Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS (School of Physical Sciences) and LHCS (Life Health and Chemical Sciences)

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Executive summary

Our project was a cross school collaboration between the School of Physical Sciences (SPS) and the Life, Health and Chemical Sciences (LHCS).

Rationale for our approach
In response to reports of student anxiety and performance concerns, enhanced proactive support was provided to SPS and LHCS students to de-mystify the remote exams processes, to facilitate them to take ownership of problem solving, and to attempt to increase their self-efficacy concerning their upcoming remote exam. This support was provided in a series of one-to-many exam preparation sessions offered to all SPS and LHCS students

Scholarship methods
After the 21J exam period (June 2022), a survey was disseminated to 2500 students across both schools, 349 of whom completed the survey. Following a preliminary analysis of survey findings, e-mail interviews and focus group analysis was conducted the following Spring to facilitate in-depth exploration of some of the issues raised in the survey and to evaluate student perspectives about their exam experience after they had obtained their exam results.

Findings
Survey data shows that the exam preparation sessions reduced anxiety. It was apparent that some students experienced technical issues and time pressures which had a disproportionately negative effect on their overall their exam experience. In the interviews there was variation in feedback on the specific issues around the remote setting of their most recent exam, but overall there was a strong preference for the continuation of online exams. The focus group drew out the diversity of how students used their time during the exam

Impact
Anecdotal evidence from colleagues in the SST and on module teams suggests that the exam preparation sessions reduced the volume of student queries during the exam period. Feedback to module teams enabled them to improve support provided to students taking remote exams. The project leads contributed to pan-University guidance provided by ACQ for students sitting remote exams in 2022/23. Furthermore our findings informed the practice of other colleagues who implemented similar initiatives in their schools. Additionally, an ongoing scholarship project exploring student completion of remote exams has built upon our project findings

Recommendations

We believe that our project feedback has helped to improve remote exams and hence we hope has also reduced sources of student anxiety. Our initial findings were disseminated within our schools, the wider STEM community and to Assessment, Credit, Qualifications (ACQ) colleagues. Findings from this eSTEeM project were used to inform FAQ guidance for SPS students. Disaggregated survey findings were also provided to individual module chairs in both schools to support 22J exam preparation. The project leads attended the exam assessment workshop and contributed to preparation of ACQ student-facing remote exams guidance. We continue to run the remote exam prep sessions with updated guidance based upon issues identified in our survey.

Aims and scope of the project

Although online at-home exams have been used to replace and / or augment traditional exams since the 1990's (Bicanich et al., 1997; Alexander et al., 2001), this form of examination did not become widespread until the pandemic forced mainstream institutions to adopt this model of delivery assessment.

Whilst much of the Open University's teaching has been provided in an online format for several years through VLE module websites and online tutorial provision, student examinations had been taken in a traditional exam hall setting prior to 2020. During the pandemic, our students were required to undertake exams remotely within their own homes or other similar spaces and our processes and systems rapidly adapted to facilitate this sudden move to online, remote exams.

As of June 2020, seven modules with SPS and seven modules within LHCS had an examination as the form of final assessment. In June 2020 all SPS and LHCS modules with an exam made use of the electronic TMA (eTMA) submission system and had a time allowance of 24 hours (midnight-midnight) for students to download, complete and submit their exam. The following year (2021), all exams within both schools were submitted via the iCME system, an adapted form of the interactive computer-marked assignments iCMA moodle quiz. SPS modules employed a shorter timed window of 4.5 hours for exam completion, but LHCS modules retained a 24-hour exam completion period (midday-midday). In June 2022, all LHCS exams moved to a shorter timed exam completion window of 4 hours, while SPS exams retained a slightly longer time of 4.5 hours; these models of exam parameters continue to be used. As can be seen, the transition from traditional exam hall exams to an established model of online, remote exam involved multiple different online exam models, exposing students taking these exams to the challenge of responding to the changes in submission system and timing of their remote exams.

The skillset and equipment needed to practically undertake an online exam differ from that needed for a traditional exam hall examination as students need appropriate

technical skills to prepare and submit their online exam. Furthermore, we were concerned that students may not have revised adequately on the understanding that they would have access to materials on module websites and the internet, thus may not have adequately consolidated their learning and could underperform or be tempted to plagiarise.

Although there is evidence in the literature that online exams may not significantly increase overall student anxiety for most students (Stowell and Bennet, 2010), the picture appears to be nuanced. A literature review by Topuz and Kinshuk (2021) highlighted that most students had a positive view of online assessment and enjoyed the benefit of taking their exams in their home environment, but also noted student concerns about typing speed, potential technical problems and the stress induced by an online timer counting down. Recent research from our own Institute found that although 69% of students were strongly positive towards online exams, students with characteristics such as disability, caring responsibilities and mental health issues expressed less positive attitudes to online exams (Aristeidou et al., 2023).

It is well established that high levels of debilitating exam anxiety are negatively correlated with academic performance (Cassady and Johnson, 2002; Woldeab and Brothen 2019). Arora, Chaudhary and Singh (2021) conducted a study specifically analysing anxiety associated with online exams. They explored the effects of anxiety on self-efficacy, defined as the 'a person's belief in their ability to succeed in a particular situation' (Bandura, 1993) and found that students with high anxiety levels tended to have low self-efficacy. However coping strategies developed by these students could mitigate the impact of exam anxiety on students' self-efficacy.

This prompted us to provide a series of one-to-many exam preparation sessions to LHCS and SPS students with online exams. A key objective of our sessions was to reduce uncertainty, encourage students to develop coping strategies and reduce exam anxiety. Students were supported to conduct detailed planning in advance, for example, organising childcare, sourcing IT equipment such as scanning or printing facilities and checking internet reliability. A step-by-step demonstration of the iCME submission system was provided with ample time for student queries. Students were specifically recommended to allocate time to practice submitting documents via the Specimen iCMA system and to make use of resources provided by the University such as the Remote exams handbook as well as module-specific resources. Students were encouraged to problem solve during the sessions about how they would cope with issues such as unexpected illness or computer or internet failures or as well as identifying who to contact for help in the event of these issues.

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Overall, this project aims to evaluate and improve the student experience of sitting remote exams. We conducted analysis to evaluate our pilot of student-facing exam preparation events and to gain a deeper understanding of how our students prepare for exams and their overall exam experience.

