Final report for eSTEeM project:

Blended tutorials in Mathematics: simultaneous face-to-face and online learning events

Keywords: blended, tutorials, blended synchronous learning, synchronous hybrid learning, synchromodal learning, mathematics

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Executive summary

A *blended* tutorial is a single learning event which gives students the opportunity of attending face-to-face or online. This project considers the barriers and opportunities to using blended tutorials to support distance learning at The Open University, especially in a mathematics-learning context.

Two pilot blended tutorials were carried out on the Level 3 mathematics module M337 *Complex Analysis*, and an evaluation undertaken via thematic analysis of qualitative data from practitioner reflections, lesson observations and semi-structured student interviews.

The five themes which emerged from our analysis consider pedagogical issues (the "two different worlds" of online and face-to-face attendance, and the need to develop a "blended pedagogy"), technical issues (audio and visual communication) and organisational issues (in relation to scheduling of tutorials).

We recommend that further experimentation and research is conducted into blended tutorials. They offer opportunities to increase the number of tutorials, to offer greater choice for students, and to give more opportunities to feel part of a wider community of learners through capturing casual interactions. More research should be conducted using a single practitioner, perhaps with the help of a student monitor.

However, care is advised in developing a pedagogical approach which is suited to the blended environment. Our analysis suggests it is not necessary to create a wholly egalitarian experience across modes, but accessibility and learner-centred pedagogy do need to be placed first, and there is scope to allow students across both modes the choice to participate in audio and text chat. For mathematics teaching and learning specifically, a shared visual space is seen as vital.

Aims and scope

A precise definition is required first and foremost. As Hrastinski (2019) points out, the word "blended" is so overused in the field of technology-enhanced learning that it might mean anything! By *blended tutorials*, we refer to what is referred to in the literature as *blended synchronous learning*. This is where a single synchronous learning event is held simultaneously as a face-to-face event and an online event. Other terms used in the literature for the same practice are *synchromodal learning* (Bell et al., 2014), *Here or There (HOT) Instruction* (Zydney et al., 2018), and *synchronous hybrid learning* (Raes et al., 2020).

Historically in the Open University (OU), tutorials have typically taken place as *either* face-to-face events, *or* online events. Efforts over the years by individual practitioners to offer *blended* tutorials have been limited in scope, and have not been subject to scholarly evaluation. This project's main aim is to explore the research question:

1. "What are the barriers and opportunities to offering blended tutorials in the context of a Level 3 OU mathematics module, *M337 Complex Analysis*?"

In addition to the main research question, several more specific questions present themselves:

2. How should practitioners design a blended tutorial for the OU context?
3. What specific challenges to a blended approach are present in a mathematics context?

In partial answer to Questions 1 and 2, Bower et al. (2015) conducted a cross-case analysis of design and implementation factors in blended synchronous learning, and offer a "Blended Synchronous Learning Design Framework" to support the design and implementation of blended synchronous

learning. Aspects of this framework were used in our design of blended tutorials; however, the OU context presents additional institutional and logistical challenges not covered by this framework. For example, the geographical spread of our students and tutors adds institutional challenges, and the fact that study centres are typically not equipped with OU equipment presents logistical challenges.

Although Bower et al. (2015) do consider a case of blended synchronous learning in a statistics class, there is, in general, a gap in the literature on the unique challenges that mathematics faces in a blended environment. For example, it is well known that rendering mathematical symbols in synchronous web environments (such as Adobe Connect) can be challenging. Smith and Ferguson (2004) report the difficulty in communicating diagrams and mathematical notation, while Loch and McDonald (2007) point to the awkwardness of being restricted to typed communication, which requires either mathematical typesetting skills or the use of embedded image files. Hodges and Hunger (2011) offer shared electronic whiteboards as a solution to what they see as a "lack of dynamism" (p.42), and this is the approach we have taken. We hope this project helps to fill the gap in the literature for mathematics-specific challenges in a blended context.

