

Unpacking the potential of 360-degree video to examine teaching and learning

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University of
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A timeline

Encouraging and mapping student engagement through 360-degree video annotation and data

2017

Supporting and developing online learners' collaborative problem-solving experiences in mathematics

2020

2018

Unpacking the potential of 360-degree video to support preservice teacher development



Why 360degree video

- Enables participants to pan the screen around to access to full 360degree view of the recording and explore their videos from different perspectives - *teaching AND learning.*



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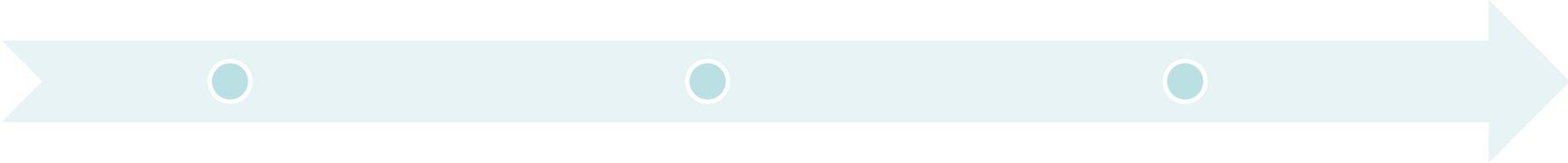
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Unpacking the potential of 360-degree video to support preservice teacher development



Encouraging and mapping student engagement through 360-degree video annotation and data analytics

- Aim of this work:
 - (a) improve the quality of student online experience and
 - (b) enhance critical engagement with course content by developing an interactive web-based desktop application for *viewing and annotating 360 degree videos*.



Encouraging and mapping student engagement through 360-degree video annotation and data analytics

Project outputs/deliverables

- A. An interactive web-based desktop application for viewing and annotating 360-degree videos of learning activities.
- B. Data analytics and visualisations to map student engagement with the course content.



Encouraging and mapping student engagement through 360-degree video annotation and data analytics

A. Application for viewing and annotating 360 degree videos

- The online 360-degree video application provides teachers and students with a panoramic view of classroom activities recorded with 360-degree cameras, and has facilities for annotating the content by means of user-generated free-text messages that can be temporally and spatially positioned as overlays in the video.
- The annotation tool allows lecturers to set learning tasks and ask questions in a context where online students can engage with and reflect critically on teaching and learning practices, and educational content and activities. The notes tool can also be used by students to respond to set tasks or perceived learning difficulties.

