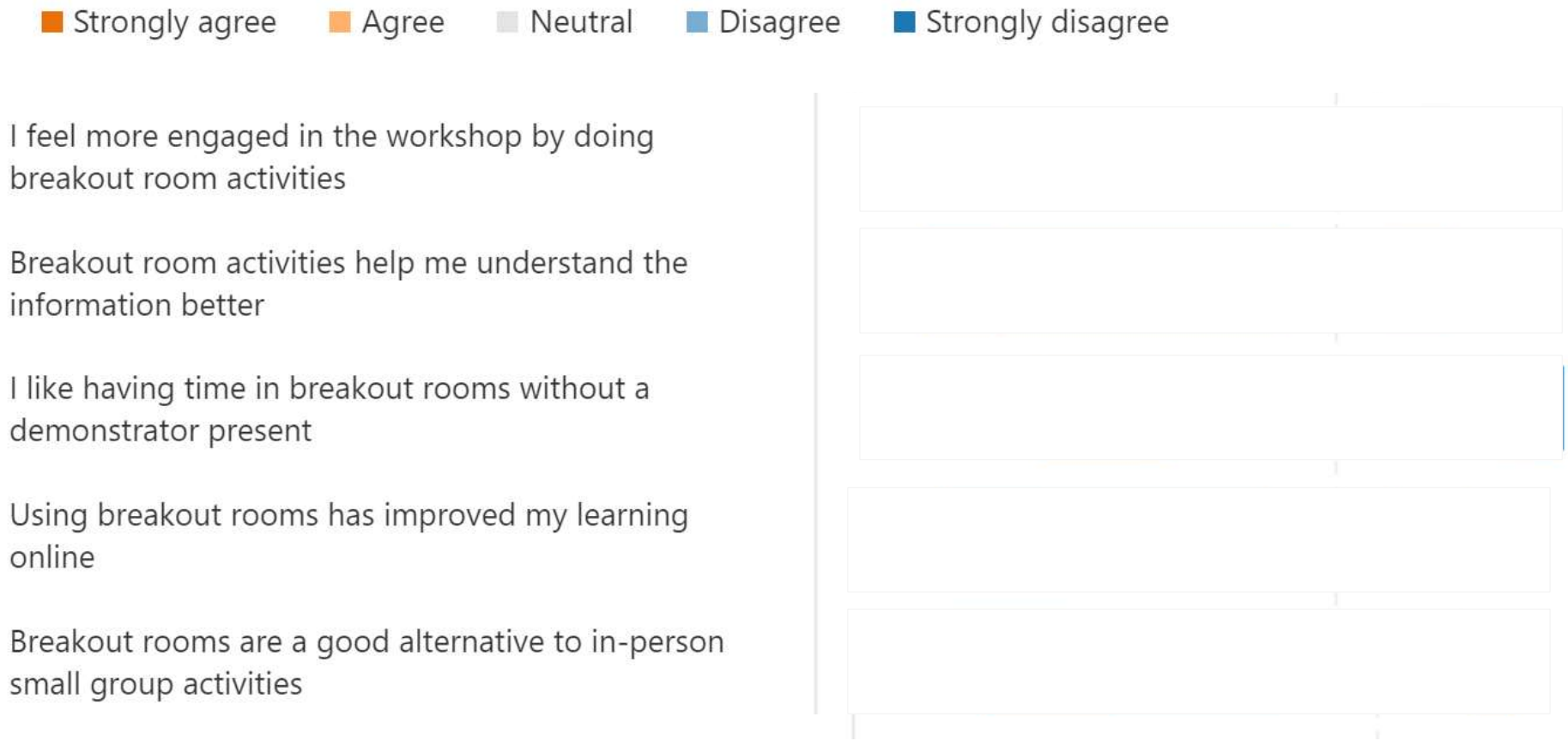
Slide 3 of 3 English (U.S.)

Help Improve Office Notes 70%

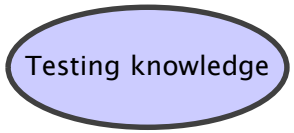
The student perspective (n = 16 of 36)



The student perspective (n = 16 of 36)



Thematic analysis of responses to open text questions

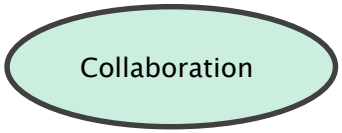


"We are able to determine our strengths and weaknesses in the subject by discussing answers and methods in which we feel we are weak."

"It is done in a "safe" space, without the professor and with less people than a normal classroom, so its easier for students to engage."

"I enjoy small group talking, everything in breakout room makes me feel good."