Activities

Evaluation strategy

To answer the main research question, we planned two blended tutorials to take place during the 19J presentation of M337 *Complex Analysis*, and designed an evaluation strategy that would explore in as much depth as possible the barriers and opportunities of blended tuition in the OU context.

To that end, we gathered perspectives from three sources:

- The *practitioner* perspective – through our own reflections;
- The *outside expert* perspective – through observations of the blended tutorials by experienced Associate Lecturers (ALs) on M337 and the M337 module chair, as well as extensive discussions with experienced academics from the School of Mathematics & Statistics;
- The *student* perspective – through semi-structured interviews with attendees of the blended tutorials.

Both of the project leaders are experienced teaching practitioners on M337 – Andrew is the Staff Tutor for M337, is a member of the module team, and used to be an AL on the module; Colin is a current AL on M337. At all stages of planning, design, implementation and evaluation, both Andrew and Colin kept reflective diaries on their practice.

To gain a more objective perspective, however, we recruited two experienced ALs on M337 to conduct observations – one for each blended tutorial. Each observer (attending in person) was given a Blended Tutorial Lesson Observation Schedule (see Appendix A) as a prompt, and had a debrief conversation with Andrew and Colin after the blended tutorial took place. In addition, the module chair of M337 viewed the recorded sessions and fed back on the asynchronous aspects of the session.

To gain a better understanding of the student perspective, we invited students to take part in semi-structured telephone interviews, where students were asked about their experiences of the blended tutorials (see Appendix B for interview schedule). In total, 7 students consented to be interviewed. Two of the students declared a disability, and were thus given reasonable adjustments to the interview process to allow them to participate fully: one student was given the interview schedule in

advance, and the other conducted the interview on a textual basis. The six audio interviews were recorded and transcribed for analysis.

All three sources of qualitative data were subjected to a rigorous thematic analysis, the results of which will be discussed in the Findings section below.

Technological setup

Technological worries dominated the early stages of planning the blended tutorials. We decided that both project leaders would facilitate each session – Andrew in the room as the lead facilitator, and Colin facilitating the online environment from home. The primary reason for this setup was to provide a backup plan in the event of catastrophic technology failure. If the connection between face-to-face and online environments proved impossible to maintain, then Andrew would still be able to continue the tutorial with the face-to-face students, and Colin would still be able to continue the tutorials with the online students.

We decided that the face-to-face venue for the tutorials should be Edinburgh. This choice was motivated primarily by the fact that, on the 19J presentation of M337, there was a large number of registered students in Scotland, but no face-to-face tutorials scheduled to take place there, due to there being no AL appointed to the module in Scotland. In addition, the venue was one familiar to Andrew, with stable Wi-Fi, an overhead projector, and a table/chair layout that would facilitate the blended environment.

To enable a shared visual space for both face-to-face and online students, Andrew used a Microsoft Surface Pro with a stylus pen for handwritten annotation. This was connected to an overhead data

Figure 1: A photo of the blended tutorial from the face-to-face students' perspective

projector, so that students in the room would see what was being written on the Surface behind Andrew's head (see Figure 1). At the same time, Andrew's screen was shared via Adobe Connect screen sharing, so that online students would see the same view (see Figure 2). A conferencing microphone/speaker sat in the centre of the room, enabling better audio communication across the two modes: face-to-face and online.

Both project leaders felt it was vital to test the technology first, and so scheduled a test session. We checked that each of us could be heard via the conferencing speaker, and that the shared screen