Activities

Remote exam preparation sessions

Building on the success of remote exam preparation sessions run for LHCS students in 2021, one to many remote exam preparation sessions were offered to both LHCS and SPS students studying modules with remote exams in 2022. The content of these sessions was informed by student feedback in previous years, including posts to module forums and communications with the SST (see Tables 1 and 2).

These sessions were advertised in the News section on each module website, on student forums and via direct CAMEL emails in advance, with a reminder email the week before. Sessions were prepared and delivered by Gemma Warriner and Becca Whitehead (SPS) and by Fi Moorman and Karen New (LHCS). Colleagues from ACQ, SST and the Computing Helpdesk also joined the May sessions to respond to student queries concerning submission systems and support on the day thus providing a holistic joined-up supportive experience.

School	Attendees	Views	Content covered	Student queries
SPS	48	349	• The format of the exam • Accessing and use of the iCME system • How to create pdfs or other file formats, using a scanner and mobile phone apps • Revision techniques • Exam day planning including where to sit the exam, planning pet and childcare • Advance troubleshooting, including planning alternative ways of accessing the internet, should a problem arise • Plagiarism, its detection and how to avoid it	• The timing of the exam and extra time, including queries about the timer • Creating the pdf file, Uploading the file and file size • The open book nature of the exam • Accessing the specimen exam and the iCME system
LHCS	58	276		

Table 1 March sessions – themed "Plan ahead"

School	Attendees	Views	Content covered	Student queries
SPS	122	162	• We discussed preparations students had done so far, linking back to the previous session • A step-by-step walk through of the iCME system. • Encouraging students to practise with the Specimen iCME. • Trouble-shooting the 'what ifs' of what could go wrong during the exam • Timings on the clock and extra time • Resources available on the Help Desk, who to contact if things went wrong on the day	• The exam format for various modules • Special circumstances, postponements and the evidence required • Details about using the iCME system, for example whether things can be uploaded more than once, • What was meant by "open book" and whether they could consult their module website. [Some students were still unclear about this] • Timings of exams
LHCS	65	208		

Table 2 May sessions – themed "What to do on the day"

Online JISC Survey

After the exam period, the link to an anonymous Jisc (Joint Informations Systems Committee) survey, comprising a mix of short, Likert-style closed-response questions and free text questions was sent to 2500 students studying modules within SPS and LHCS with remote exams. Questions were grouped to collect responses on student preparation for the exam including perceived usefulness of these exam preparation sessions and student experiences and perceptions of their recent remote exam. Students were also asked whether they would be willing to participate in further research. In total, responses from 349 different students were gathered over a 4-week period in June 2022.

Online interviews and focus group

Forty-five students who indicated they were willing to participate in further research were e-mailed an invitation to take part in an online interview consisting of a series of 5 questions on the Jisc system and 18 responses were received. The responses were collected during February 2023.

A focus group was conducted in April 2023, with 6 student participants from a pool of 45 students. Participating students discussed the themes via microphones and a Chat Box in an Adobe Connect room. A transcript from the session was produced and combined with the messages from the Chat Box.

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Data analysis

Quantitative data from the survey was analysed using in built survey tools. The qualitative data from the Jisc survey, online questionnaires and the focus group were coded and analysed using NVivo. Themes were also identified from the qualitative data by manual methods.

Findings

Survey findings

349 students (138 from SPS and 211 from LHCS) responded to at least one question in the survey. The students were studying the following modules: SK299, SK320, SM123, S295, S317, S217, S294, SM348, S283, S248, S215, SM359, S382 and S315.

Of the 343 students who responded to the question of whether they had previously taken an Open University remote exam, just under two thirds (221; 64.7%) indicated that they had previously taken an OU remote exam.

Exam preparation

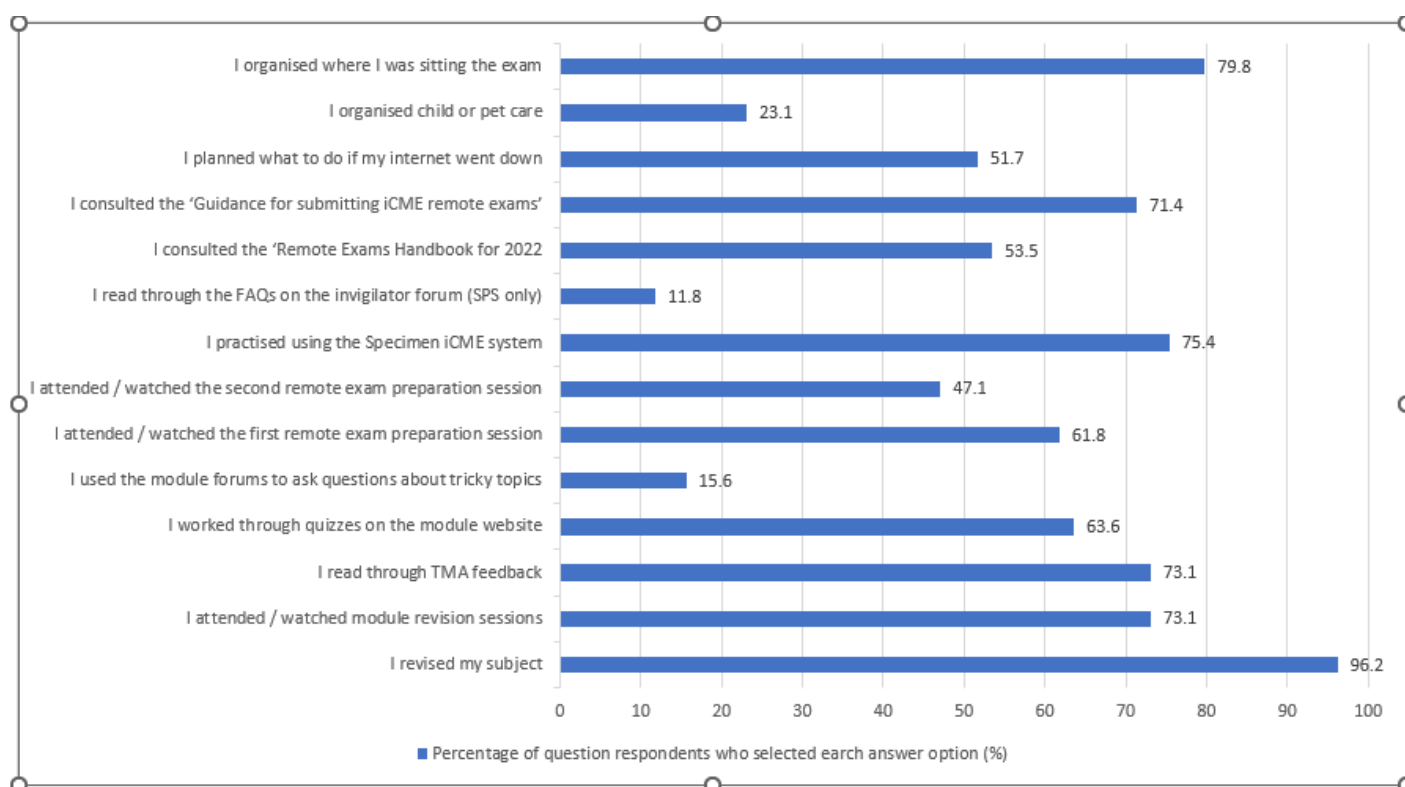Students were asked about preparation for their exam.

