

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

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| <b>TITLE (PROVISIONAL)</b> | Perceptions of Medical Students Towards Online Teaching During the COVID-19 Pandemic: a national cross-sectional survey of 2721 UK medical students |
| <b>AUTHORS</b>             | Dost, Samiullah; Hossain, Aleena; Shehab, Mai; Abdelwahed, Aida; Al-Nusair, Lana  |

### VERSION 1 – REVIEW

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| <b>REVIEWER</b>        | Daniëlle Verstegen<br>School of Health Professions Education (SHE),<br>Maastricht University, The Netherlands |
| <b>REVIEW RETURNED</b> | 17-Jul-2020   |

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| <b>GENERAL COMMENTS</b> | <p>This study is relevant in current times. A strength is that it involves medical students from many medical schools all over the UK. The results are interesting, but a number of issues need to be addressed, at least in the discussion of results. The abstract actually gives more appropriate conclusions, but these are not clearly present in the Discussion section, which is now an ad-hoc list of arguments that are not related to each other.</p> <p>The questions in the questionnaire largely cover superficial issues of online learning. Questions are largely multiple-choice with pre-specified answers. They seem to be mostly teacher-centred, talking of online teaching rather than online learning (though these terms seem to be mixed up sometimes). They give little insight in student learning processes. That is ok, but then the research aim/question has to be more modest: you investigate students' perceptions of online teaching provided during the pandemic, not their perceptions on the role of online education in facilitating their education....</p> <p>Respondents are also asked to add up apples and pears: using online resources to practice anatomy is something completely different listening to online lectures or replacing small-group discussions with online reading materials or question banks. This issue needs to be mentioned at least, and incorporated in the discussion, where now 'evidence' for or against online teaching is drawn from studies about completely different kinds of online learning. Without more context these arguments cannot be combined. Practicing anatomy might actually work better with an online game, whereas asynchronous online discussions have been shown to be much more difficult than synchronous face-to-face discussions (and synchronous online discussions can work very well but only under certain circumstances). You present 'evidence' that listening to prerecorded lectures correlates negatively to learning success, but this comes from a specific</p> |
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|  | <p>implementation (lecture-based curriculum?) and a setting where face-to-face lectures were also available. In the end, the question is not whether online learning is better than face-to-face or not. The question is: what kind of learning can take place online (and how), and what really needs to be done face-to-face. There really is quite a lot of research on this.</p> <p>The scores in Table 2 are very low, at least compared to what I'm used to seeing in student evaluations. I would expect the discussion to go into potential reasons of dissatisfaction of students. One reason might be that the questionnaire stimulates respondents to compare online teaching with clinical teaching. The scores might have been different if respondents were asked to compare with 'no teaching' (which was in this case the realistic alternative).</p> <p>I would suspect that there are other important reasons too: ill-prepared teachers, bad organisation, technical troubles etc. Beyond that, for me the important argument: online teaching/learning requires dedicated instructional design efforts: careful thinking about how to shape teaching and learning processes. There was no time for this in the COVID-crisis, understandably, but still: no wonder.</p> |
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| <b>REVIEWER</b>        | Dr Sarah Hyde<br>Three Rivers University Department of Rural Health, Charles Sturt University, Orange, NSW, Australia |
| <b>REVIEW RETURNED</b> | 25-Jul-2020   |

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| <b>GENERAL COMMENTS</b> | <p>BMJ Open Review July 2020</p> <p>This is a well written paper with a nice neat study design, great sample, and a topic that is of particular relevance today. Your introduction was succinct and clear.</p> <p>I enjoyed reading the paper and it was well constructed and referenced with good points made throughout the introduction and discussion. My comments relate mostly to the methodology and results which I feel could benefit from greater clarity being achieved with the inclusion of the following points:</p> <ul style="list-style-type: none"> <li>• Although your sample is great, and your Medical School response rate fantastic, it would be useful for the reader to know more about the overall population details which should be publicly accessible. How many medical <u>students</u> are in the UK?</li> <li>• On page 7, first sentence of the methodology, it may be best not to refer to this as an observational study as it does have other connotations and could be misleading to the reader</li> <li>• In the Questionnaire Design – there is no mention made of having open-ended comments/free text responses. This needs to be included along with a description of how those responses were analysed and categorized.</li> <li>• In the description of participants – do you mean graduate entry instead of postgraduate? In some contexts, post-</li> </ul> |
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graduate refers to masters and doctoral level degree programs

