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Lessons from a pandemic: how can we use disabled students experiences of online learning to develop more inclusive models of teaching?

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ABSTRACT

The shift to online learning during the COVID-19 pandemic presented both opportunities and challenges for students with hidden disabilities in higher education. This study examines the experiences of students with hidden disabilities at a UK university during the academic years 2019/20 and 2020/21, focussing on the accessibility, effectiveness, and impact of online learning. A questionnaire was designed and disseminated to students university wide and 96 people with hidden disabilities completed it, providing quantitative and qualitative data on a wide range of issues pertaining to online learning.

The findings from this investigation suggest that the vast majority of participants found online learning challenging, citing isolation, loneliness, anxiety and motivation issues as primary barriers. However, many respondents did appreciate the increased flexibility that asynchronous learning resources provided and felt more able to study at times that were conducive to them. As a result, approximately 65–70% of respondents wished to move to a permanent blended learning model in the future.

The study underscores the importance of developing inclusive teaching strategies that accommodate diverse needs, particularly for students reluctant to disclose disabilities. Key recommendations include creating engaging asynchronous content, implementing universal accommodations, and prioritising flexibility in educational delivery. These findings contribute to ongoing discussions about fostering equity and inclusivity in higher education.

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1. Introduction

1.1. Literature review

Due to the worldwide spread of Covid-19 in 2020, universities in the UK and around the world had to adapt their teaching methods at extremely short notice to ensure that they could deliver their courses while also obeying government rules relating to social-distancing. In the vast majority of universities, this meant that all teaching was moved online and software such as Microsoft Teams and Zoom was used to facilitate the instruction of large groups of students (Hodges et al. 2020).

The transition to online learning happened very quickly, and this had a significant effect on academic staff and students who had to readjust to this new normal. All staff had to prepare how to teach in an online learning environment, yet many staff did not feel comfortable doing this as they lacked confidence in the use of relevant software needed to deliver online education (Junus et al. 2021; Littlejohn et al. 2021; Polly, Martin, and Guilbaud 2021). Additionally, some staff did not feel comfortable communicating with and assessing students solely using electronic means (Kearns 2012). A further complication concerned the nature of the subjects being taught, with some staff teaching subjects that do not seem to easily translate into an online learning environment (Ní Fhloinn and Fitzmaurice 2021), and others having to figure out how to teach material from distance that traditionally rely on laboratory and/ or practical work (Lellis-Santos and Abdulkader 2020; Villanueva and Zimmermann 2020). There are also pedagogical challenges when changing the mode of delivery, as strategies for learning that work well in a classroom may not be replicated in a virtual environment (Ali 2020).

For many students, the move to online learning proved very challenging. Different studies have shown that access to computers and good internet reliability are significant barriers to online learning (Muilenburg and Berge 2005), while many students reported issues with distractions and concentration when working from home (Lemay, Bazelais, and Doleck 2021). Some students were also very reluctant to move to online learning and struggled with the intrinsic motivation needed to successfully study online (Aguilera-Hermida 2020). However, perhaps the biggest drawback of learning exclusively online was that many students experienced significant loneliness and social isolation (Gillett-Swan 2017). An investigation by Richardson, Elliott, and Roberts (2017) discovered that loneliness in the student population often leads to the development of mental health problems, and several studies that investigated the effects of lockdown on mental health in different countries around the world (e.g. Adams-Prassl et al. 2022; Ahrens et al. 2021; Banks and Xu 2020) found significant evidence that lockdown had a negative effect on the mental health of much of the student population, particularly women (Elmer, Mepham, and Stadtfeld 2020; Werner et al. 2021). Based on this wealth of evidence, it seems likely that an increasing number of students would have suffered from mental health problems during the pandemic.

From the perspective of students with disabilities, work by Kotera et al. (2021) raises the real concern that online learning can be a real challenge for this group. Previous research has already shown that students with mental health conditions can be reluctant to disclose their conditions to universities as they are worried about perceived stigma (Kendall 2016; Martin 2010) and so may not be accessing support that they need to thrive (Marshak et al. 2010). A key investigation by Meleo-Erwin et al. (2021) further

indicated that many universities did not provide a sufficient wealth of online information about sources of support for disabled students during online learning, which meant that some students struggled unnecessarily with their studies and their health. However, online learning is not inherently inaccessible, or actively avoided by disabled students, as evidenced by institutions such as the Open University, which taught over 35,000 disabled students in the academic year 2021/22 (The Open University 2024). This highlights that the challenges for disabled students during the pandemic arose not from the transition to online learning as a modality but from the unexpected shift in teaching formats and inadequate preparation for addressing accessibility needs.

Despite the points made above, online learning boasts some significant advantages for students with disabilities. One of the biggest advantages is that traditional classroom models of learning can leave many disabled students feeling excluded (Fuller* et al. 2004), whereas online learning environments have the potential to be much more inclusive and can help students with disabilities avoid unwanted attention and stigmas (Burgstahler 2015). Incorporating elements of online learning into any degree programme allows for the creation of flexible learning environments that meet the needs of all learners (Capp 2017), particularly with regard to the flexibility of the location an time that a person chooses to study. In fact, there is evidence that the introduction of online learning can reduce the number of student absences (Keramidas 2012). Online learning also enables students and staff to engage and interact both synchronously and asynchronously (Seale 2013; Tandy and Meacham 2009) and potentially more frequently. Richardson and Radloff (2014) reported that frequent interactions between students and staff lead to a perception that both groups are allies in learning, and technology that offers the opportunity for an increasing number of interactions has the potential to enhance this effect and strengthen this idea. However, these authors note that a perceived increased in distance between staff and students can lead to miscommunications and less rapport between students and staff.