4 May 2018

4 May 2018

4 May 2018

EDUC 5184 Group 1



EDUC 5184 Group 2
Round 2
11 May 2019



EDUC 5184 Group 3
Round 2
11 May 2019



EDUC 5184 Group 4
Round 2
11 May 2019



EDUC 5184 Thurs Group
2 Round 1
11 May 2019



EDUC 5184 Group 1
round 2
10 May 2019



EDUC 5184 Group 3
Round 1
22 Mar 2019



EDUC 5184 Thurs Group
4 Round 1
22 Mar 2019

Video Inau



Group 1 Part 1
May 2
4 May 2019

EDUC 5184 Group 1 WED



Wed Group 1 Round 2
8 May 2019



Wed Group 2 Round 2
8 May 2019



5184 Wed Group 1
complete
2 Apr 2019



EDUC 5184 FULL file
Group 1 Round 1
31 Mar 2019



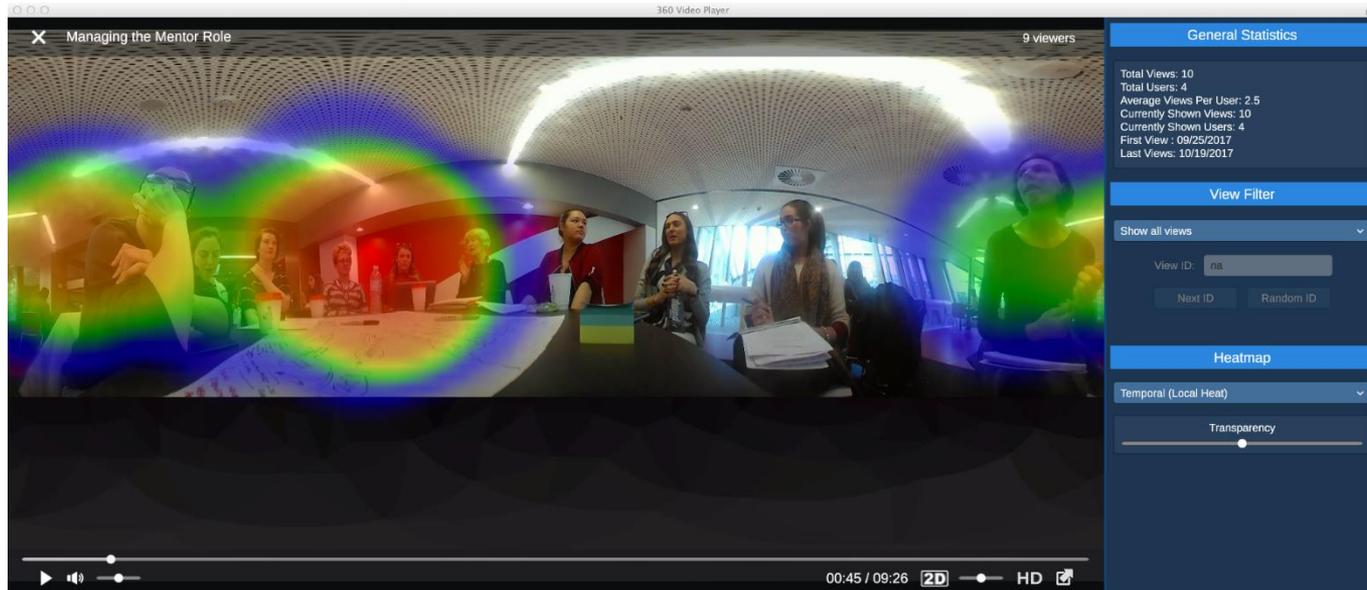
5184 Wed Round 1 Group
2
22 Mar 2019

Encouraging and mapping student engagement through 360-degree video annotation and data analytics



Encouraging and mapping student engagement through 360-degree video annotation and data analytics

B. Data analytics and visualisations to map student engagement with course content



Encouraging and mapping student engagement through 360-degree video annotation and data analytics

- Aim of this work:
 - (a) improve the quality of student online experience and
 - (b) enhance critical engagement with course content by developing an interactive web-based desktop application for **viewing and annotating 360 degree videos.**

O'Halloran, K., Tan, S., Sheffield, R., Mallet, D., Aubusson, P., Berry, A. & O'Keeffe, L. (2018). *Encouraging and mapping student engagement through 360-degree video annotation and data analytics*. Final Report, Curtin University.

A timeline

Encouraging and mapping student engagement through 360-degree video annotation and data

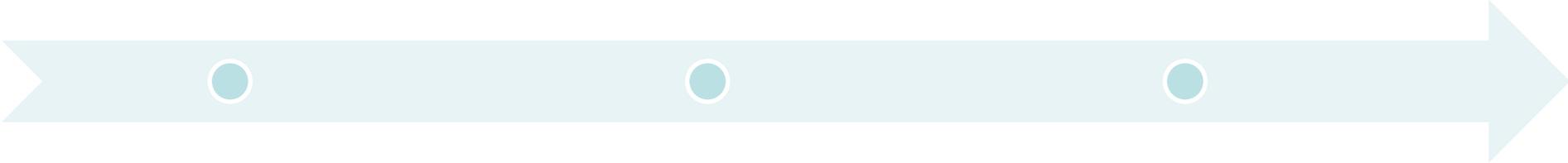
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Unpacking the potential of 360-degree video to support preservice teacher development



Unpacking the potential of 360degree video to support preservice teacher development

- Video observation of teaching practices (observation of oneself or others) strongly encourages the analytical and reflective abilities (Girardet, 2018)
- Detailed and systematic observation of specific practices of the teacher in classroom promotes the development of the so-called ***professional vision*** (Goodwin, 1994), that is, the ability to notice and interpret significant features of classroom interactions.