- For true replicability the reader needs to know how medical students involved in the piloting and distribution of the survey across sites were recruited? Was it through an online student club/med school network? Were there any incentives to participation?
- Does the data represented in Table 1 reflect the overall med student population demographics in terms of gender?
- The reporting of gender in the Table 1 differs from the reporting of gender in the text on page 9 under Cohort Demographics. For example, in the text, it says that 68% of respondents were female, but in Table 1 it says that 31% were female
- The reporting could be strengthened and the study improved by providing a further breakdown of the survey responses by pre-clinical vs clinical cohorts
- I would also be interested in reading if the time spent using online platforms differed across year groups/stage of training
- The description of the Likert Scale on page 11 – with 1 being strongly disagree and 5 being strongly agree, differs from how it was described on page 7 where the order was reversed
- Table 2 displays some interesting data – especially where the mean score for “being well prepared for my profession” is 2.28. that is of concern and needed greater mentioned in the discussion
- The information in Table 2 would also be interesting to compare with the DREEM survey results reported elsewhere from F2F classes
- The findings reported on page 13, Student perceptions on effectiveness of online learning – were interesting and I was curious to see that YouTube was more effective than the live tutorials – it would be interesting to see your viewpoints on why that was the case
- On Page 27, the description of Figure 3, I would be interested to read how many respondents opted to provide open ended comments/free text responses and how were the responses categorized?
- Figure 1 – not all options have been included in this Figure. I would be interested to see how the live tutorials offered by ones own medical school differed from those of other medical schools for example. Also, why is there no ‘during COVID-19’ bars included in the illustration?
- How were the categories in Figure 3 arrived at?

In the Discussion of limitations, having made the conclusion that medical schools should do more team-based/problem-based learning online, it would have been useful to test the sentiment of medical students towards this suggestion, or to back up the feasibility of this suggestion being acceptable to students with

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|  | <p>some further references to student receptivity to online PBL or group work.</p> <p>Great work on a very relevant topic!</p> |
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## VERSION 1 – AUTHOR RESPONSE

### Reviewer 1 Comments

- 1. This study is relevant in current times. A strength is that it involves medical students from many medical schools all over the UK. The results are interesting, but a number of issues need to be addressed, at least in the discussion of results. The abstract actually gives more appropriate conclusions, but these are not clearly present in the Discussion section, which is now an ad-hoc list of arguments that are not related to each other.**

We have now restructured and edited our discussion to follow the abstract, with a conclusive summary at the end (see page 18, lines 362-367). We have also added in sub-headings to improve the readability and flow of our discussion.

- 2. The questions in the questionnaire largely cover superficial issues of online learning. Questions are largely multiple-choice with pre-specified answers.**

Participants were provided the opportunity to give additional comments to further expand on their experiences of online teaching via free text boxes throughout the survey (Appendix I). We have now clarified the inclusion and analysis of these free text questions in the methodology (see page 6, lines 88-89).

- 3. They seem to be mostly teacher-centred, talking of online teaching rather than online learning (though these terms seem to be mixed up sometimes). They give little insight in student learning processes. That is ok, but then the research aim/question has to be more modest: you investigate students' perceptions of online teaching provided during the pandemic, not their perceptions on the role of online education in facilitating their education....**

We thank the reviewer for highlighting this; we agree that we are investigating students' perceptions of teaching as opposed to learning. We have now updated the title and aim of this study to: "Perceptions of Medical Students Towards Online Teaching During the COVID-19 Pandemic: a national cross-sectional survey of 2721 UK medical students". We have also ensured that we are referring to online teaching, instead of online learning, throughout the manuscript to clarify this.