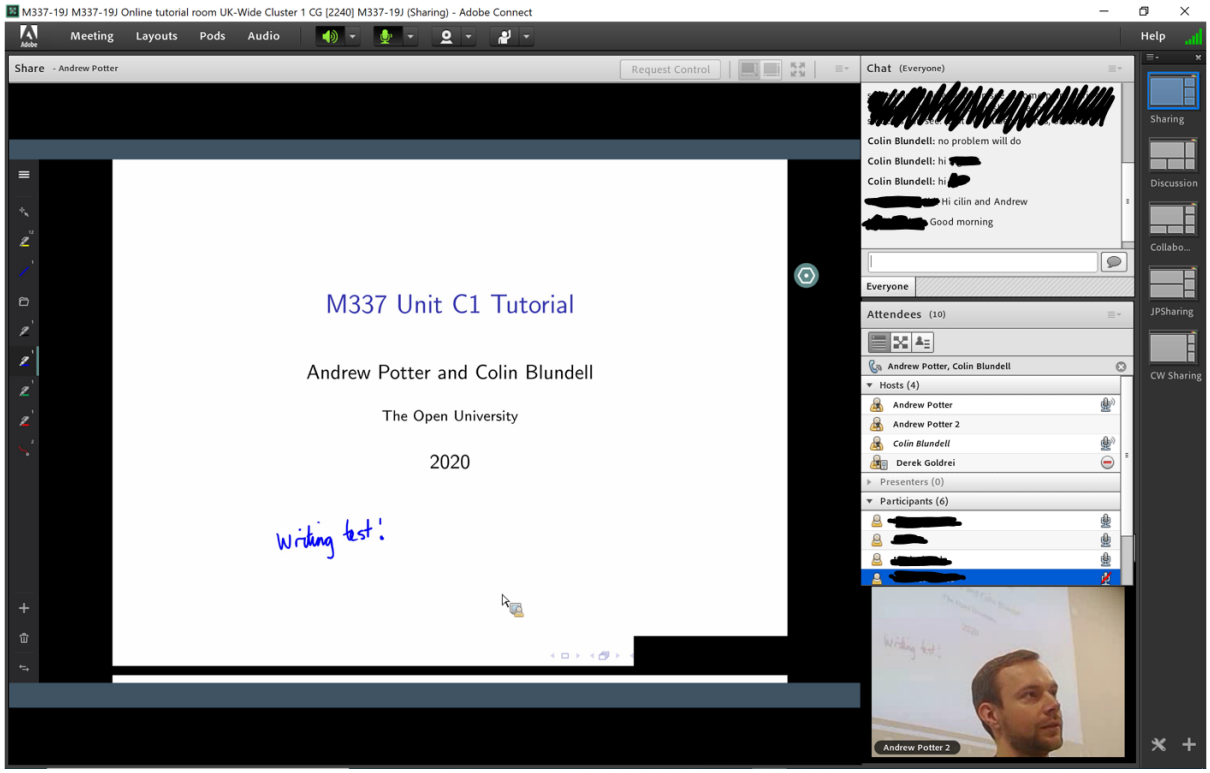

Figure 2: A screenshot of the blended tutorial from the online students' perspective

could reliably be shared through Adobe Connect screen-sharing, and that handwritten annotations could be seen as well.

Pedagogical approach

Because of technological constraints, we decided to adopt a largely tutor-led approach to the pedagogical design of the sessions. Andrew, in particular, was concerned that other approaches might not work because of the technological setup. The only ways to communicate between the face-to-face students and the online students were (by audio) through the conferencing microphone/speaker and (visually) through the shared screen, both of which were near to Andrew only. As such, Andrew felt that the only way to proceed was for both tutors to act as facilitators across both modes. Further reflection on this approach will be found in the Findings section below.

The format of each tutorial was designed as an examples class with the opportunity for whole-class discussion. Students who signed up to the tutorial received by email a problem sheet one week in advance. The tutor then led the students through the problems, using tutorial slides with the questions and various teaching points pre-prepared on them, and writing solutions to the problems by hand on blank spaces left on the slides. Students were encouraged to ask and answer questions at various points, to stimulate discussion.

Participation in numbers

All students on M337-19J were invited to attend the blended tutorials. We wanted to make sure that no students felt disadvantaged by the experimental nature of this pilot scheme. Therefore we were very clear to students that these tutorials were *additional* to the usual tutorial programme, but that we hoped they would find it beneficial to attend.

The attendance numbers were as follows:

- 11 January 2020: 8 face-to-face students, 16 online students, 52 students watched recording;
- 29 February 2020: 3 face-to-face students, 15 online students, 28 students watched recording.