Figure 1 Quantitative survey results: Respondents (%) reporting their experience of preparing for their 21J exam, n=346

The top five activities in preparation for the exam were revision, sorting out a space to work, practising using the iCME system, reading through TMA feedback and module revision sessions.

Statement	Very useful/ useful	Undecided / neutral	Not very useful/ not useful at all
Supporting my revision	144 (53.7%)	73 (27.2%)	51 (19.1%)
Preparing for my remote exam (overall)	170 (62.9%)	71 (26.3%)	29 (10.7%)
Using the iCME system	157 (58.8%)	71 (26.6%)	39 (14.6%)
Knowing who to contact if I had an IT issue	155 (57.8%)	68 (25.4%)	45 (16.8%)
Knowing who to contact if could not complete my exam	148 (55%)	65 (24.2%)	56 (20.8%)
Removing uncertainty about sitting my remote exam	**150 (56.2%)**	**71 (26.6%)**	**46 (17.2%)**
Improving my general anxiety about my remote exam	**123 (45.8%)**	**77 (28.6%)**	**69 (25.7%)**

Table 3 Quantitative survey results: Respondents (n, %) reporting their perception of usefulness of the remote exam preparation sessions. Between 267 and 270 individuals responded to these statements.

Feedback about our exam preparation sessions was positive, with the majority of students reporting that these sessions were beneficial for overall exam preparation and in removing uncertainty (62.9% and 56.2% respectively). However, it must be acknowledged that despite these positive aspects, 25.7% of students felt their anxiety had not been improved.

Exam experience

Statement	Very easy/ easy	Undecided/ neutral	Difficult/ very difficult
Finding an undisturbed 'space' to sit the exam	276 (79.5%)	42 (12.1%)	29 (8.3%)
Downloading the exam paper	320 (93.3%)	15 (4.4%)	8 (2.3%)
Uploading the completed exam paper	277 (80.3%)	39 (11.3%)	29 (8.4%)
Submitting the completed exam paper	302 (87.5%)	22 (6.4%)	21 (6%)
Completing the exam within the time available	**125 (36.1%)**	**58 (16.7%)**	**164 (47.2%)**
Overall exam experience	177 (50.5%)	77 (22.3%)	91 (26.4%)

Table 4 Quantitative survey results: Respondents (n, %) reporting their perception of their exam experience. Between 343 and 347 individuals responded to these statements.

Most students were positive about the overall logistics of their exam such as downloading and submitting their exam paper and thought these processes easy or very easy. However nearly half (47.2%) found it very difficult to complete the exam in the time available and this clearly influenced their overall experience as only 50.5% of students reported their overall experience as easy or very easy.

Exam arrangements

Most students indicated that they had standard arrangements, with only 30 (8.7%) reporting that they had additional arrangements for their exam. Of these students, 29 reported that these arrangements concerned additional time. When these students responded to a secondary question about whether the timer reflected the approved additional time, 4 students (13.8%) reported that the appropriate time was not shown on the timer.

Of those that supplied free text answers on the matter some reported that the additional time was not sufficient. One student reported that the fact that the extra time was not indicated until the iCME was opened was confusing to him when reading the instructions.