Unpacking the potential of 360degree video to support preservice teacher development

- Rich and Hannafin's (2009) use of video reflection with PSTs highlighted its usefulness in supporting PSTs to develop their skills of noticing, as well as for improving functional aspects of their teaching such as consistency, clarity of directions, and vocal intonation.
- They refer to this idea of *reviewing one's own practice as 'stepping-back'*.



Unpacking the potential of 360degree video to support preservice teacher development

- VIDEO: an effective tool for decentralizing oneself, removing action from the here and now, slowing the emotional burden and triggering systematic processes of thoughtful thinking.
- 360 VIDEO: Above +
 - Immersive, multiple perspective
- We look at the potential of 360-degree video of one's own practice to support PSTs in their reflections.

Balzaretti, N., Ciani, A., **Cutting C.**, **O'Keeffe, L.** & **White, B.** (2019). Unpacking the potential of 360degree video to support preservice teacher development. *Research on Education and Media.11 (1), 63-69.*



Unpacking the potential of 360degree video to support preservice teacher development

The pre-service teachers:

- First semester of the first year of their teacher education program and in general have no formal teaching experience.
- Have studied at least four courses (equivalent of half a year of fulltime study) of university-level Mathematics as part of a previous undergraduate degree.
- Their first curriculum course in Mathematics Education as part of their Master of Teaching (Secondary).



Unpacking the potential of 360degree video to support preservice teacher development

Part of assessment (2018)

- The PSTs, in assigned groups, are required (as part of normal course work) to prepare a teaching presentation for their peers on a particular aspect of mathematics.
- Each teaching group (typically $n = 5$ or 6) planned together as a larger group and taught their lesson (~50 mins) to their peers.
- The presentations are recorded using 360-degree cameras, the video files were converted to the appropriate format and shared with the pre-service teachers after they had completed a written group reflection.



Unpacking the potential of 360degree video to support preservice teacher development

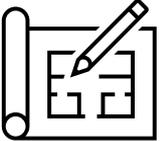
Part of assessment (2022)

- The PSTs, in assigned groups, are required (as part of normal course work) to prepare a teaching presentation for their peers on a particular aspect of mathematics.
- Each student plans and teaches an aspect of a lesson (~4-5 mins) to their peers. This is done in the first half of the course.
- Each student is paired with another student to co-plan a lesson. They then teach an aspect of the lesson at same time but to separate groups of peers (in different rooms).
- The presentations are recorded using 360-degree cameras, the video files were converted to the appropriate format and shared with the pre-service teachers. Initially just their own video, then after their reflection they reflect on the other partner's video.

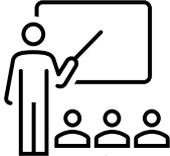


Overview of our approach

Plan



Teach



*Record using
360 video*

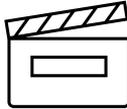
Reflect



Reflect



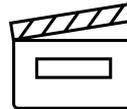
*Review own
360 video*



Reflect



*Review partner's
360 video*



Key research question guiding this phase of our work is:

How can 360-degree video enable deep reflection of pre-service teacher's awareness of their classroom presence?

- How useful was the 360-degree video player to help you understand and reflect on the lesson/workshop content and activities?
- Did you notice/learn anything about the following from watching the video: [their own **teacher presence**, boardwork, examples, modelling, clarity and explanations, interactions etc.]
- How did watching your partner's video help you?

Unpacking the potential of 360degree video to support preservice teacher development

O’Keeffe, L. & White, B. (under review, submitted Aug 2021). Supporting Mathematics pre-service teacher reflection with 360degree video and the knowledge quartet. *Australian Journal of Teacher Education*.