Of these students, 28 were identified by the Student Research Project Panel as approachable for interview, and 7 students consented to be interviewed (25% response rate).

Technological disruptions and adjustments

As predicted, there were minor technological hiccups during the running of each blended tutorial, which required minor adjustments. Firstly, as is common in web conferencing, there were periods where online and face-to-face participants talked over one another, leading to a lot of repetition and checking that statements were heard properly. For this reason, it was useful to have Colin acting as a representative for the online students, highlighting key questions and comments that had been asked in the text chat and bringing them to the attention of the face-to-face students. In the first tutorial, Andrew had no sight of the text chat, and so relied upon Colin's audio interruptions to bring out the online students' contributions. For the second tutorial, however, Andrew set up a second device with the student view of the Adobe Connect screen, so that he could monitor the text chat himself.

During each of the two blended tutorials, there was a period of around 3—5 minutes where connectivity was interrupted. For Andrew and the face-to-face students, there was no immediate indication that the connection had been lost. Noticing the disconnection and re-establishing the link caused a small disruption to the pedagogical flow of the lesson. We decided there was not much more we could do to prevent this from happening, and the students reported only minor disruption.

One of the students reported additional minor issues with the recording that was produced. There were periods where the recording had not synced the different audio contributions correctly, leading to periods in the recording where Andrew and Colin were talking over one another that had not happened live. We decided this was not serious enough to warrant any further action.

Lastly, the first tutorial made little use of the webcam feature of Adobe Connect, driven mainly by bandwidth concerns. At the beginning of the tutorial, and before the recording was started to allay any privacy concerns, Andrew put his camera on briefly and did a sweep of the room to show the online students the face-to-face setup. In the second tutorial, however, Andrew kept his camera on for the duration of the session, facing himself only. This was intended to give online students more of a sense of a live event taking place face-to-face.

The Findings section below will reflect more on these technological issues further.

COVID-19 pandemic

The second blended tutorial took place on 29 February 2020, just a few weeks before the nationwide lockdown. We had originally hoped to offer face-to-face interviews with students, but this became

impossible, and so all interviews were conducted remotely from home. The pandemic also introduced significant delay to our project, as we had hoped to extend the trials into the 20J presentation, and as workload increased for both of us. Unfortunately, face-to-face tutorials were cancelled for both the 20J and 21J presentations. We hope to continue research into this topic as soon as it is practicable.

Findings

The thematic analysis of our practitioner reflections, lesson observations, and student interviews drew out the following five themes, which we will consider in turn:

1. Two different worlds
2. Blended pedagogy
3. Audio communication
4. Visual communication
5. Organisational issues

Two different worlds

Student interviewees reported that the tutorial "felt like a normal tutorial" – whether they had attended face-to-face or online. Indeed, one online attendee did not realise that there had been students who attended face-to-face! In that sense, the blended tutorials seemed to replicate the style of tutorial that students were used to.

This was confirmed by one AL observer, who remarked that, at several points, there was a rich discussion happening "here" (in the room) and also "there" (in the text chat of Adobe Connect), but there was not much discussion or interaction *across the boundary of the two modes*.

For both of us as practitioners, this gave rise to the reflection that this was probably due to the way in which we had set ourselves up as gatekeepers of each mode. Students would have to get through us, the tutors, in order to communicate across the modes. This had not been our intention in designing the sessions. This gives rise to the question of whether a truly blended experience is possible. Can the experience of face-to-face students and online students ever be made truly equal? This is a question which requires further research.

Nevertheless, student interviewees reported an *acceptance* that the experience for online students was fundamentally different to the experience for face-to-face students. This was not considered to be a positive nor negative aspect, with each of the options for attendance bringing benefits that the other lacked. Online students talked of the convenience of attending from home, the benefits of recording, and the relative security of being "unseen" passive observers. Face-to-face students, on the other hand, enjoyed the opportunity to meet tutors in person, ask questions dynamically, see body language, and meet other students.