Technical issues affecting remote exam

In response to the question whether they had experienced any technical issues during the exam, 294 students (85% of question respondents) said they did not, but 52 students reported technical issues.
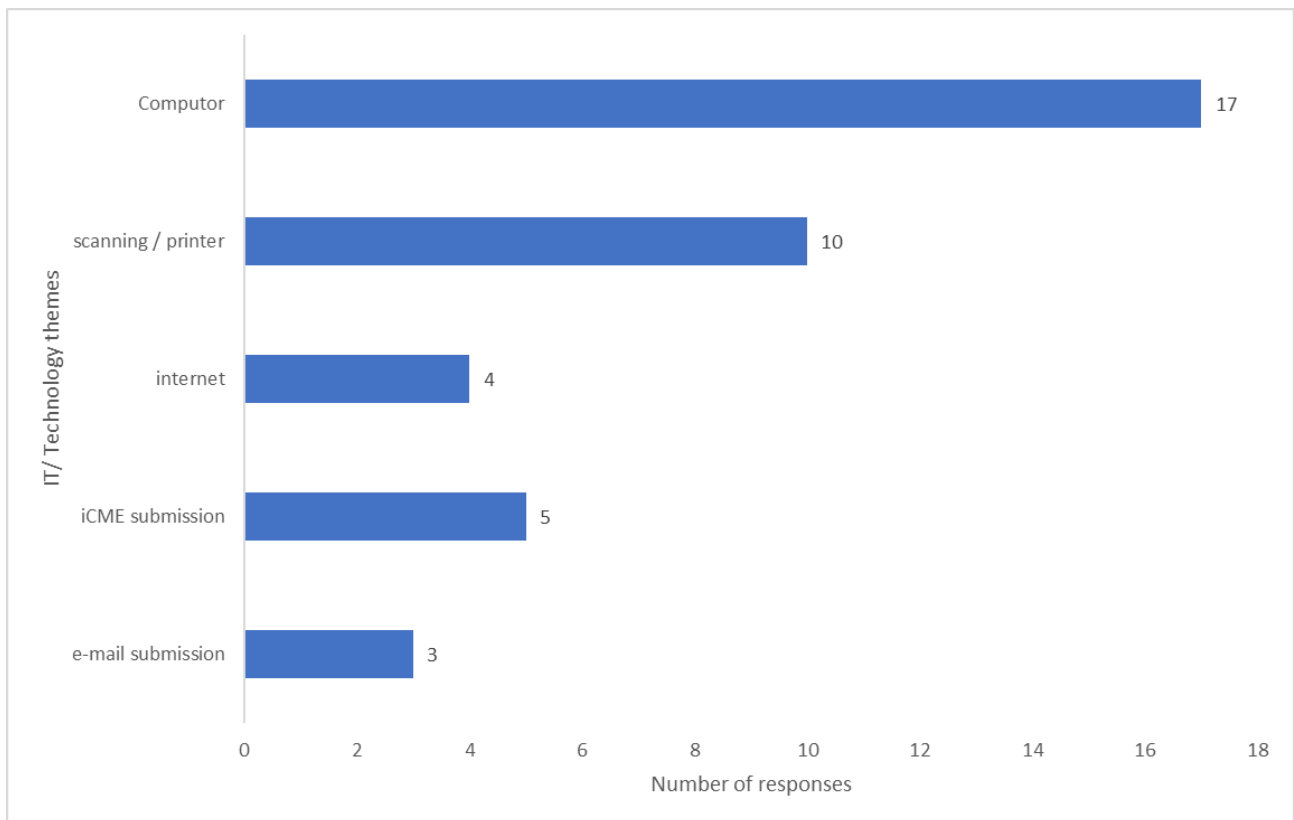
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Figure 2 Number of responses relating to IT and technical issues during the exam by theme

Computer issues were the biggest factor followed by the scanning /printer issues. As the comments below show this is a source of anxiety for many students.

Internet issues
'…Slow internet speed.' 'Intent [sic] went down for 5 minutes it just caused anxiety but it all went back to normal soon'
PC or laptop issues
'The tab for the iCME froze on my computer. The clock was still counting down but I could not move to the next question using next button on question status box.' 'My tablet had an error when I was trying to send my document to my email before submitting. It took much longer to fix than it should have so lost some time and ended up entering the "penalty period" and am very frustrated about this.' 'I managed to get the computer working by closing the laptop for a few minutes (around 3 or 4) but I lost some time doing this.' 'My keyboard stopped working so I couldn't type anything!'
e-mail submission issues
'The university did not even bother to create an iCME portal for disabled students (even though we are 20% of the student population at the OU) meaning we could not complete practice processes, have flexible start and in many cases could not even recieve the email never mind send the completed exam' 'When I contacted the student support and senior advisor an hour before my exam time ended they didn't know about the exam email address and it was 2 hours later after exam period ended they mentioned it.'
iCME submission issues
'When I pressed submit it did not ask me to pick a file so I don't know what I sent' 'I inadvertently pressed the submit button before uploading my answers on the system.' 'I went to submit one of my exams and the refresh rate on the page took my exam time to roughly 30 seconds after exam time was up.' 'Very confusing at submission stage the instructions are not clear cut'

Table 5 Representative voices from students relating to IT and technical issues experienced during the exam.

As a follow-on question, students were asked to indicate which of the following actions they did in response to their technical issues.
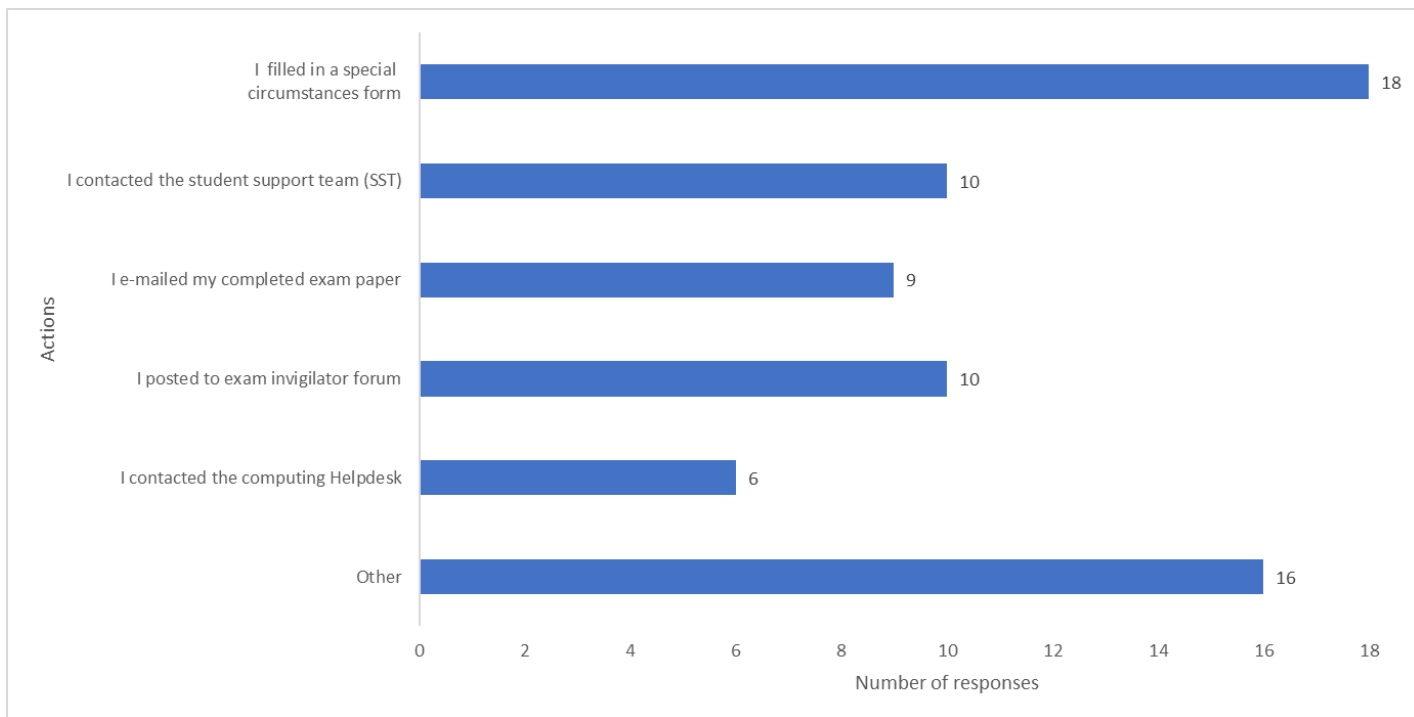
Figure 3 Number of responses relating to actions taken in response to technical issues during the exam, by theme

When asked whether their IT/ technical issues had been resolved, 33 students said yes, but 14 students (29.8%) said that they had not been resolved. In addition, under 'Other', various self-help actions predominantly concerning their hardware were described by students to resolve their technical issues.