When considering all the arguments discussed above, it would seem fair to surmise that students with disabilities are likely to have had differing experiences of online learning during the pandemic, with some battling against additional barriers created by learning from distance and others seeing an enhanced inclusivity in their learning environment and richer educational experience.

1.2. The current study

This study aims to investigate the experiences of students with hidden disabilities during the shift to online learning at Liverpool John Moores University (LJMU) in the academic years 2019/20 and 2020/21. While it is not possible to generalise findings to all disabled students or institutions globally, this research provides valuable insights into the experiences of a specific group of students within a defined institutional and national context. The UK higher education system, characterised by its particular infrastructure, pedagogical approaches, and institutional support mechanisms, provides a distinct backdrop for this investigation.

The decision to focus specifically on students with hidden disabilities was informed by several considerations. Existing research highlights that students with hidden disabilities often face unique challenges, such as difficulties disclosing their conditions due to stigma or fear of judgment, which can limit their access to institutional support mechanisms (Chaudoir and Fisher 2010). Furthermore, hidden disabilities, including mental health

conditions, specific learning disabilities, and chronic illnesses, can be less visible to staff and peers, potentially leading to their needs being overlooked or inadequately addressed (Couzens et al. 2015).

By examining the experiences of this subset of disabled students during the pandemic, this study aims to explore whether the shift to online learning exacerbated existing challenges or provided opportunities for greater flexibility and inclusion. While our findings are specific to LJMU, they contribute to a broader understanding of how online learning impacts students with hidden disabilities and offer important insights for improving inclusive teaching practices in higher education. This research acknowledges the variability that may exist across institutions, countries, and pedagogical systems but emphasises the value of studying a particular group within a specific context to identify actionable recommendations for future practice.

The specific research questions guiding this study are as follows:

- did students with hidden disabilities tend to find online learning a generally positive or negative experience?
- what were the best and worse aspects of online learning?
- which types of online resources were the most successful in facilitating learning?
- which elements of online learning should be retained and implemented in the future?
- do students wish to return to more traditional models of learning in the future?

Through these questions, the study seeks to capture the nuanced perspectives of students with hidden disabilities and identify strategies for creating more inclusive and flexible learning environments in higher education. In order to answer these questions, a questionnaire was disseminated to students with hidden disabilities university wide. We discuss this in more detail in the next section.

2. Materials and methods

2.1. Summary of online learning at LJMU in 2020/21

After the UK initiated a nationwide lockdown in March 2020, all teaching at Liverpool John Moores University (LJMU) was moved online, except where students were required to complete a significant amount of practical work. Given the prevalence of Covid-19 that was still circulating in the UK before vaccines were widely available, LJMU made the decision to continue teaching online throughout the academic year 2020/21 with staff and students working from home. Students were able to access the campus and university buildings to use computer labs, and were able to use the library, but with the exception of a few practical labs and clinical practise, all interactions with staff, including lectures, tutorials and 1:1 sessions, took place online.

The overwhelming majority of coursework assessments were unchanged during this move to online learning, but closed book examinations were replaced with open book, uninvigilated examinations and students were given double time to complete their exams whilst working at home. All exam papers were disseminated to students via the virtual learning environment (VLE), with students expected to upload their attempts to the VLE at the end of the exam.

Students who had formally declared their disability to LJMU, whether physical or invisible, and had an individual student learning plan (ISLP) to support them were still eligible to receive the same support that they received on campus (e.g. automatic extensions for assessments, access to specialist support and 1:1 support). However, students who received extra time for examinations received the standard double time tariff afforded to the class as a whole; no additional adjustments were made. Students without an ISLP or students who had not declared their disability received no additional support beyond that offered to their peers.

2.2. Study and questionnaire design and dissemination

A questionnaire containing 28 questions was designed by the project team and developed with the goal of identifying students' feelings about their experience with online learning as a result of the COVID-19 pandemic. The survey comprised a mixture of quantitative and qualitative questions, with a 5 point Likert scale ranging from 1 (strongly disagree/ very unlikely) to 5 (strongly agree/ very likely) used for the quantitative questions. Respondents were given the option to provide additional text comments following each quantitative question, allowing them to elaborate on their answers if they chose to do so.

The survey was emailed to all LJMU students (approximately 27300 people) in June 2021 using faculty emailing lists. This was because the team wished to receive responses from students who had declared their disabilities and those who had not declared their disabilities, and this seemed to be the only way to reach both of these groups of people. Students were instructed not to fill in the survey unless they had a hidden disability, and were also asked if they were happy for us to use their responses in this study. All respondents gave us permission to do so.

Prior to circulating the survey to LJMU students, ethical approval was sought from and approved by the University Research Committee (UREC) at LJMU (reference number 21/CMP/003).

2.3. Initial hypotheses

Drawing on existing literature about students' experiences of teaching and learning during the COVID-19 pandemic (outlined in the literature review) and the authors' observations from interactions with students and discussions with colleagues in other disciplines, we developed the following initial hypotheses for this study:

(1) Diverse Perceptions of Online Learning: There will be no clear consensus from the survey population regarding online learning. While some students will have appreciated the flexibility and found it easier to study remotely, others will have struggled with the lack of structure, isolation, or other challenges.
(2) Poor Reception of Online Lectures: Online lectures will have been poorly received, with most participants expressing dissatisfaction. This prediction is based on previous reports of technical difficulties, reduced interaction, and a lack of engagement commonly associated with synchronous online delivery.

(3) Minimal Variation Between Faculties: We expect there will be limited variation in student experiences across faculties, as the shift to fully online teaching was implemented universally across degree programmes, with very few exceptions.
(4) Preference for Retaining Aspects of Online Learning: We anticipate that the majority of respondents will favour retaining specific elements of online learning when face-to-face teaching resumes (e.g. recorded materials and lectures)

These hypotheses reflect both findings from the literature and insights gained through personal observations of how students adapted to the rapid shift to online learning. By framing these hypotheses, we aim to explore the extent to which the anticipated trends align with the survey findings.