Blended pedagogy

As mentioned above, we adopted a largely tutor-led pedagogy in the design of the blended tutorials, motivated primarily by Andrew's technological worries. This appears to be an example, noted by Cornelius (2014), of practitioner anxiety in technology-enhanced learning leading to a "retreat towards teacher-led approaches" (p.261).

For the student interviewees, the tutor-led approach was not seen to be a negative, with face-to-face students in particular valuing the opportunity to ask questions as the tutorial progressed. Some students reported a very minor increase in interaction from what they would expect, with one

student saying it was good to be able to hear student questions. However, many of the students reported issues of not wanting to disrupt “the flow” of the tutorial, which suggests an excessive tutor-led approach inhibiting interaction. One student didn’t want to “interrupt” or “derail the tutorial” with tangential questions; another didn’t want to “waste other students’ time”, and be seen by other students as “showing off”. One face-to-face student also reported that the recording made them a little bit self-conscious, not being accustomed to being recorded in a face-to-face tutorial.

One AL observer also commented on the pacing of the tutorial. The audio interruptions, sound checks, reporting across modes and technical breakdowns all served to slow the pacing down somewhat. However, when asked about it, students either reported that they didn’t notice a difference, or that it was a positive to keep things slower. One student reported, for example, that in online tutorials, she often finds it difficult to type quickly enough to be able to ask a question, and often the moment passes before she has a chance to ask it.

Bower et al. (2015) report that blended synchronous learning can often place considerable extra cognitive effort on the practitioner, and this is certainly confirmed by Andrew’s experience, who was exhausted after each tutorial! Bower et al. (2015) also recommend that pedagogy be given first consideration in learning design, and in retrospect, both Andrew and Colin would be keen to embed more of a student-led approach from the beginning. Colin, in particular, would be keen to experiment in future with more student-led pedagogy in a blended environment, giving students more of the work to do.

Audio communication

Many of the student interviewees talked about the aforementioned audio issues. However, none of the interviewees reported that this seriously diminished the student experience – “I’m used to it” was a common response. This caused Andrew and Colin to reflect that perhaps they had spent too much time worrying about technological issues, and that the students were more resilient to technical glitches than they had anticipated.

One student made the observation that, as the number of attendees grows, the problems associated with turn-taking, and the potential for audio lag and talking over one another also increase, and so inhibited him from wanting to contribute too much. Another student (online) said that he prefers speaking, but since no one else does, he doesn’t contribute. This suggests greater care is needed in facilitating audio interaction in a blended environment.

Because of the positioning of the conferencing speaker/microphone near to Andrew, one student (who is hearing impaired) reported that he couldn’t really hear any of the face-to-face student contributions, but could hear Andrew. Although care had been taken to ensure accessibility of the blended tutorials, this was an unanticipated issue, and would require careful consideration in future blended sessions.

An unintended positive consequence of audio communication emerged when Andrew accidentally left the conferencing microphone open during a ten-minute coffee break. One online interviewee reported that she found listening to the informal chatter which was captured between the students comforting. During this time, they chatted about future module choice, which parts of the module they found difficult, and other informal topics. The online student reported that this made her feel part of a community of learners that she had not before experienced.

Visual communication

Because not much use of the webcam was made, online student interviewees commented that it was difficult to discern meaning without the visual cues present in normal speech. This accords with Price et al. (2007), who report student frustrations due to the lack of "paralinguistic cues". When asked about the use of the webcam in the second tutorial, one student said it was good to see the human side. However, another student remarked, "It was nice to see [Andrew], but it didn't really add much." A third student said that it was, in fact, a bit distracting because the video was not synced to the audio.

Students and practitioners alike agreed that the shared screen was vital to a mathematics tutorial, and being able to see what Andrew was writing was crucial to understanding. However, this meant that visual space was at a premium, both for online and face-to-face students. For online students, having the text chat was important for communication, but it came at the expense of being able to see what was going on in the room. Even if the webcam had worked as intended, the size of the window would be so small as to have been useless. On the other hand, students in the room had no access to the text chat, because it would have been too small to read on the projected screen. As such, they relied on Andrew and Colin to relay any salient questions or comments from the text chat. For this reason, one of the AL observers recommended that face-to-face attendees be invited to bring a laptop so they could access the text chat if they wished.