Exam completion

A little over 10% of the 340 students who responded to the question 'Were you able to complete your remote exam', indicated that they were unable to complete their exam (38; 11.2%). Figure 4 provides a breakdown of reasons provided for being unable to complete their exam by theme.

Figure 4 indicated the relatively large proportion that saw time as a primary issue, although all these reasons are related. Table 6 provides representative quotes to include the student voice.
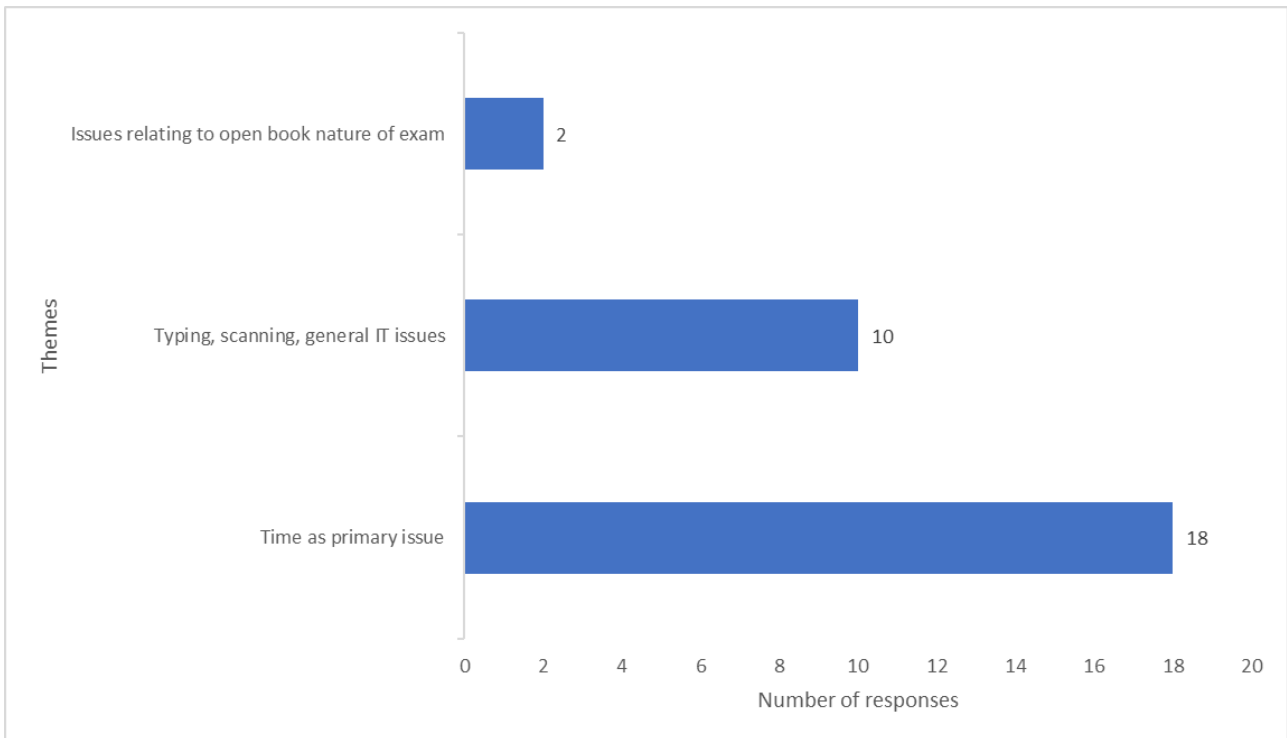
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Figure 4 Number of responses relating to reasons for not completing exam by theme

Open book nature of exam
'My exam didn't get additional time - it was 3 hours. It being open book was more of a hinder than a help - too tempting to refer to books which caused time to run out.'
'Exam set as open book, but insufficient time to consult books'
Time
'Not enough time given for the type and quantity of questions asked.'
'Time frame allowed to complete the questions was not long enough. Felt like I was under a lot of pressure from the start'
'The paper was unsuited to the time allowed. There was no thinking or reading time'
'Felt like there was not enough time in the exam to complete it some of my exams were only half done'
'I am not a novice where exams are concerned and have never failed to finish before. The time constraints meant there was no time for thought or planning and everything was rushed   *I didn't have enough time. 3 or 4 hours is never enough for me to write an exam.'*
'I submitted my exam but I ran out of time to complete it'
Typing, scanning, general IT issues
'I physically completed it but I was not able to use my Audio software eg read aloud which meant I have a high chance of missing marks for details.'

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> 'I submitted the exam but wasn't able to complete all questions due to the time taken to resolve technical issues and the slow speed of my laptop due to extreme heat.'
>
> 'I am unable to type quickly and this is a real disadvantage in this situation.'
>
> 'Time allowed – using a computer is actually slower than an exam in a room to complete.'

Table 6 Representative voices from students relating to exam non-completion

The value of hindsight

Theme	Number of responses
How little time I'd have / how fast it would go	37
That an open book exam would be harder/ take longer	4
That I'd have IT issues	33
That the support/ preparation would not have been adequate	11
That I would be confused about other aspects of the exam/ processes	21
That it would be ok / positive	21
Miscellaneous (timer / distractions / OU admin / anxiety)	13

Table 7 What students wished they had realised before their exam

When students were asked about aspects they were not aware of prior to sitting their exam, unsurprisingly time management along with IT issues were key factors identified by students as can be seen in Table 7. Lack of adequate support and / or preparation and confusion about exam processes were also mentioned by students.