4. Respondents are also asked to add up apples and pears: using online resources to practice anatomy is something completely different listening to online lectures or replacing small-group discussions with online reading materials or question banks. This issue needs to be mentioned at least, and incorporated in the discussion, where now 'evidence' for or against online teaching is drawn from studies about completely different kinds of online learning. Without more context these arguments cannot be combined. Practicing anatomy might actually work better with an online game, whereas asynchronous online discussions have been shown to be much more difficult than synchronous face-to-face discussions (and synchronous online discussions can work very well but only under certain circumstances). You present 'evidence' that listening to prerecorded lectures correlates negatively to learning success, but this comes from a specific implementation (lecture-based curriculum?) and a setting where face-to-face lectures were also available. In the end, the question is not whether online learning is better than face-to-face or not. The question is: what kind of learning can take place online (and how), and what really needs to be done face-to-face. There really is quite a lot of research on this.

We thank the reviewer for highlighting this. One of the limitations of our survey was that it did not assess student perceptions of different teaching modalities for different types of modules or topics. We have now mentioned this limitation in our discussion and limitations (see page 15, lines 297-302 and page 19, lines 381-384). We have now provided context surrounding the evidence about pre-recorded lectures correlating negatively with learning success referred to in the discussion (see page 16, lines 313-314) and differentiated between the benefits of live online tutorials and pre-recorded tutorials (see page 16, lines 310-314).

We have now also addressed what type of learning needs to take place face-to-face, in our discussion; in general, students have been found to prefer face-to-face learning for communication<sup>1</sup>, while doctors requiring feedback on their work also favour face-to-face learning<sup>2</sup> (see page 15, line 286-287).

1. Paechter M, Maier B. Online or face-to-face? Students' experiences and preferences in e-learning. *Internet and Higher Education*. [Online] 2010;13: 292–297. Available from: doi:10.1016/j.iheduc.2010.09.004

2. Ifediora CO. Online Medical Education for Doctors: Identifying Potential Gaps to the Traditional, Face-to-Face Modality. *Journal of Medical Education and Curricular Development*. [Online] 2019;6: 1–8. Available from: doi:10.1177/2382120519827912

5. The scores in Table 2 are very low, at least compared to what I'm used to seeing in student evaluations. I would expect the discussion to go into potential reasons of dissatisfaction of students. One reason might be that the questionnaire stimulates respondents to compare online teaching with clinical teaching. The scores might have been different if respondents were asked to compare with 'no teaching' (which was in this case the realistic alternative). I would suspect that there are other important reasons too: ill-prepared teachers, bad organisation, technical troubles etc. Beyond that, for me the important argument: online teaching/learning requires dedicated instructional design efforts: careful thinking about how to shape teaching and learning processes. There was no time for this in the COVID-crisis, understandably, but still: no wonder.

We have now compared the student evaluation scores to previous DREEM scores reported in literature (see page 14, lines 263-264, and page 15 lines 283-284). We have now also explored reasons behind these differences, including the short time period available for development of online resources during the pandemic (see pages 14-15, lines 264-288). We acknowledge that it is difficult to truly evaluate the online teaching available during the pandemic by comparing it to clinical teaching, which was not a possible alternative for students at the time (see page 14, lines 264-269). However, we felt this comparison was appropriate, as clinical teaching was one of the main methods of medical education prior to the pandemic and hence may be a valid comparator.

## **Reviewer 2 Comments**

This is a well written paper with a nice neat study design, great sample, and a topic that is of particular relevance today. Your introduction was succinct and clear.

I enjoyed reading the paper and it was well constructed and referenced with good points made throughout the introduction and discussion. My comments relate mostly to the methodology and results which I feel could benefit from greater clarity being achieved with the inclusion of the following points:

- 1. Although your sample is great, and your Medical School response rate fantastic, it would be useful for the reader to know more about the overall population details which should be publicly accessible. How many medical students are in the UK?**

According to the most recent report available in 2019, there were 42,190 medical students in the UK in the 2017-18 academic year<sup>3</sup>. We have now included this in the methodology (see page 6, line 102).

3. General Medical Council. The state of medical education and practice in the UK. [Online] 2019 [Accessed: 20th August 2020]. Available from: [https://www.gmc-uk.org/-/media/documents/the-state-of-medical-education-and-practice-in-the-uk---workforce-report\\_pdf-80449007.pdf](https://www.gmc-uk.org/-/media/documents/the-state-of-medical-education-and-practice-in-the-uk---workforce-report_pdf-80449007.pdf)

- 2. On page 7, first sentence of the methodology, it may be best not to refer to this as an observational study as it does have other connotations and could be misleading to the reader**

We thank the reviewer for highlighting this; we have now altered the methodology accordingly and now refer to the study as “cross-sectional” (see page 6, line 81).