2.4. Study demographic

A total of 96 students responded to the survey. All respondents were asked to state the nature of their disability, the faculty to which they belonged and whether they had declared their disability to the university or not. This information is presented in Figure 1. Note that APSS refers to the Faculty of Arts, Professional and Social Studies, and that the total number of disabilities is higher than 96 as some students declared multiple disabilities.

We note that over half of the students who completed the survey declared that they had a mental health condition, whilst approximately one third of the participants had a specific learning disability. Additionally, the majority of respondents belonged to the Faculty of Health, whilst the Faculties of Science and Engineering and Technology (FET) were also well represented.

We also note that over 20% of respondents did not declare their disability to the university and would not have been eligible to access any specialist support to help them with their studies. Given that an additional 10% of respondents preferred not to answer this question, the actual number of students who did not declare their disability could have been as high as 30%.

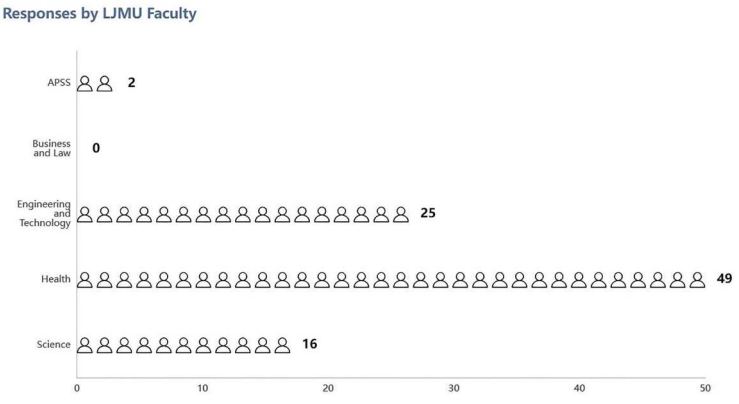
3. Results

Whilst all of the questions are valuable in their own right, this article focuses on the following key questions/statements:

- I have found online learning less challenging than in-person learning (Q2)
- I have had no difficulty engaging in live online classes (Q11)
- I have had no difficulty engaging with recorded materials (Q12)
- How likely would you be to attend in person classes if they were all recorded? (Q18)
- Given the option, which learning approach do you think would be most beneficial going forwards? (Q19)

The scoring system for these questions is described in Table 1.

These specific questions were chosen because they attracted the most detailed text responses from students, offering valuable insights into the reasons behind their



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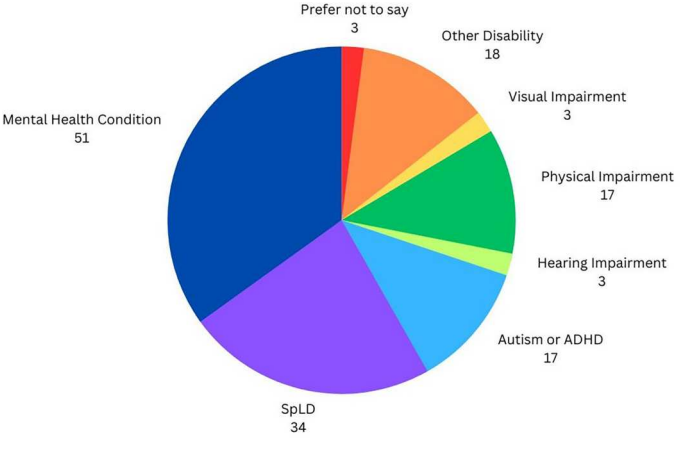

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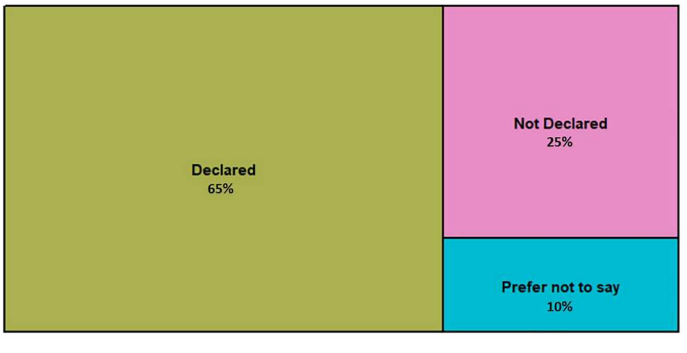

(c)

Figure 1. The different demographics of the students who responded to the survey. The figure in (a) shows the different faculties that the respondents belong to, (b) describes the number of students with different types of hidden disabilities represented in the study and (c) whether students had officially declared their disability to the university or not.

Table 1. A description of the possible responses and scoring system for the questions considered in this work.

Question	Response type	Possible answers
2	Numeric	1 (Strongly disagree) – 5 (Strongly agree)
11	Numeric	1 (Strongly disagree) – 5 (Strongly agree)
12	Numeric	1 (Strongly disagree) – 5 (Strongly agree)
18	Numeric	1 (Very unlikely) – 5 (Very likely)
19	Textual	'Blended', 'Online', 'In person'

answers. They also provided rich qualitative and quantitative feedback about students' experiences of teaching during the study period and their preferences for future learning approaches.

In analysing responses to these questions, we examine both the overall population and various subgroups, which are categorised as follows:

- by disability type
- by the number of disabilities respondents have (single or multiple).
- by whether students formally declared their disabilities to LJMU or not
- by Faculty.