Online interview findings

18 responses to the JISC based interview were received from 45 students who were available to be approached. It is important to note that responses were collected during February 2023, approximately 6-7 months after students would have received their 2022 F1 exam results. Students gave free text responses to the questions asked below and were also offered an opportunity at the end to give any other comments.

The answers given have been categorised into positive or negative comments and some themes were identified in their answers.

Question	Positive	Negative
Q1. How did your most recent remote exam feel, compared to previous exams you have sat in a face-to-face setting or remotely?	13 (72%)	5 (28%)
Q2. Do you think your experience would have been different in a face-to-face exam hall. If so, why?	4 (22%)	14 (78%)
Q3. Of the exam preparation support available which did you find most helpful and why was this? Was anything unhelpful, and if so, why was this?	17 (94%)	1 (6%)
Q4. Do you feel that your IT equipment was sufficient for taking your exam?	18 (100%)	0 (0%)

Students who made positive comments about remote exams focussed on the advantages of their home environment (43%), lack of travelling (36%) and the ability to choose timing (21%). Those who were categorised as negative about remote exams preferred to focus on the positive aspects of face-to-face exams such as the improvement of performance due to the stress and the ease of handwriting their answers.

From the positive comments about helpful exam prep, 45% felt that past papers were the most helpful. 35% found exam prep sessions most helpful and finally 20% found tuition (including support from tutors) most helpful. The only respondent who commented on unhelpful support focussed on the amount of information available before the exam and that some of it was contradictory.

All the students asked about their IT equipment indicated that it was sufficient for them indicating 'yes' but it is important to note that there were only 18 self-selecting respondents.

Some indicative student comments from the interview responses are shown below.

How did your most recent exam feel?
'Much better, much less stress. I haven't sat a remote exam before but was very pleased with the experience'   'I felt [...] less nervous, much more prepared. I was in a familiar environment with all the equipment I was used to and could begin when I was ready.'   'I was definitely more relaxed. No pressure to find parking or the exam centre etc. Being able to sit the exam at a time that suited me was also a great help'
Do you think your exam experience would have been different in a face-to-face exam hall?
'I do not like face to face exams and I am glad I will not do anymore. My last two modules do not require face to face exams. Noisy backgrounds, small desks, limited space, all conspire to make things uncomfortable'   'Yes, the nearest exam centres are 20-30 miles away. There would have been a huge amount of additional stress in getting there.'   'I would have arrived feeling stressed, even if there had been no issues with getting there, and the negativity would have continued from point onwards.'
Helpful exam support
'Practice tests and past papers are useful as they encourage filling in of knowledge gaps and provide reinforcement of ability. Mock exam similar to above and helps with the time management.'   'The exam preparation was helpful and there was available support with tips on revision and how to go about tackling a remote exam.'   'The only support I feel I need is good tuition. If I have a good tutor who presents one or two good tutorials before the exam I'm happy with that.'
IT equipment sufficient?
'Yes, but I'm fortunate to have a dedicated desk space plus dual screens. I think if people were having to work from a laptop screen it would have been a challenge.'   'Yes, everything was fine.'   'The IT equipment was fine - although I had a worrying moment at one point when my internet connection went down. However, I was able to get it back again quite quickly.'
Any other comments about remote exams
"I would like them to become standard. The ability to start the exam at a suitable time with less pressure on arriving to exam centres for the start was a massive help"   "They are very much preferred by me. Much of the artificial stress is removed and I find it much easier to concentrate on the exam itself being in a familiar environment"   "Please don't get rid of them! I can understand that those who haven't sat them may feel they are easier, but there was a definite step up in complexity of questions for both modules when compared to past 'paper' exams"   "For a part time student, the way the remote exams are set up are much more convenient to complete"   "Finally, I found the exam questions required a lot more time than that allocated. Disappointingly, I run out of time while I was working on a question for which I knew the answer"

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"Speaking personally, my last remote exam felt a little bit like a typing contest and I also struggle to type straight from memory. For most of my answers I needed to write something down first. This added to the time and led me not to finish all the questions. In saying that though, I don't think it changed the score that I ended up with in the module"

Table 8 Representative student voices from a JISC based interview

Focus group findings

The respondents were offered an opportunity to make any comments that they chose at the end of the interview. The majority chose to make positive comments about remote exams but some reiterated the issues about the lack of time and inability to finish their exam.

Some themes from the session are outlined in Table 9 with references from each contributor from each contributor listed as F1, F2 etc in the table below.

	F1	F2	F3	F4	F5
Being in own home	2	2	1	2	1
Open book	2	3	1	0	2
Lack of time	2	2	1	0	2
IT issues	0	0	0	1	0
Harder exam	0	0	0	0	3
Change in exam type	0	1	1	0	1
Anxiety	1	0	2	1	1

Table 9 Themes from Focus Group

As can be seen from the table there was much discussion on the advantages and disadvantages of being in one's own home. The ability to take breaks on the one hand was seen as a plus, but also distractions were more available. Four of the students discussed at some length the fact that having resources available to them (such as module materials and the internet) was not always helpful and could eat into the time available. Four of the students discussed their anxiety sitting the exam which tended to be linked to keeping to the time.

What does it mean for your exam experience that you have access to the module materials and the internet?
'I suddenly felt that there is an information overload'(F2)
'I actually found it more stressful having access to my books and the internet than in a conventional exam setting! It was too much of a temptation to look up something you didn't know' (F5)

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'it was reassuring … didn't feel the pressure of having to remember everything' (F1)
How did you use your time on the day?
'You don't actually know the notes that well and that's – it starts absorbing time, and once you get into the notes you start reading the notes again and that's not what you are meant to be doing' (F2)
What preparation did you do?
'I put in as many hours as I can manage of revision regardless of remote or not' (F1) *'I wonder if there is a tendency to have some false reassurance because it's an open-book exam and it doesn't look like the people in this group saying this, but I do wonder if some other people felt oh well, you know, I don't need to do as much preparation as its open book and I can look things up!' (F5)* *'Yes I definitely did less preparation than I would have done for an exam, or type of exam!' (F4)* *'I'd spent years working towards doing these exams, and everything that comes with that, and I felt reassured that I would be at home in a known and cosy environment, and I had everything set up, I thought, but I could not have prepared myself as the sheer panic when, with the timer words as well that – the digital timer that you have on the screen was ticking down and it really did panic for me and it definitely did affect my performance on the day, so in future I would have to prepare for that element of it'(F3)*