"Breakout rooms are very beneficial, especially during this time. It allows students to get to know their peers"



"It also shows student their peers way of working which can be found helpful for other students that may struggle with a specific topic"

"If there is a difficult concept I need to grasp it helps getting other opinions/help with"

"It helps me fully understand some topics that I may have been unsure on"

Key lessons learned:

Breakout groups can be effective in supporting collaboration between students, although it is vital that activities are well-structured and students are briefed accordingly.

Less confident students did not participate as much when breakout tasks involved chemistry concepts, but activities on presentation skills, academic integrity etc were more inclusive.

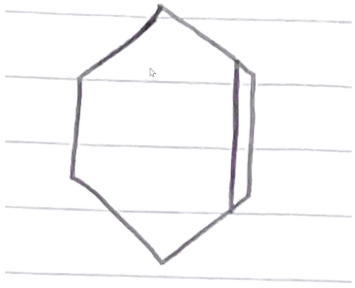
Proposal: I would like to retain a weekly online slot to use for appropriate activities i.e. those where collaboration in a breakout room is as (or more) effective than in a room e.g. tasks involving editing documents/files.

Assessment – a brief consideration

Compound A has the structural formula $CH_3CH_2CH=CHCH_2CH_2OH$ and exhibits *cis/trans* geometric isomerism. **Compound A** can be dehydrated in the presence of a catalyst to form **compound B**, which has the formula C_6H_{10}.

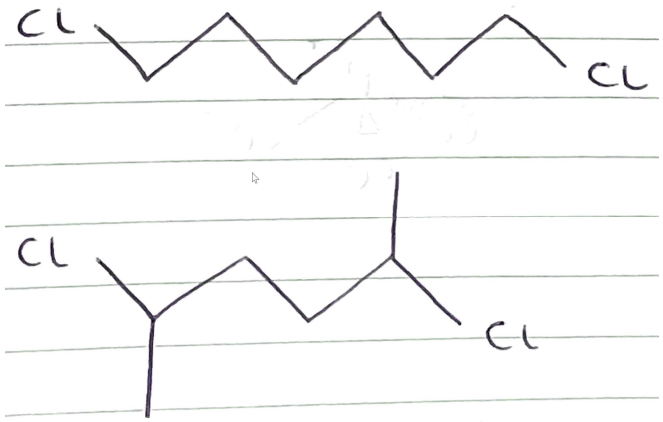
(iii) Draw the <u>skeletal</u> formula of **compound B** and give its name.

[2 marks]



(iv) One mole of **compound B** reacts sequentially with <u>two moles</u> of hydrogen chloride to form a number of isomers with the molecular formula $C_6H_{12}Cl_2$. Draw skeletal formulae of <u>two</u> of the isomers formed in this reaction.

[2 marks]



Let’s look to the future

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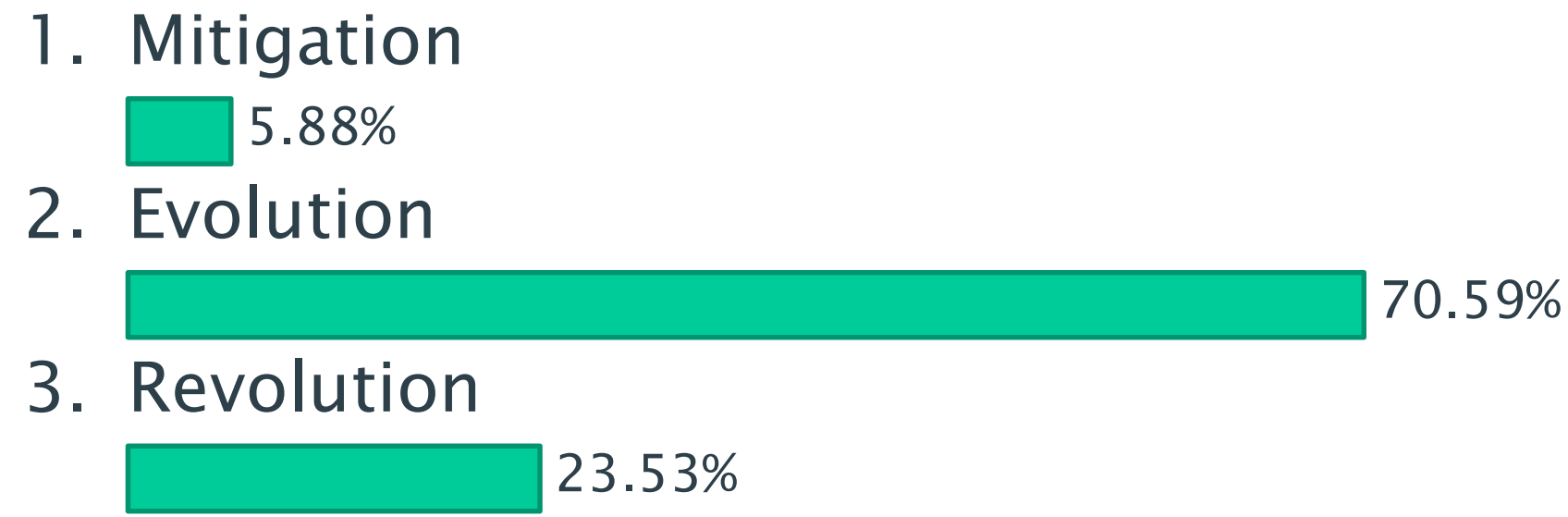
Which term best describes your teaching journey during COVID?*