Organisational issues

A key reflection for both Andrew and Colin was the question: "Could a blended tutorial be facilitated by a single tutor only?" In order for blended tutorials to be viable in terms of resources, then it should at least confer some benefits over simply having two separate tutorials. Certainly, this requires further testing and research. However, as a starting point, both Colin and Andrew have reflected on the change between the first and the second tutorial. As mentioned above, at the first tutorial, Andrew relied on Colin to mediate the text chat, but at the second tutorial, he had a second machine set up so he could see the text chat directly. This led us to speculate that the role of the online tutor did not need to be a tutor at all, but could, for example, be a student monitor, or that perhaps greater efforts to encourage audio interaction with online students could suffice. Of course, this strategy depends on scale, and would require foreknowledge of the numbers of students present.

When asked about whether they would support blended tutorials being used in the future, students demonstrated a nuanced understanding of the resourcing constraints that the university faces in tutorial provision. However, it was clear that the face-to-face students were particularly keen to preserve as many face-to-face opportunities as possible, and the online students were keen to have as many tutorials (in whatever medium) as possible. If blended tutorials allow for a greater number of tutorials (and face-to-face opportunities), then students appeared to be in favour.

Conclusion and recommendations

The five themes we have explored give the main barriers and opportunities to using blended tutorials, based on the practitioner perspective, the outside expert perspective, and the student perspective. On the whole, all three groups of stakeholders were positive about the future of blended tutorials, showing that more research into this area is needed. We conclude this section of the report with some recommendations, which seek to answer all of the research questions posed in the Aims and Scope section.

1. Blended tutorials offer a tremendous opportunity to **maximise face-to-face opportunities** for students, and **increase the number of tutorials** for all students.
2. The design of blended tutorials needs to place **pedagogy** and **accessibility** first, before any technological considerations.
3. Blended tutorials **do not need to offer equivalent experiences** to face-to-face and online students – students are aware of the advantages of each mode and **value the choice**.
4. **Leave the microphone on** during coffee breaks – students benefit from the community building of listening to informal conversation.
5. Allow face-to-face students the opportunity to participate in **text chat**, and allow online students the opportunity to participate in **audio chat**.
6. For blended synchronous learning in **mathematics** specifically, having a **shared visual space** is vital.
7. More research needs to be done into **facilitating blended tutorials with a single practitioner**, perhaps with the help of a **student online monitor**.
8. More research needs to be done into **facilitating student-led pedagogies** in a blended environment where **visual and audio space are both at a premium**.

Impact

Student experience

This project's main aim has been to improve the student experience by increasing the quantity and quality of tutorials on M337-19J. For students who live in Scotland, this project has offered an opportunity for face-to-face tuition that would not otherwise have been possible due to resourcing constraints. Indeed, four of the students who turned up to one of the blended tutorials were not from Scotland, but who had travelled for the opportunity. For online students, this project was additional to the usual tutorial timetable, offering extra support during what would turn out to be a difficult year. The SEaM satisfaction rate for M337-19J was 98.7%, an increase of 3.1 percentage points from the previous presentation. We hope, however, that the impact on student experience will broaden to other modules, presentations and institutions from the lessons we have learned.

Teaching

Our project has attracted a considerable amount of attention internally, as teaching practitioners consider innovative approaches to tuition. We have presented to internal audiences at:

- The eSTEeM scholarship roadshow to the Open University in Scotland in March 2020;
- The 9th annual eSTEeM conference in April 2020;
- The SHARE scholarship seminar in August 2020.