Table 10 Representative voices from students in the focus group

Discussion and conclusions

Our study builds upon previous research conducted at the Open University exploring the perspectives of students concerning their experiences of online exams. Analysis of survey responses from 631 students in this previous study indicated that most respondents (76%) had a largely positive exam experience, with only 5% and 19% of respondents reporting a negative or mixed experience (Aristeidou et al., 2021). This study was conducted on students studying in all faculties, with approximately 30% within STEM, whereas our project focused on student experience of exams conducted within the schools of SPS and LHCS. It must also be noted that the window for completion of exams within this 2021 study was mostly a 24-hour period rather than the shorter timed exam window of between 3-4.5 hours used in subsequent years on SPS and LHCS modules.

Our study highlighted themes that link to the questions of student anxiety and remote exams. These are split into preparedness, lack of time and IT and technical issues below but each of these does feed into the others.

1. Preparedness

The motivation in running the preparation sessions was to reduce anxiety in the students by equipping them with the information they needed and by promoting self-efficacy.

The majority of students in the survey said the exam preparation sessions were useful (see Table 3) with 56.2% saying that they were very useful in removing anxiety about their exam, The top 5 exam preparation activities undertaken by students (Figure 1), were recommended in our exam preparation sessions. However not all students that had responded had attended the sessions. Students discussed their own revision and revision opportunities within their modules in the interviews and focus groups; with some feeling that they had needed more support. Some also wished that they had practised with both their equipment and the online systems, as lack of preparation was the cause of some of the IT issues in Figure 2. We noted that there was low use of the SPS FAQs (only 11.8% of students accessed these) and of module forums for tricky questions, indicating that these need to better advertised. We also noted that 4 students (13.8%) reported that the appropriate time was not shown on the timer, despite having additional time arranged in advance.

The preparation of the home setting and exam environment ranked highly in Figure 1. When asked about this in the interviews the majority (72%) preferred the comfort they had at home and were pleased to be relieved of the logistics of getting to the exam centre (see Q1 and Q2 answers in particular). This was echoed in the focus group, with participants appreciating that they could take breaks (although this of course would

not be time spent on the exam) and discussing how they arranged their materials around them. The sense of preparedness may vary from student to student as was discussed in the focus group. The timed nature of the exam can cause anxiety even in the most prepared students, see table 10 *"I could not have prepared myself as the sheer panic when… the digital timer that you have on the screen was ticking down".*

People employ different coping strategies in response to stress; these have been categorised into active or 'approach' strategies focused on planning, taking specific actions or seeking support in response to a stressful or challenging situation and 'evasive' coping strategies which use distraction, denial and wishful thinking to evade a stressor (Zimmer-Gembeck, and Skinner (2016) as cited in Freire et al, 2020). A study by Freire et al., (2020) employed a self-assessment questionnaire to examine the relationship between different coping strategies profiles and self-efficacy of 1072 University students. Four different profiles were identified with varying extents of the 'approach' coping mechanisms; students with high levels of all three approach coping strategies (planning, taking specific actions or seeking support) showed the highest levels of self-efficacy. While not encouraging catastrophising, our pre-exam sessions supported students to conduct detailed advance planning and problem solving considering how they might cope should issues such as internet outage, laptop failure, upload issues occur during their exam as well as providing clear signposting to appropriate sources of SST and IT help should students need to seek support. It is plausible that through development of coping strategies, students' self-efficacy was also enhanced.

2. Lack of time

An overarching theme in both the quantitative and qualitative survey responses was that some students felt that they didn't have enough time to finish their exam. The reasons for lack of time or perceived lack of time are multifaceted. It should be observed that students have always run out of time in exams, but our survey did highlight some issues that are particular to the remote exam setting and may induce anxiety.

There was a perception it that the exam itself was more difficult, had too many/longer questions or was differently formatted to past papers from previous face-to-face exams. This was reported in the survey (Table 6) and was also discussed in the questionnaire responses to Q5 and the focus group. This issue of greater difficulty was repeatedly mentioned in the free text comments in the survey, particularly in Q8 where it was referenced 28 times. The feeling that they had not been given enough time to

complete their exam was voiced by many students. It was also discussed as an issue by the focus group. This was a complaint common to students in both SPS and LHCS.

Some students discussed distractions or lack of focus due to sitting an exam in their own home, leading to less time available to answer questions (tables 6 and 10). Clearly there is not parity of experience here depending on personal circumstances. Within the survey students mentioned being Interrupted, challenging childcare and issues connected with using their own set up including slow internet and printers and scrolling on a single screen. In the focus group participants largely appreciated that they could take breaks during the exam period (although this of course would not be time spent on the exam).

The exams had been classified as "open book". One response in the survey indicated that this had been an issue "It being open book was more of a hinder than a help - too tempting to refer to books which caused time to run out." As this had also been raised in the exam prep sessions this was something that we asked about in the focus group. The participants there did discuss that they were tempted to look at their own notes, books and module resources more than was warranted and feared that this cost them time. Indeed, this mirrors findings by Myyry and Joutsenvirta (2015) where over half of 110 Undergraduate students reported using more time to complete an open-book, open-web online exam compared to a traditional face-to-face exam. The complexity of information available to choose from when answering questions was cited by some students as a reason for the longer time taken to complete the exam paper.

3. IT and technical issues

Online assessment can potentially exacerbate educational and social disadvantage due to differences in access to, and literacy in digital technologies associated with age, gender, and socioeconomic factors. As mentioned above some students felt let down by their own internet speed and equipment. Another anxiety for students was the formatting, scanning and upload of the materials. This was particularly challenging for some students with disabilities who may have issues typing or needed to use additional software (Table 6)

The logistics of using the iCME system and uploading the finished document was also a source of worry, with some students unable to complete the final step of submission. There was confusion about the timer and whether the division of time between completing the exam and upload time was measured. IT issues were mentioned 38 times in the free text answers to Q4, Q7 and Q8 and was discussed in the focus group. It is of concern that 14 students (29.8%) said that their issues had not been resolved. It is likely that the 10 students that were unable to complete their exam due to IT issues (see figure 4) were among these 14 students.