For some questions, we present results for the total population alongside subgroup analyses where notable differences emerge. For others, only the overall population results are considered. Qualitative analyses were performed using the method of Braun and Clarke (2006) to identify recurring patterns present in the data,

It is important to note that we cannot test for statistical significance for data split by disability type. This limitation arises because many respondents reported multiple disabilities, making the subpopulations non-independent. However, for other subgroup analyses, such as those based on the number of disabilities, formal disability declarations, and Faculty, chi-squared tests were performed to further examine the results. The detailed outcomes of these tests are presented in Appendix and are briefly summarised in the subsequent text.

3.1. Students overall experience of online learning

3.1.1. Quantitative analysis

The responses to Q2 from all participants who took part in the survey are contained in Figure 2. We can see from these results that this question drew very mixed responses as some students reported that they found online learning much more challenging than face-to-face learning, whilst others found it much easier. However, we can see that the majority of respondents found online learning more challenging than face-to-face learning, with the modal response to this survey being a 1 or 'strongly disagree'.

Given that the overall set of results to this question is mixed, we may obtain a clearer picture by considering responses obtained within different subsets of the data. The results presented in Figure 3 depict the responses to Q2 for the student with the four most commonly occurring disability types that appear in the survey. We can see that the results obtained for the students with SpLD, social communication disorders and mental health conditions are very similar to those of the total population. However, the

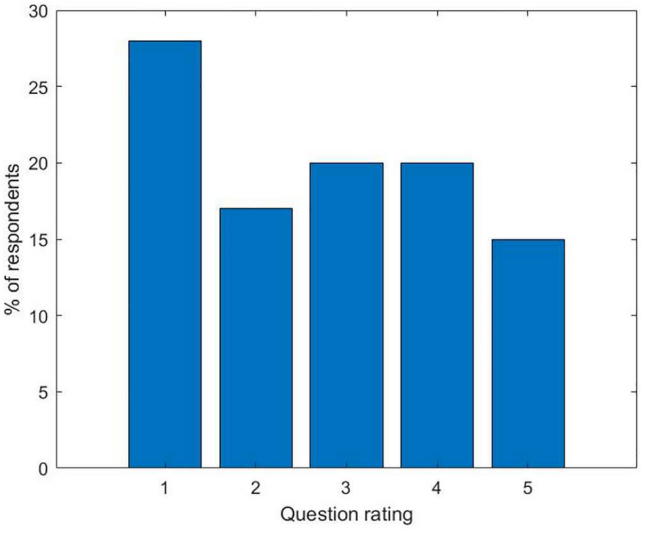

Figure 2. Survey responses to Q2 'I have found online learning less challenging than in-person learning' obtained from all respondents.

results for the group with hidden physical disabilities appear to be rather different as the modal response is a 4 or 'agree'. This suggests that students in this group had a much more positive experience with online learning.

We note here that splitting the data by the number of declared disabilities or by formal disclosure to LJMU revealed trends consistent with Figure 2. These results are therefore not shown here.

3.1.2. Qualitative analysis

Many of the responses from the group of people who declared a physical disability indicated that it was much more comfortable to work at home and easier to manage their conditions. Two of the members of this group provided the following comments:

> It's been more adaptable around my illness. Less pressure to get dressed and get into university. Doing lessons in comfort of own home with own facilities rather than hot and uncomfortable classrooms. Lectures being recorded means can look back over them. Only downside is less ability to ask questions and discuss things with peers.

> It's easier for me to manage my bad days with my disability at home with things to make me more comfortable to manage my pain but I also believe learning in person can't be replaced with online learning all the time, as you will be missing out on peer discussions and asking direct questions and becoming involved

A further benefit identified by members of this group is that online learning requires no need to travel to campus and can save time, effort and money.

> The ability to cut out my commute to uni has meant that I can manage my conditions more effectively and learn in a more comfortable environment.

Students outside of this group also identified the ability to avoid potentially lengthy commutes to campus as a significant advantage of online learning.