As the COVID-19 pandemic has forced more institutions to consider innovative approaches to teaching delivery, there has been an increased external interest in the lessons learned from our project. We have given:

- A short presentation at the Horizons in STEM conference in June 2020;
- A recorded presentation at the Advance HE STEM conference in January 2021 (Potter and Blundell, 2021);
- A workshop on blended synchronous learning in mathematics at CETL-MSOR 2021 at Coventry University in September 2021. A peer-reviewed paper has been accepted by the journal *MSOR Connections* for a special conference issue, and is due for publication in Spring 2022 (Potter and Blundell, 2022).

Strategic change and learning design

Our project has attracted the attention of colleagues in Learner Experience Technology (LXT), who are interested in the way that online rooms on Adobe Connect are used to facilitate innovative forms of tuition.

List of deliverables

Potter, A. and Blundell, J. C. (2022) "Blended Tutorials: Blended Synchronous Learning in Mathematics", *MSOR Connections,* special conference issue from CETL-MSOR 2021, formally accepted for publication, due Spring 2022.

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University approval processes

- SRPP – Approval from the Student Research Project Panel was obtained according to the Open University's code of practice and procedures before embarking on this project. Application number 2020/022
- Ethical review – An ethical review was obtained according to the Open University's code of practice and procedures before embarking on this project. Reference number HREC/3439/Potter
- Data Protection Impact Assessment/Compliance Check – A Data Protection Impact Assessment/Compliance Check was obtained according to the Open University's code of practice and procedures before embarking on this project. Data Protection registration number 28-02-22

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Appendices

Appendix A – Blended tutorial observation schedule

Section 1: Tutorial details

1	**Module**	M337		
2	**Tutorial type**	Module-wide		
3	**Timing**			
	☐ start	☐ first third	☐ middle	☐ last third ☐ exam prep
4	**Date**	_____		
5	**Max number**	face-to-face: 20 students		Online: 100 students
6	**Actual number**	face-to-face: ____ students		Online: ____ students
7	**Name of tutors**	face-to-face: Andrew Potter		Online: Colin Blundell
8	**Length**	_____ hours		
9	**Primary purpose(s) of tutorial (tick all relevant boxes)**			
		☐ Module content		
		☐ TMA preparation		
		☐ Exam preparation		
		☐ Skills development		
10	**Recorded**	☐ Yes	☐ No	

Section 2: Tutor's presentation style

11 **Tutors presentation style**

Introductions	☐ Yes	☐ No	☐ N/A
Open and friendly	☐ Yes	☐ No	☐ N/A
Engaging and encouraging tone	☐ Yes	☐ No	☐ N/A
Positive demeanour	☐ Yes	☐ No	☐ N/A
Didactic	☐ Yes	☐ No	☐ N/A
Webcam used	☐ Yes	☐ No	☐ N/A
Adjusted to student needs	☐ Yes	☐ No	☐ N/A
Appropriate pace	☐ Yes	☐ No	☐ N/A
Alternative explanation to struggling students	☐ Yes	☐ No	☐ N/A
Step approach to threshold concepts	☐ Yes	☐ No	☐ N/A
Accessibility adjustments made	☐ Yes	☐ No	☐ N/A
Stopped recording to manage engagement	☐ Yes	☐ No	☐ N/A
Tested technology	☐ Yes	☐ No	☐ N/A
Managed chat box	☐ Yes	☐ No	☐ N/A
Technology worked	☐ Yes	☐ No	☐ N/A

12 **Comments on style**

Section 3: Tutorial content

13 **Tutorial content**

Setting the scene / learning outcomes	☐ Yes	☐ No	☐ N/A
Opportunity for questions	☐ Yes	☐ No	☐ N/A
Checks understanding	☐ Yes	☐ No	☐ N/A
Asks for feedback	☐ Yes	☐ No	☐ N/A
Encourages students to speak/chat	☐ Yes	☐ No	☐ N/A
Used audio/video	☐ Yes	☐ No	☐ N/A
Sending documents/slides	☐ Yes	☐ No	☐ N/A
Manages thinking time	☐ Yes	☐ No	☐ N/A
Slide content right level	☐ Yes	☐ No	☐ N/A
Diagrams used	☐ Yes	☐ No	☐ N/A
Engaging content	☐ Yes	☐ No	☐ N/A
Signposts follow up work	☐ Yes	☐ No	☐ N/A