O’Keeffe, L. & White, B. (2021) Supporting pre-service teachers of mathematics to ‘notice’. In Y. H. Leong, B. Kaur, B. H. Choy, J. B. W. Yeo & S. L Chin (Eds.), *Excellence in Mathematics Education: Foundations and Pathways (Presented at the 43rd annual conference of the Mathematics Education Research Group of Australasia)*, pp. 1-18. Singapore: MERGA.

O’Keeffe, L., Roas, A., Vannini, I. & White, B. (2020) Promote Informal Formative Assessment practices in Higher Education: the potential of video analysis as a training tool. *Journal per la formazione in rete*. 20 (1), 43-61.

O’Keeffe, L., Balzaretto, N., White, B., Cutting, C. & Ciani, A. (2019). Pre-service teacher perceptions: the use of 360-degree video in preservice teacher reflection. Presented at the *European Conference on Educational Research (ECER)*, Hamburg, Germany, September.

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Supporting and developing online learners' collaborative problem-solving experiences in mathematics



Aim of this work:

- Explore ways in which aspects of collaborative problem solving (recorded 360 degree video snippets) can support online learners in asynchronous learning experiences.
- Create a pedagogical design to deliver engaging and collaborative curriculum in online learning environments which supports asynchronous student collaboration.

O'Keeffe, L., White, B. Albrecht, A., Cutting, C. & Neill, B (2021), Collaborative problem-solving: An initial analysis of the role of prompts to support online learners in mathematics. In Y. H. Leong, B. Kaur, B. H. Choy, J. B. W. Yeo & S. L Chin (Eds.), *Excellence in Mathematics Education: Foundations and Pathways (Presented at the of the 43rd annual conference of the Mathematics Education Research Group of Australasia)*, pp. 1-18. Singapore: MERGA

Supporting and developing online learners' collaborative problem-solving experiences in mathematics



The project itself was located in two courses — a mathematics course and a mathematics curriculum course.

In these courses we looked at students doing:

1. in-class problem solving
2. external independent problem solving and
3. a scenario where we embedded 360 video snippets of different stages of collaborative problem solving as a potential resource for students.

Survey the students to better understand their experiences, and then analyse their interactions and engagement analytics.

The issue

- Off-campus/online learning offers students increased flexibility, but also poses new complexities in maintaining consistency and equivalency of student learning outcomes and experiences.
- For example, there are challenges in digitising teaching approaches that rely on the co-construction of knowledge through **social interaction** between learners.



The issue

- Social interactions and group-work are important for developing and extending students' higher-order thinking and are as important in online learning as in a face-to-face/on-campus learning environments (Gillett-Swan, 2017).
- Often these social interactions in an online environment are typically more focused on finished products/solutions rather than the development and analysis of strategies, approaches etc. which rely on student interactions.
- However, in problem-solving and creative tasks with 'on-campus' students, key learning often comes from initial discussions and negotiation about the many different approaches that may be used.



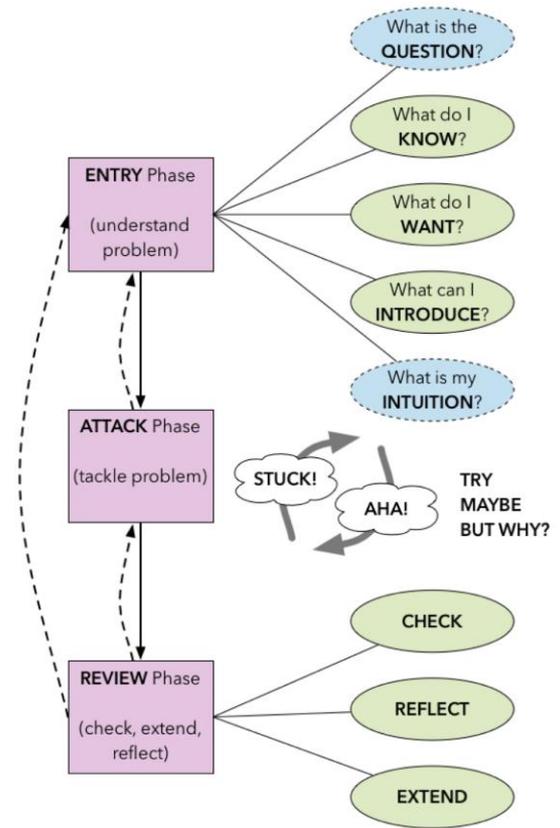
A possible solution

- In this project we explore one way of providing more access to collaborative problem solving for online students.
- We used extracts of collaborative problem-solving situations, recorded with 360-degree video, and reframed them in ways which enable online learners to experience different approaches and methods to various mathematical problem-solving situations.