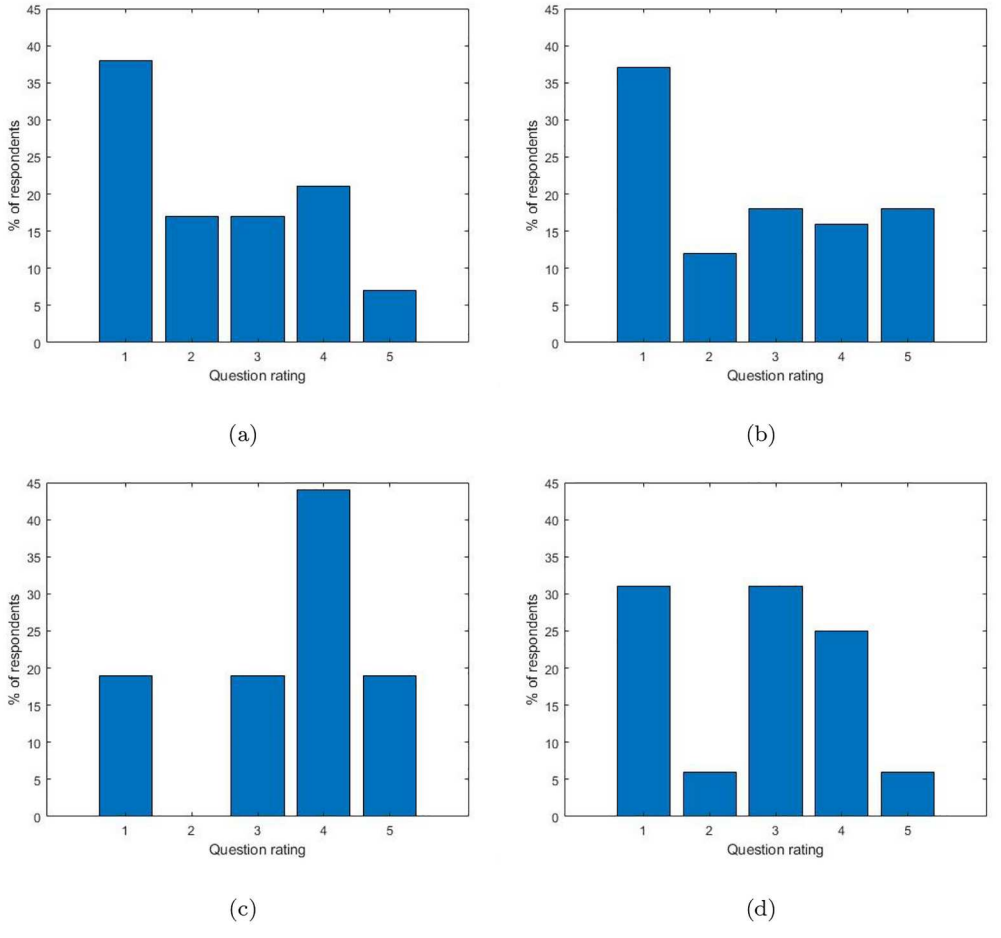

Figure 3. Survey responses to Q2 'I have found online learning less challenging than in-person learning' sorted by disability type. Figure (a) shows the results for students with specific learning disabilities (SpLD), figure (b) shows the results for students with a mental health condition, figure (c) shows the results for students with a physical health condition and figure (d) corresponds to students with a social communication disorder.

> I feel its less stressful because I have children so I do not need to rush to get to the uni (sic). Also less stress not sat in traffic.

Some students also reported feeling less anxious when studying from home:

> Felt less anxious, I became more participative (sic) in lessons, made feel less judged by my colleagues.

> No face to face contact with people I don't know so it's easier to concentrate without feeling anxious.

However, 30 respondents focussed on the more negative aspects of online learning and were unable to find any positives in the experience. The primary negative aspects reported by students were feeling isolated:

The isolation of online learning is not a good thing.

struggling with motivation and distractions:

Due to my autism, my home and especially my room are considered my safe place. It is filled with distractions and I lose interest in my lecture super easily and quickly because of the distractions.

It doesn't feel as legitimate as in person learning so I struggle to stay motivated. I also don't know any of my lecturers so asking for help is more difficult.

and finding it difficult to juggle university study with demands at home

At home I am a mum first, at uni I am a student, online learning has left me leaving things last minute and not focusing properly to sort child care instead.

3.2. Synchronous and asynchronous learning resources

3.2.1. Quantitative analysis

The results in Figure 4(a) present the entire group's responses to Q11. This question aimed to discover how easily students with disabilities were able to engage with and learn from synchronous activities, and these results indicate that approximately 75% of respondents found online classes hard to engage with. This finding was investigated in more detail by considering the results obtained when responses were sorted by disability type and faculty but no new insights were obtained (not shown here).

The results in Figure 4(b) present the entire group's responses to Q12. In this case, we can see that the students surveyed were far more positive about asynchronous learning resources with approximately 50–55% of students indicating that they found them easy to engage with and beneficial to their learning. As for Q11, breaking down responses by disability type and faculty reveals an almost identical results profile for each group, and no new insights are obtained (not shown here).

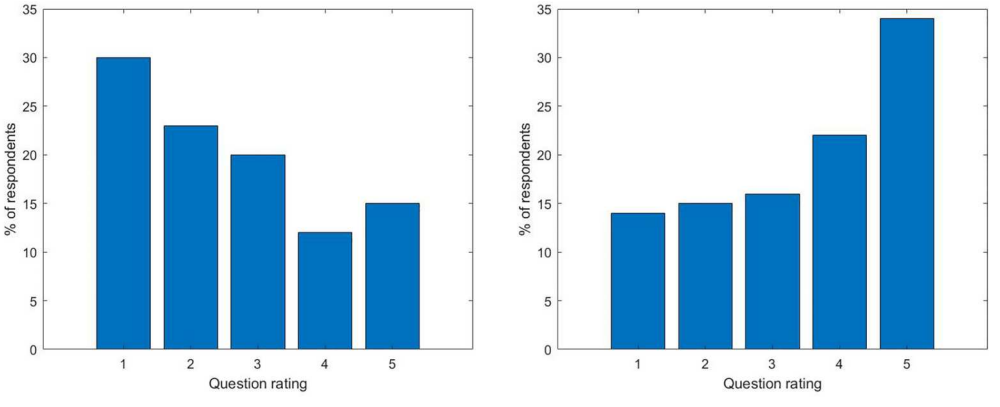

Figure 4. Survey responses to (a) 'I have had no difficulty engaging in live online classes' (Q11) and (b) 'I have had no difficulty engaging with recorded materials' (Q12) obtained from all respondents.

3.2.2. Qualitative analysis

When questioned about the usefulness of synchronous resources, a few respondents highlighted how poor internet connections prevented engagement in live classes:

> Live online classes are stressful especially with bad technology.

However, many respondents were very critical of lectures that took place on Zoom. The main reasons for this were that putting cameras on, using the chat function and asking questions made people feel very anxious.

> It has been difficult to engage at times, especially through turning on the mike (sic) and speaking, or sending a message in the public chat. It is extremely anxiety inducing, especially turning on the camera, as it feels like everyone is watching you, particularly if not many others have their camera on.

> Don't like talking on zoom because feel like everyone is listening to me, rather ask questions after lesson (sic).

Some students with sensory issues also found it very difficult to concentrate during online lecture:

> I've had some problems with Zoom where you cannot mute other students. Because of my condition I cannot focus properly if I hear external noises, especially loud ones.

In contrast to the feedback received about Zoom lectures, recorded materials were received very positively by many of the students surveyed here, mainly because they could be watched repeatedly to assimilate information:

> Recorded materials were great as you can pause rewind, play etc at your leisure.