- 3. In the Questionnaire Design – there is no mention made of having open-ended comments/free text responses. This needs to be included along with a description of how those responses were analysed and categorized.**

Participants were provided the opportunity to give additional comments to further expand on their experiences of online teaching via free text boxes throughout the survey (Appendix I). We have now updated the questionnaire design to clarify the inclusion and analysis of these free text questions (see page 6, lines 88-89).

**4. In the description of participants – do you mean graduate entry instead of postgraduate? In some contexts, post-graduate refers to masters and doctoral level degree programs**

We thank the reviewer for highlighting this; by postgraduate we meant graduate entry. We have now updated the description of participants to “graduate entry” (see page 6, line 102).

**5. For true replicability the reader needs to know how medical students involved in the piloting and distribution of the survey across sites were recruited? Was it through an online student club/med school network? Were there any incentives to participation?**

Through online social media platforms, we collated a database of students that were interested in taking part in distributing a national survey, which has now been clarified in the methodology (see page 6, lines 97-98). Students benefitted from getting involved in a research project and gaining insight into data collection. The students have been mentioned in the acknowledgements for their contributions to survey distribution (see page 20, lines 408-414).

**6. Does the data represented in Table 1 reflect the overall med student population demographics in terms of gender?**

Our cohort demographics did not accurately reflect the overall medical student demographics. 68.06% of participants were female, in comparison to 55% of UK medical students who are female<sup>3</sup>, potentially limiting the generalisability of our results to the medical student population. We have now acknowledged this in our limitations (see page 18, lines 378-380).

3. General Medical Council. The state of medical education and practice in the UK. [Online] 2019 [Accessed: 20th August 2020]. Available from: [https://www.gmc-uk.org/-/media/documents/the-state-of-medical-education-and-practice-in-the-uk---workforce-report\\_pdf-80449007.pdf](https://www.gmc-uk.org/-/media/documents/the-state-of-medical-education-and-practice-in-the-uk---workforce-report_pdf-80449007.pdf)

**7. The reporting of gender in the Table 1 differs from the reporting of gender in the text on page 9 under Cohort Demographics. For example, in the text, it says that 68% of respondents were female, but in Table 1 it says that 31% were female – to look over**

We thank the reviewer for highlighting this; we have now corrected Table 1 to 68% respondents being female and 31% male (see page 8).

**8. The reporting could be strengthened and the study improved by providing a further breakdown of the survey responses by pre-clinical vs clinical cohorts**

We have now stratified some of the data further to compare pre-clinical and clinical responses for student engagement with online platforms, and perceived effectiveness of online resources. Figure 2 has been updated accordingly, to form a compound figure with additional bar graphs to clearly illustrate this. We found similar patterns of time spent on online platforms before and during the pandemic, however a greater proportion of pre-clinical students than clinical students spent >15 hours during the pandemic. Furthermore, pre-clinical students ranked video tutorials to be the most effective method of online teaching, whilst clinical students ranked live tutorials to be the most effective. These results and differences have now been mentioned in the results and discussion (see Figure 1 and 2; page 9-10, lines 156-158; page 10, lines 166-169; page 13, lines 239-240; page 15, lines 290-295). We did not find any significant differences between pre-clinical and clinical student perceptions of online teaching; as we found this to be a homogenous group, we did not feel this analysis was relevant to include.

**9. I would also be interested in reading if the time spent using online platforms differed across year groups/stage of training**

We have now stratified the time spent on online platforms before and during the pandemic, according to stage of training (pre-clinical vs. clinical) (see Figure 2Bi and 2Bii). We found similar patterns of time spent on online platforms before and during the pandemic, however a greater proportion of pre-clinical students than clinical students spent >15 hours during the pandemic. These results have now been mentioned in the results and discussion (see page 10, lines 166-169; page 13, lines 239-240).