Context: the course

- MATH 1070 is a problem-solving course focussed on developing mathematical thinking, communication, and problem-solving skills in pre-service maths teachers.
- Each workshop is centred around students working together to tackle unfamiliar mathematical problems. Each activity is followed by whole-class discussion to emphasise and draw out key aspects of mathematical thinking and problem solving.



Adapted from: Mason J, Burton L & Stacey K 2010, Thinking mathematically, 2nd ed, Prentice Hall, UK



Our question

The key question guiding our project is:

How can 360-degree video be used to support asynchronous online learners in experiencing collaborative problem solving in mathematics?



Our approach

Group-based in-person task

- **Class A** engaged with **Problem A**
- **Class B** engaged with **Problem B**
- 360degree cameras were used to record in-class problem solving
- Video grabs were used as part of an online problem-solving framework



Workflow

An introduction to the 'Cool Years' problem

A cool year is one whose individual digits add up to a square number.

For example:

2020 is a cool year because:

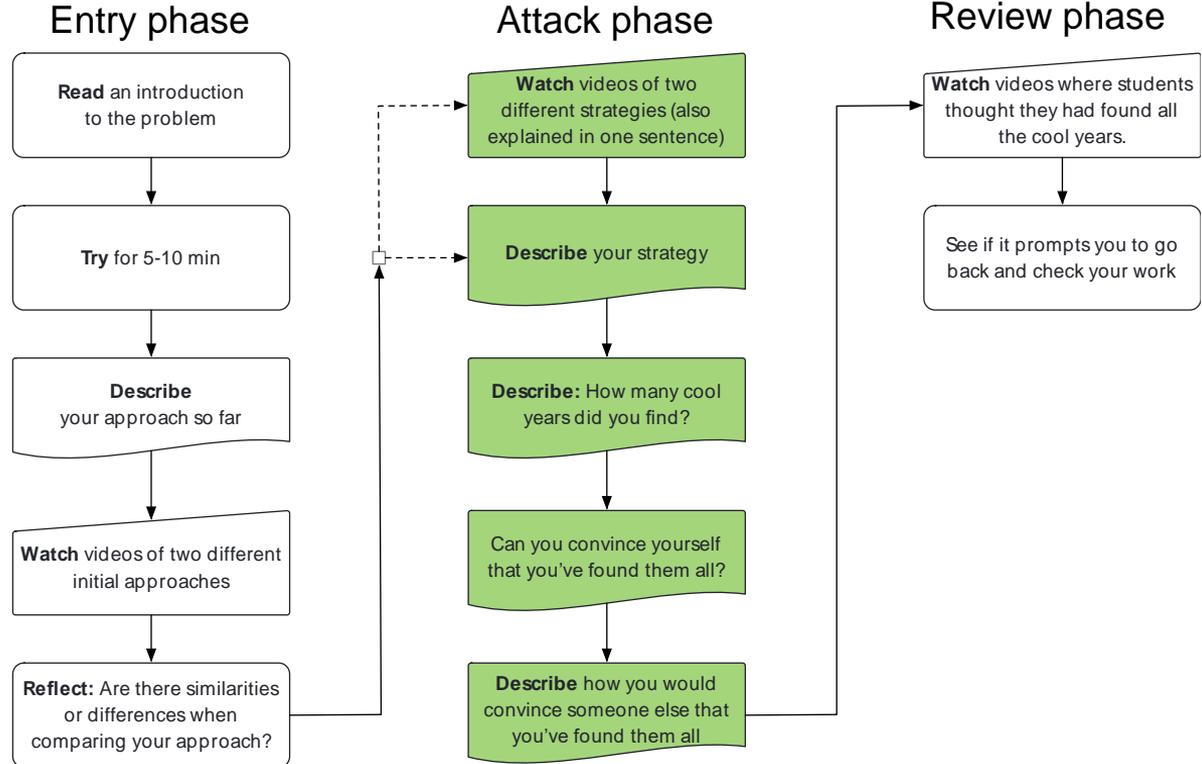
$$2 + 0 + 2 + 0 = 4$$

and 4 is a square number.

However, 1980 is not a cool year because:

$$1 + 9 + 8 + 0 = 18$$

and 18 is not a square number.



Our approach

Group-based in-person task

- **Class A** engaged with **Problem A**
- **Class B** engaged with **Problem B**
- 360degree cameras were used to record in-class problem solving
- Video grabs were used as part of an online problem-solving framework

Individual online task

- **Class A** engaged with **Problem A**
- **Class B** engaged with **Problem B**
- Students completed surveys after each task



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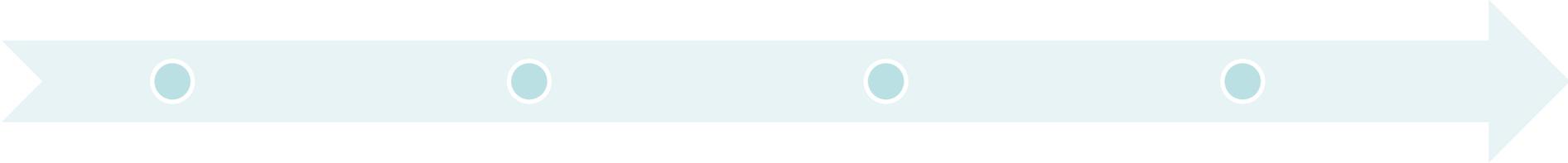
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???



Over-arching themes/guiding principles

In line with work such as that by Blomberg et al. (2013), Roth et al. (2017), Santagata (2012), we have, over time, found the need to target specific aspects/qualities to help the pre-service teachers to develop their abilities to undertake such reflections

1. Structured scaffolded reflection
2. Collaboration
3. Multi-perspective with minimal invasion