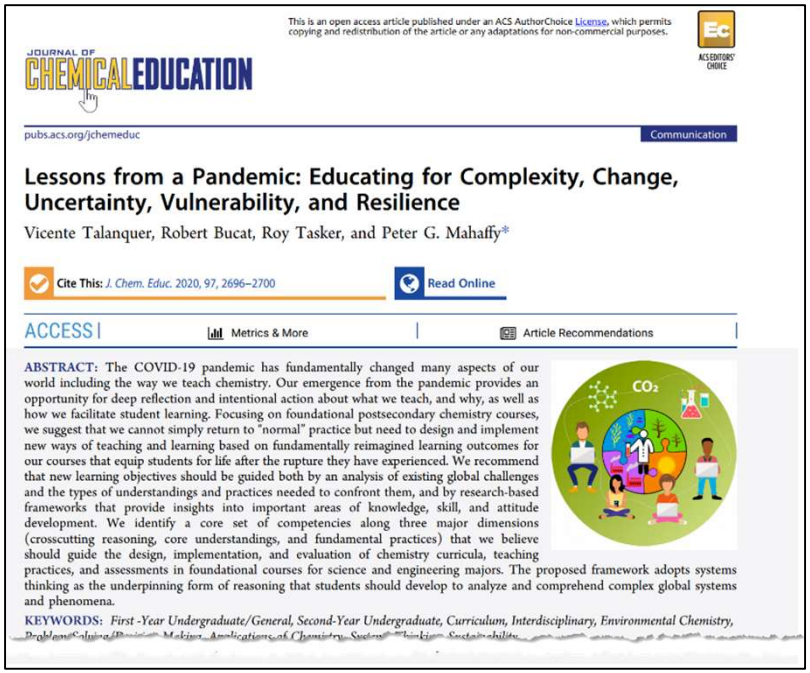


*consider your post-COVID destination when answering

“Build back better”

“Build back better”

‘…we cannot simply return to "normal” practice but need to design and implement new ways of teaching and learning based on fundamentally reimagined learning outcomes for our courses that equip students for life after the rupture they have experienced’



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Communication

Lessons from a Pandemic: Educating for Complexity, Change, Uncertainty, Vulnerability, and Resilience

Vicente Talanquer, Robert Bucat, Roy Tasker, and Peter G. Mahaffy*

Cite This: *J. Chem. Educ.* 2020, 97, 2696−2700

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ABSTRACT: The COVID-19 pandemic has fundamentally changed many aspects of our world including the way we teach chemistry. Our emergence from the pandemic provides an opportunity for deep reflection and intentional action about what we teach, and why, as well as how we facilitate student learning. Focusing on foundational postsecondary chemistry courses, we suggest that we cannot simply return to "normal" practice but need to design and implement new ways of teaching and learning based on fundamentally reimagined learning outcomes for our courses that equip students for life after the rupture they have experienced. We recommend that new learning objectives should be guided both by an analysis of existing global challenges and the types of understandings and practices needed to confront them, and by research-based frameworks that provide insights into important areas of knowledge, skill, and attitude development. We identify a core set of competencies along three major dimensions (crosscutting reasoning, core understandings, and fundamental practices) that we believe should guide the design, implementation, and evaluation of chemistry curricula, teaching practices, and assessments in foundational courses for science and engineering majors. The proposed framework adopts systems thinking as the underpinning form of reasoning that students should develop to analyze and comprehend complex global systems and phenomena.

KEYWORDS: *First-Year Undergraduate/General, Second-Year Undergraduate, Curriculum, Interdisciplinary, Environmental Chemistry,*

Talanquer, V., Bucat, R., Tasker, R., & Mahaffy, P. G. (2020). *J. Chem. Ed.*, *97*(9), 2696-2700.