> It was really helpful having lectures recorded as I could pause them, go for a walk and then come back (stopped my eyes hurting!)

and because poor internet connections did not cause a problem when accessing such materials:

> Recorded materials are easy for me to view with my bad technology.

Those students who struggled to engage with asynchronous resources cited issues focussing on the material:

> I really struggle to engage with lectures that are not live and often find myself distracted and not paying attention.

> I found myself have to rewind multiple times as I felt I hadn't properly taken the information in, it also doesn't allow questions to be asked like you would expect in a normal lecturing environment.

Many of the students who did not like recorded materials had a sensory processing disorder, and particularly struggled with both the lack of interaction in such resources and sensory sensitivity with colours of slides and font-size:

> I have ADHD so pre-recorded material can be difficult to stay focused on due to no interaction.

> A lot of the PowerPoints have been arranged well, but most aren't, and have so much information crammed into one slide, in different colours and fonts, and they are very inaccessible for people with sensory processing issues or sensitivities.

3.3. Future likelihood of attending lectures

3.3.1. Quantitative analysis

In addition to surveying students about their experiences of online learning, we attempted to gain some insight into the likelihood of students attending classes in the future (Q18). Students responses to this question are presented in Figure 5. We can again see that while the modal group is 5, which corresponds to 'very likely', the overall picture is mixed with between 30–50% of respondents being unlikely to attend or unsure about attending. This picture varies somewhat if we split the results up into different subgroups.

Table 2 presents descriptive statistics responses for a selection of subgroups of respondents. The table indicates some groups of students would still be very likely to attend lectures in the future whilst others would almost certainly not. In particular, students with a physical disability or a social communication disorder indicated that they would be much less likely to attend classes in future.

Performing chi-squared tests on the data for this question reveals that the differences between Faculties are highly significant at the 5% level (p-value 0.01). The median values obtained for these populations coupled with this result indicate that students in the Faculty of Health are significantly more likely to attend lectures in future than students in FET, with 21 respondents from Health stating that they would be very likely to attend future classes.

3.3.2. Qualitative analysis

Those students in favour of returning to in person classes said that it was easier to engage with their peers and social interaction make for easier discussions:

> I would be able to socially interact with peers and discuss learning experiences and materials, etc. We are human not robots.

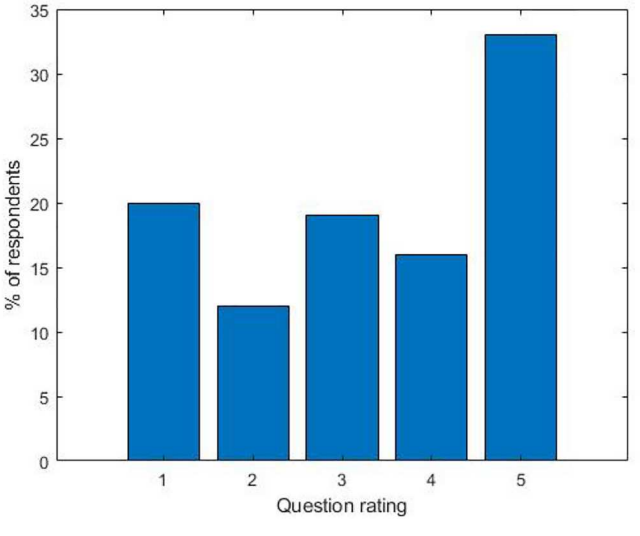

Figure 5. Survey responses to Q18 'How likely would you be to attend in person classes if they were all recorded?' obtained from all respondents.

Table 2. Descriptive statistics obtained from several subgroups of respondents for Q18.

Respondent Subgroup	Mean	Median	Mode
SpLD	3.19	3	5
Mental Health Condition	3.06	3	5
Physical Health Condition	2.88	2.5	1
Social Comm. Disorder	2.88	3	1, 3
Students with one disability	3.46	4	5
Students with multiple disabilities	3.05	3	5
Students who declared their disabilities	3.45	4	5
Students who didn't declare their disabilities	3.18	3	5
FET Students	3.20	3	5
Health Student	3.39	4	5
Science Students	3.29	4	4

> Much better interaction with live classes and makes for easier discussion with class mates.

Other students stated that they are more comfortable asking questions in person:

> During in person classes, we can ask the questions to things we don't understand either during or after the lecture. I'm less likely to ask if its an online lecture.

Those students who said that they would be unlikely to attend in-person classes in the future highlighted the advantages of distance learning in helping to maintain their work/life-balance. Some of the reasons given included that flexible learning from distance is an excellent way of managing childcare responsibilities:

> I'm busy with a child. I could save money on childcare if I could listen to a lecture while she is sleeping at night rather than during the day.

and that learning from home saves time commuting and allows people to manage their disabilities more effectively:

> My travel to LJMU is 2 hours each way, which hinders my focus on learning and also may trigger my disabilities. Having all content available online as an option for people like me would really break down the barrier to higher education for those with disabilities, whether they are mental, physical or otherwise.