Structured scaffolded reflection

- Reflection is an integral part of teacher development and for enacting change in teaching
- The bridge between descriptive reflection and analytical/critical reflection is often a difficult process.
- An example of this might be choosing to focus on a specific aspect of teaching, such as noticing and providing prompts to guide educators to review particular aspects of practice.



Structured scaffolded reflection

- HOWEVER, Reflection *is less useful* when one does not have the opportunity to enact new understandings or be well structured and scaffolded
 - » particularly in the early stages of video analysis for professional development ideas as a result of reflecting.
- Hence, repetition is a key component of our reflection video analysis work;



Collaboration

- A strength of collaborative professional development is that it allows the incorporation of a range of views into discussion and reflections (Barfield, 2016; O’Leary & Wood, 2019).
- A core part of our work is the use of collaboration with paired/ grouped video analysis.
 - » an additional layer of feedback and
 - » two opportunities to see similar things taught in different ways.



Collaboration

- The intention behind this type of collaboration is to create a form of *dissonance* for educators.
- Teaching similar topics in different ways and then undertaking video analysis on both approaches
 - » educators can reflect on how different students engage with different pedagogical approaches.
 - » This can be particularly useful for someone who might struggle to see or believe in alternative approaches to teaching;



Multi-perspective with minimal invasion

- An important part of our work is the opportunity for educators to reflect on their teaching from different perspectives,
 - » e.g. their own as an educator and their students.
- One particular concern with single perspective video analysis is that focusing on the teacher alone promotes a view of teaching as teacher centred with a passive student body (Clarke, 2006).
- Our approach to multiple perspective video analysis, while maintaining minimal intrusion, has been to use 360-degree video technology.



Closing remarks

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Questions?