14 **Tutorial content comments**

Section 4: Student interactions

15 **Proportion of students engaging in tutorial activities**

Discussed subject in main room

☐ 0% ☐ ≤25% ☐ 26—50% ☐ 51—75% ☐ >75% ☐ not offered

Asked questions in main room

☐ 0% ☐ ≤25% ☐ 26—50% ☐ 51—75% ☐ >75% ☐ not offered

Asked questions in chat box

☐ 0% ☐ ≤25% ☐ 26—50% ☐ 51—75% ☐ >75% ☐ not offered

Answered questions in chat box

☐ 0% ☐ ≤25% ☐ 26—50% ☐ 51—75% ☐ >75% ☐ not offered

16 **Comments on student interaction (please anonymise individual student data)**

17 **Comments on interactivity in face-to-face medium**

18 **Comments on interactivity in online medium**

Section 5: General comments

19 **General comments on effectiveness of blended medium**

20 **Suggestions for improvements**

Appendix B – Semi-structured interview schedule

M337 BLENDED TUTORIALS SEMI-STRUCTURED INTERVIEW SCRIPT – Andrew Potter & Colin Blundell

Introduce yourself and where you are calling from (OU). Check that it is convenient to speak.

Thank you for agreeing to take part in the M337 Blended Tutorials scholarship project follow-up interviews. I'm going to ask you questions about your experiences of the blended tutorials that took place on 11th January and 29th February 2020. We don't envisage this taking more than about 30 minutes. I am going to record the interview, so that we can transcribe the responses for our analyses. We might quote some of your responses, but we will not identify you in any publications or feedback to the module teams or tutors. Are you happy for me to record the interview and begin?

If yes, thank and proceed. If no, explain more about what you are doing and ask again. Do not proceed without permission (terminate interview).

Semi-structured interview questions

Closed starter questions

1. Did you attend the blended tutorial live on 11th January?
    - Yes – face-to-face
    - Yes – online
    - Didn't attend live
2. Did you attend the blended tutorial live on 29th February?
    - Yes – face-to-face
    - Yes – online
    - Didn't attend live
3. Did you watch any part of the recordings for either of the tutorials?
    - Yes – both
    - Yes – only 11th Jan
    - Yes – only 29th Feb
    - Did not watch any recordings

Face-to-face attendees

4. Had you attended a tutorial face-to-face before?
    a. (If no) What made you decide to come along to this tutorial?

b. (If yes) In what way(s) was the experience different at the blended tutorial?

Online attendees

5. Had you attended an online tutorial before?
    a. (If no) What made you decide to come along to this tutorial?

    b. In what way(s) was the experience different at the blended tutorial?

Students who watched at least one recording

6. Let's talk about your experiences of the recording(s).
    a. (If attended face-to-face) In what way(s) was the experience of watching the recording different from your experience in the room? Was there any added benefit?

    b. (If attended online) In what way(s) was the experience of watching the recording different from your live experience? Was there any added benefit?

c. (If didn't attend) What were your experiences of watching the recording? How were they different from watching recordings of other online tutorials?

All students

7. Let's talk about technology. We used quite a few different pieces of technology – a projector, a Microsoft Surface Pro with stylus, Adobe Connect, a Jabra conferencing microphone/speaker… Were there any issues with any of these that hindered your learning in the tutorial? Is there any way these could be addressed better?

8. We're interested in how the online students felt about their interaction with face-to-face students and vice versa. How did you feel about the interaction between online students and face to face students?

9. What were your thoughts on the pacing of the tutorial? Were there any differences between what you are used to from other tutorials?

10. What were your thoughts on the use of the webcam at the beginning of the tutorial?

11. How would you feel if tutorials like this were more frequently used on mathematics modules?

12. How do you think a mathematics tutorial differs from other subject areas? What effect do you think this has on blended approaches?

13. Do you have any other comments?

Thank student for their participation and turn off recording.