3.4. Preferred mode of future learning

3.4.1. Quantitative analysis

The final question that we investigate here concerns the respondents preferred mode of study in the future. The responses to this question are contained within Figure 6, and unlike the responses to the other questions, indicate a clear preference for one option. Between 60–70% of respondents indicated that blended learning would be their preferred approach to study in the future, and this proportion remains unchanged even when we consider splitting respondents by disability type. However, splitting respondents up by faculty indicates a different response, as can be seen in Figure 7. The results obtained by students from the faculties of Health and Science are almost identical to the results produced for the total population, but the results for students from the Faculty of Engineering and Technology (FET) show that only 50% of people want to move to a blended learning model in the future with over 40% of of people wishing

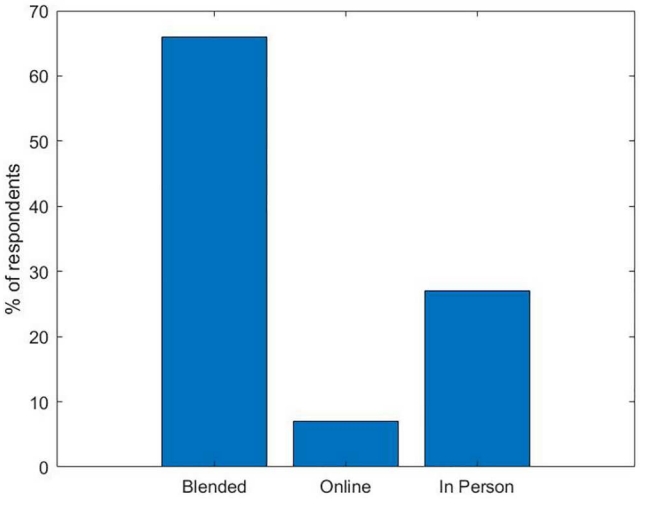

Figure 6. Survey responses to Q19 'Given the option, which learning approach do you think would be most beneficial going forwards?' obtained from all respondents.

to return to in-person learning only. This is an interesting result, as it is much more likely that respondents from this group would have had no in-person classes during the academic years being investigated here, whereas students from the other faculties are likely to have attended some clinics or laboratory sessions. This complete lack of face-to-face learning may well have had a bearing on the results obtained here.

A chi-squared test was performed to further investigate this result but it is not statistically significant at the 5% level as the p-value obtained was 0.334.

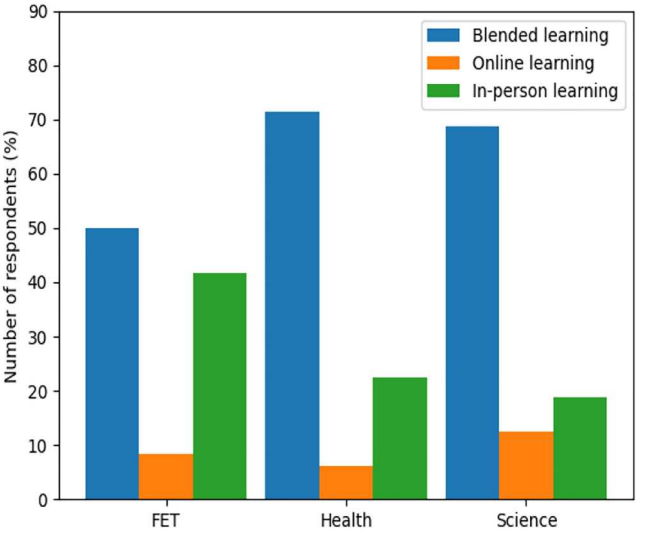

Figure 7. Survey responses to Q19 when respondents are split by faculty. Note that the students from APSS have been omitted from these results as there were only 2 respondents in this group.

3.4.2. Qualitative analysis

Those people in favour of blended learning indicated a preference for the flexibility of asynchronous materials coupled with the increased opportunity for interaction with their peers:

> I think some aspects of online learning should be maintained, such as lectures being recorded, PowerPoint slides being available online in advance, and maybe smaller pre-recorded videos. But I would prefer for it to be majority in person.

Those in favour of returning to solely in-person learning felt that it would make them feel less lonely:

> There is no substitute for meeting people and being able to discuss learning materials, strategies, experiences in person with HUMAN CONTACT.

The primary reasons provided by students who wish to remain learning online in the future are very similar to those that have been provided in response to other questions and refer to the increased ability to manage disabilities at home:

> Again, I'm mobility impaired, getting places is painful and difficult

Given the discrepancies between responses provided by students in different faculties, it is interesting to note that none of the comments pertaining to this question that were provided in the survey are subject-specific. This seems to indicate that it is the more general elements of in-person, blended and online learning that have been considered when choosing a preference, rather than students feeling that their subjects are inherently suited to a particular model of learning.

4. Discussion

The results from this study provide valuable insights into the online learning experiences of students with hidden disabilities during the COVID-19 pandemic. While the shift to online education presented significant challenges, it also highlighted opportunities for creating more inclusive learning environments. These nuanced experiences underscore the importance of flexibility and inclusivity in higher education.

This study contributes to the understanding of how students with hidden disabilities navigate online learning. It reveals a dual reality: while many students faced heightened isolation, anxiety, and motivational challenges, others found online learning more inclusive, particularly those with physical disabilities. By reducing barriers such as commuting and offering flexibility, online learning enabled these students to better manage their conditions. These findings emphasise the necessity of tailoring educational models to accommodate diverse needs.

4.1. Key findings

One of the most significant outcomes of this study is the disparity in reception between synchronous and asynchronous learning resources. While synchronous sessions were associated with heightened anxiety, technological barriers, and discomfort with online interactions, asynchronous materials were widely appreciated for their flexibility and

accessibility. Students particularly valued the ability to pause, rewind, and review recorded lectures at their own pace. This underscores the need for universities to invest in diverse asynchronous resources, ensuring high-quality audio and visual design to enhance accessibility.

The study also highlights a significant issue: a substantial proportion of respondents (between 25–35%) chose not to formally disclose their conditions to LJMU. This non-disclosure limited their access to support services and reflects broader challenges related to stigma and institutional barriers. Proactive measures are required to encourage disclosure, such as creating safe spaces for communication and normalising discussions around disabilities.