**10. The description of the Likert Scale on page 11 – with 1 being strongly disagree and 5 being strongly agree, differs from how it was described on page 7 where the order was reversed**

We have corrected our methodology accordingly, so that 1 represents strongly disagree and 5 represents strongly agree (see page 6, line 87).

**11. Table 2 displays some interesting data – especially where the mean score for “being well prepared for my profession” is 2.28. that is of concern and needed greater mentioned in the discussion**

We agree with the reviewer; the low score for being well prepared for the medical profession is certainly concerning, and we have now highlighted this in the discussion (see page 15, lines 283-288).

**12. The information in Table 2 would also be interesting to compare with the DREEM survey results reported elsewhere from F2F classes**



We agree with the reviewer; we have now compared our findings to previously reported DREEM scores for face-to-face classes in the discussion (see page 14, lines 263-264, and page 15 lines 283-284). We have now also explored reasons behind these differences, including the short time period available for development of online resources during the pandemic (see pages 14-15, lines 264-288).

**13. The findings reported on page 13, Student perceptions on effectiveness of online learning – were interesting and I was curious to see that YouTube was more effective than the live tutorials – it would be interesting to see your viewpoints on why that was the case**

We have now discussed the possible reasons as to why YouTube was more effective than live tutorials in the discussion, including the updated findings of pre-clinical students in particular finding it most effective (see page 15, lines 290-295).

**14. On Page 27, the description of Figure 3, I would be interested to read how many respondents opted to provide open ended comments/free text responses and how were the responses categorized?**

82 students provided free text comments on the advantages of online teaching, and 81 students provided free text comments on the barriers to effective online teaching (now included) (see pages 11-12, lines 202 and 208). The individual responses were coded, then arranged into different themes, for example motivation, anxiety and attention, in order to categorise them through thematic analysis.

**15. Figure 1 – not all options have been included in this Figure. I would be interested to see how the live tutorials offered by ones own medical school differed from those of other medical schools for example. Also, why is there no 'during COVID-19' bars included in the illustration?**

We thank the reviewer for highlighting this; we have now updated Figure 1 accordingly to include all options, including "live tutorials by other sources" (see Figure 1, and page 9, lines 148-149). We did not include an option for live tutorials delivered by other medical schools, and hence were unable to comment on this. A smaller proportion of medical students utilised live tutorials via online platforms by other sources than by their medical school (1.79% vs. 4.46%).

We explored the time spent on online teaching during the pandemic, as well as how medical schools had adapted during this time, however we did not include a question on the specific platforms utilised by medical students during the pandemic. In retrospect, we should have included a question on this, which would have been useful when comparing to the platforms they were previously accustomed to using, and the differences in time spent on online platforms, which we did record.

**16. How were the categories in Figure 3 arrived at?**

The categories for options for the advantages of and barriers to online learning, displayed in Figure 3, were based on common findings from previous literature<sup>4-7</sup> and following discussion with members of the team to consider issues that may have arisen due to disruptions from COVID-19. For example, family distractions were thought to be a common barrier following lockdown measures requiring all household members to stay at home.

4. Keis O, Grab C, Schneider A, et al. Online or face-to-face instruction? A qualitative study on the electrocardiogram course at the University of Ulm to examine why students choose a particular format. *BMC Medical Education*. [Online] 2017;17: 194. Available from: doi:10.1186/s12909-017-1053-6
5. Sandars J, Walsh K, Homer M. High users of online continuing medical education: A questionnaire survey of choice and approach to learning. *Medical Teacher*. [Online] 2010;32(1). Available from: doi:10.3109/01421590903199171
6. Muilenburg LY, Berge ZL. Students Barriers to Online Learning: A factor analytic study. *Distance Education*. [Online] 2005;26(1): 29–48. Available from: doi:10.1080/01587910500081269
7. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of e-learning in medical education. *Academic Medicine*. [Online] 2006;81(3): 207–212. Available from: doi:10.1097/00001888-200603000-00002

**17. In the Discussion of limitations, having made the conclusion that medical schools should do more team-based/problem-based learning online, it would have been useful to test the sentiment of medical students towards this suggestion, or to back up the feasibility of this suggestion being acceptable to students with some further references to student receptivity to online PBL or group work.**