Vive la revolution (or viva la revolucion)

GDCh **Gast-Editorial** Angewandte Chemie

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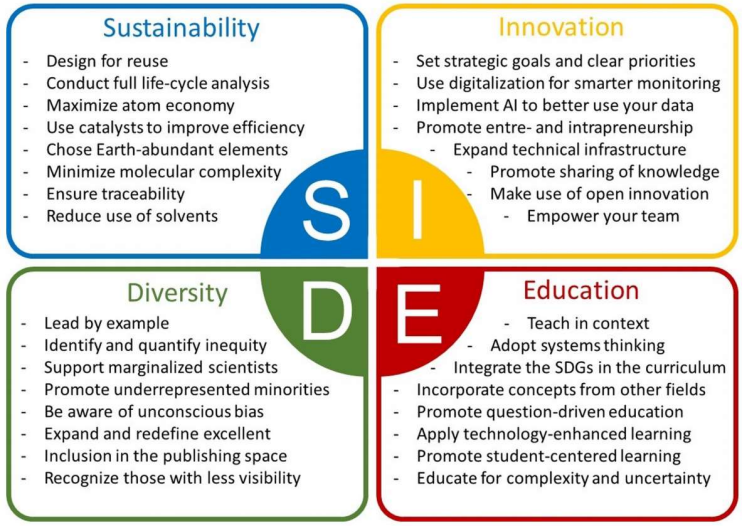
Zitierweise: *Angew. Chem. Int. Ed.* **2021**, *60*, 4956–4960
Internationale Ausgabe: doi.org/10.1002/anie.202014779
Deutsche Ausgabe: doi.org/10.1002/ange.202014779

Chemistry 2030: A Roadmap for a New Decade

*Javier Garcia-Martinez**

Stichwörter: chemistry · circular economy · education · sustainability

2020 has surprised us with news that only a few months ago we could not have imagined. In one way or another, we have all suffered from a pandemic that has taken far too many lives, has wiped out millions of jobs, and forced many industries to adapt in a matter of weeks to sudden changes in demand. The movement of people between countries stranger to discrimination and bigotry, and numerous initiatives have been launched in recent months demanding and providing solutions to improve the situation of women, minorities and discriminated communities. Another challenge, and perhaps the most worrying of all, is that many people dismiss experts and prefer to ignore evidence. In 2020



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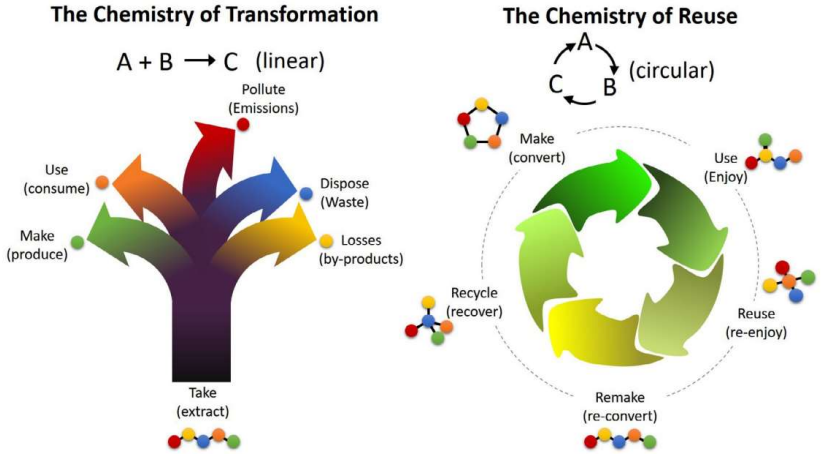

A quote from a colleague on 02/07/2021

“I’m going through and looking what everyone is requesting for next year. Looks like everyone apart from inorganic are reverting back to the good old days…

***sigh*”**

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Manchester University sparks backlash with plan to keep lectures online

More than 3,000 students sign petition against keeping lecture halls vacant with no reduction in tuition fees

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Rachel Hall *Education correspondent*

@rachela_hall

Mon 5 Jul 2021 12.35 EDT

Simon J Dixon
@WoodinRivers

I feel at some point we're going to have to abandoned all the good pedagogical reasons for having recorded lectures & flipped seminars & say "fine, you're paying your money, you want one shot at hearing a old guy mumble for an hour in a wood panelled lecture hall, here you go".

> **Politics For All** @PoliticsForAll · 19h
>
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>
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Acknowledgements

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What are your thoughts on the future of Chem Ed and its delivery?

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