Digital poverty is clearly relevant and access to printers and multiple screens, with some students noting that they would have had a better experience if they had two screens. Interestingly the group interviewed were generally positive about their IT set ups and didn't flag this as an issue. Differences in digital proficiency and confidence also factor. Although younger students may be considered digital natives (Prensky, 2001), they may be more comfortable with social media and not so conversant with systems used for online exams thus less able to trouble shoot should there be an unexpected issue.

Final words

There were some limitations to the data that we gathered. Our sample was relatively heterogenous; students were taking exams across 14 different modules at different levels of study, with just over one third not having previously taken an OU remote exam. Although 349 students completed our survey, this was a small fraction of those taking their exam that year. Furthermore, it must be acknowledged that there may have been a degree of response bias in the students who completed the initial survey, with students who had a difficult exam experience potentially being more motivated to complete the survey to express their frustrations.

There was a gap of eight months between the pre-exam survey and the follow up questionnaire and the focus group, meaning that students would have received their module results when they participated in the later events which may have led to a change of perspective. The interview cohort was quite small, with 18 students responding and the focus group smaller still with 6 students taking part. Finally, the survey, online interview and focus group data were self-reported, which has potential to bias the results.

Nonetheless the themes we identified above have led us to a number of key conclusions and recommendations.

- Preparing students for their exam via the online sessions did reduce the anxiety of many. This work should be continued and extended, to equip students with as much information and support as possible in the run up to the exams to develop their coping strategies and self-efficacy. We should remember the fact that even with all this support in place, some students will find exams very stressful.
- Timings proved a significant issue. It is important to emphasise to students that searching for internet-based resources is not needed. We recommend that module teams consider how much they expect students to consult module materials when writing exams and plan the amount of content accordingly. Clarity around timings and the timer itself would address the concerns of many students.

- Inequality of students' own equipment is likely to continue to be a factor in remote exams as will the nature of the students' home setting. There was anxiety around the use of the iCME systems and we recommend that ongoing technical support during the exam period is vital to allay these concerns.

Impact

Our project had impact on the student experience, practice within our schools and the wider community.

Student experience

It is plausible that our exam preparation sessions contributed to a better examination experience for the 21J cohort who sat their exams in June 22, as measured by fewer reports of issues on forums and fewer phone calls to the SST. Student feedback in our surveys attested to the benefit of the sessions and data from ACQ showed a 5.5% increase in exam completion in June 2022 (93.7%) for SPS modules, compared to the previous year (88.2%). For the 22J cohort the material presented was refined based upon findings from the student survey. As technical issues were a clear source of anxiety both within the exam and in the preparation, we worked with colleagues to try and support students to resolve technical issues. IT colleagues were included in our 22J exam prep sessions to provide direct advice to students about dealing with technical problems and colleagues from the Student Support teams were also there to explain what to do if issues prevented exam completion in the time.

The time allocation was clarified, and students advised to consider carefully their time spent looking at module materials and cautioned against referring to wider internet. The need to practise producing a document was emphasised and SPS students encouraged to decide whether to type or handwrite based upon their own skills, and the type of questions that they would face. It was noted that students seemed more relaxed in the 22J preparation sessions than in the previous year.

There are plans to further develop FAQs written as a response to this project and to distribute these to students before the 23J exams. As our survey findings indicated a low uptake of this resource, plans are being made to advertise it more widely.
It is reasonable to assert that equipping students with more information about exams leads to less anxiety for the majority of students, greater completion of exams and therefore more students moving on to the next module, improving retention and / or progression on our qualifications.

A colleague from another STEM school subsequently ran similar exam preparation sessions after hearing of our project. She felt that this approach reduced student anxiety about exams and is looking to implement this approach more widely.

Teaching

Findings from our survey were disaggregated by module and shared with Module teams who used these findings to inform setting exam papers and planning student support measures. In addition, our presentations highlighting the issue of lack of time fed into discussion about the number of questions to have and to factor in time spent looking at module materials. The issues of anxiety and lack of time was shared with exam markers to inform their practice. This project was of wider benefit to students taking exams within our Schools. ACQ and module teams' amended guidance, also is of benefit to all students.

The project leads contributed to discussions resulting in changes to ACQ guidance given to students on the Help Centre. The term "open book" was removed and replaced with "You can consult your module materials and other online resources during your exam but be aware that you may not have time to make extensive use of these resources if you're taking a timed exam."

List of deliverables

- Remote exams FAQs (SPS) This is a document outlining all the information that the students will need on the day.

- Slide decks for Remote exam sessions

Conference proceedings

Oral presentation at the 13th eSTEeM conference: Moorman, F., Warriner, G. & Whitehead, B. 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS' (April 2024)

Oral presentation at 'Share First Friday' cross faculty Staff Tutor community event: Moorman, F., Warriner, G. & Whitehead, B. 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS' (Jan 2024)

Can we reduce anxiety of students sitting online exams? Moorman, F., Warriner, G. & Whitehead, B Abstract submitted to Horizons in STEM (2024)

Oral presentation at the 12th eSTEeM conference: Warriner, G., Whitehead, B. and Moorman, F. 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS?' Preliminary findings (April 2023)

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Non-refereed presentations

Invited presentation to STEM ST Conference as part of 'Scholarship for all' workshop: Warriner, G., Whitehead, B. and Moorman, F. 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS?' (March 2023)

Invited presentation at School of Physical Sciences Physics Education Research & Scholarship of Teaching and Learning Seminar 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS' Warriner, G., Whitehead, B., Moorman, F. (October 2022)

Invited presentation at STEM Board of Studies Group 'Can we reduce anxiety of students sitting online exams? Sharing best practice between SPS and LHCS' Warriner, G., Whitehead, B., Moorman, F. (October 2022)

University approval processes

SRPP/SSPP – Approval from the Student Research Project Panel/Staff Survey Project Panel was obtained according to the Open University's code of practice and procedures before embarking on this project. Application number **2022/2303**

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/4383/Moorman** - work was classified as local evaluation research that did not require formal HREC review.

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 28-04-097**

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