We also discovered notable differences in student experiences across faculties, particularly for those in practical or lab-based disciplines. Our results produced a statistically significant result when investigating students' likelihood of attending lectures in the future, and given the descriptive statistics for the three faculties under consideration, it seems that students in the Faculty of Engineering and Technology will be much less likely to attend lectures in future than students in the Faculty of Health. These differences highlight the need for faculty-specific adaptations in educational delivery.

The most important finding of this work is that many students in this study do not want to revert to more traditional models of learning, but instead expressed a preference for blended learning, which combines the flexibility of online resources with the benefits of in-person interactions. Approximately 65–70% of respondents favoured this approach, citing its ability to accommodate diverse learning styles and personal circumstances. These preferences underscore the need for institutions to develop adaptable, hybrid models that cater to varying student needs while maintaining a high standard of education.

4.2. Implications for future practise

While the overall picture of online learning was mixed for the cohort surveyed during this study, there are some very clear trends that should be taken account of in the future. Based on the responses obtained here, we make the following recommendations:

- Universities should diversify asynchronous materials, including recorded lectures, podcasts, and interactive modules. Staff training in creating engaging, accessible content is essential.
- Institutions should adopt proactive strategies to reach students who do not disclose disabilities, such as universal accommodations and anonymous support services.
- While many universities embrace the principles of Universal Design for Learning (UDL), a review of practices is essential to ensure all students receive adequate support to succeed. Whilst this will benefit all students, it will be vital in supporting those students who do not declare their disabilities to their university. Between 25–35% of the students who took part in this study did not declare their disability to LJMU, and although we have not explored the reasons why students did not do so here, other studies have attempted to answer this question (e.g. Vickerman and Blundell 2010). However, this trend indicates that universities need to abandon the medical model of disability as it cannot be relied upon to support all the students who need additional help.

- Universities in the UK and elsewhere should stop using attendance in class as the primary measure of student engagement. Monitoring attendance in class can be helpful in identifying students who are struggling (Newman-Ford et al. 2008) but it is not a reliable metric by itself as this study has shown that many students find it easier to manage their disabilities at home and while they may wish to attend in-person classes as regularly as possible, there will be times when this is not possible. Flagging students on the basis of poor attendance alone perpetuates discrimination against people who struggle to attend due to physical issues and issues relating to mental health (e.g. anxiety).

5. Conclusions

The purpose of this study has been to investigate the online learning experiences of students with hidden disabilities during the academic years 2019/20 and 2020/21 at Liverpool John Moores University in the UK. In order to obtain the answers we sought, a questionnaire was designed and disseminated to students across the institution and was completed by 96 people, with many respondents evoking strong feelings and opinions about the process, circumstances and quality of online learning enforced during the specified time period.

The research conducted here offers several contributions to the existing body of knowledge as it discusses:

- Diverse Experiences of Online Learning
- Reception of Synchronous vs. Asynchronous Learning
- Variability in online learning experiences across Faculties
- Hidden Disabilities and issues of Non-Disclosure

By highlighting these findings, this study contributes to ongoing conversations about inclusive education, flexible learning, and the role of online teaching practices in supporting diverse student populations. It offers practical recommendations for universities to adapt their teaching methods and support mechanisms to ensure that all students, particularly those with hidden disabilities, can thrive in higher education.

As a final note, this survey has made it abundantly clear that some of the enforced changes during the pandemic proved to be incredibly beneficial to many students. As such, it is vitally important that we do not disregard all of our teaching practise from this period just because circumstances have changed and we can return to more traditional models of learning. The students surveyed here have pointed to more flexible methods of delivery helping them to manage their time, their disabilities and their lives more effectively and it seems likely that many students without disabilities would appreciate increased flexibility in their studies too. The current cost-of-living crisis that is engulfing many countries around the world is likely to have a significant effect on the student population as a whole, as it will make it more expensive for students to live away from home and makes it more likely that many students will have to take on significant amounts of paid work to help them fund their studies. Increasing the flexibility of studies in higher education can only help all students during such difficult times.

Ultimately, we hope that the adoption of blended learning models, whatever they may look like, will help all students balance their work and personal lives, and move us closer to realising the goal of providing inclusive learning environments and equal opportunities for all.

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Data availability statement

Data not available as participants did not consent for their responses to be made available to the public.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix

The tables below contain the outcomes of the chi-squared tests conducted in the main body of our article.

Table A1. Results of the chi-squared test determining whether or not statistically significant differences exist between subgroups for Q2: 'I have found online learning less challenging than in-person learning'.

Population split	*p*-value	Significant at the 95% level
Number of disabilities	0.091	No
Declared disability	0.438	No
Faculty	0.894	No

Table A2. Results of the chi-squared test determining whether or not statistically significant differences exist between subgroups for Q11: 'I have had no difficulty engaging in live online classes'.

Population split	*p*-value	Significant at the 95% level
Number of disabilities	0.137	No
Declared disability	0.617	No
Faculty	0.59	No

Table A3. Results of the chi-squared test determining whether or not statistically significant differences exist between subgroups for Q12: 'I have had no difficulty engaging with recorded materials'.

Population split	*p*-value	Significant at the 95% level
Number of disabilities	0.855	No
Declared disability	0.375	No
Faculty	0.320	No

Table A4. Results of the chi-squared test determining whether or not statistically significant differences exist between subgroups for Q18: 'How likely would you be to attend in person classes if they were all recorded'.

Population split	*p*-value	Significant at the 95% level
Number of disabilities	0.653	No
Declared disability	0.946	No
Faculty	0.010	**Yes**

Table A5. Results of the chi-squared test determining whether or not statistically significant differences exist between subgroups for Q19: 'Given the option, which learning approach do you think would be most beneficial going forwards'.

Population split	*p*-value	Significant at the 95% level
Number of disabilities	0.991	No
Declared disability	0.968	No
Faculty	0.250	No