Although we found that students engaged well with small group sizes and discussions, ideally, we would have explored the receptivity of students towards PBL/TBL in our survey. However, we only discovered it would be a viable suggestion after searching the literature for effective solutions to the barriers of online teaching for our discussion. We have now discussed this in our limitations (see page 19, lines 387-388). The current literature suggests that students do approve of its use, which we have now mentioned in our discussion (see page 18, lines 358-360)

**VERSION 2 – REVIEW**

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| <b>REVIEWER</b>        | Daniëlle Verstegen<br>Maastricht University, The Netherlands |
| <b>REVIEW RETURNED</b> | 25-Sep-2020  |

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| <b>GENERAL COMMENTS</b> | <p>This manuscript has improved considerably, especially the discussion part in lines 260-302. I still have some issues regarding the results and other parts of the conclusions, though.</p> <p>1. The description of the results in Table 2 is questionable. On a 5-point Likert scale 3 stands for 'neutral' and anything under 3 is negative. Given that the scores on these items are under 3, it is not correct to say "Students agreed that learning online was engaging, enjoyable and allowed room for questions.". Moreover, I think it will help support your own conclusions if you make clear</p> |
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|  | <p>that students did not really like the online learning (even if they were not really negative).</p> <p>2. Some of the conclusions do not seem to be based on results of this study:</p> <ul style="list-style-type: none"> <li>- line 245: How does availability of software packages lead to opportunities to learn from a wider community of professionals?</li> <li>- line 249: On what do you base the statement that students desire this flexible curriculum? The students had no other choice in lock-down times, and your study shows that they did not like online education.</li> <li>-line 251: How did online material contribute to high absenteeism? They were not allowed to come! And on which results do you base the conclusion that they were disengaged?</li> <li>- It is rather strange that you use old literature in this paragraph. The sources you cite are from times that synchronous online interaction was very difficult. There has been a lot of change and research since, to support your claim that synchronous interaction is preferable, when possible.</li> </ul> <p>3. Details:</p> <ul style="list-style-type: none"> <li>- Line 153/220: these lines are double. Please remove overlap</li> <li>- line 154/221: 'YouTube/Osmosis appeared to be the most effective...': It would be more precise to make clear that this is the students perception (they think, in their opinion). As an educationalist I doubt that videos are more effective for learning than some of the other forms, but I have no doubt that (many) students think so.</li> <li>- Line 232: some awkward sentences in this paragraph. Please check.</li> </ul> |
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## VERSION 2 – AUTHOR RESPONSE

### Reviewer 1 Comments

1. **The description of the results in Table 2 is questionable. On a 5-point Likert scale 3 stands for 'neutral' and anything under 3 is negative. Given that the scores on these items are under 3, it is not correct to say "Students agreed that learning online was engaging, enjoyable and allowed room for questions.". Moreover, I think it will help support your own conclusions if you make clear that students did not really like the online learning (even if they were not really negative).**

We thank the reviewer for highlighting this, this was an oversight on our part. We have now clarified and corrected the description of the results in Table 2 (see page 11, lines 194-196).

2. **Some of the conclusions do not seem to be based on results of this study:**
  - a. **Line 245: How does availability of software packages lead to opportunities to learn from a wider community of professionals?**

We realise that we had not made clear what we meant by teaching “programs” and have now updated this terminology to “programmes” (see page 13, line 243). These teaching programmes are not software packages, rather online medical education content and courses organised or taught by a multitude of healthcare professionals from across the UK. This removes limitations of face-to-face teaching sessions faced by both students and tutors e.g. travel, costs, timetable clashes, and room bookings. Furthermore, these resources are synthesised in conjunction with medical students, such as the Osmosis Ambassador program, allowing content to be disseminated within medical schools and improved based on feedback.

- b. Line 249: On what do you base the statement that students desire this flexible curriculum? The students had no other choice in lock-down times, and your study shows that they did not like online education.**

What was suggested by this statement was that the increase in the range of online medical education resources may indicate a demand by students for a more flexible approach. We do not mean by this to be an interpretation of our results, or to say that this was only observed during lockdown, rather many of these diverse platforms were initiated before and used throughout the pandemic by students. We have now clarified this in the discussion (see pages 13-14, lines 248-251).

- c. Line 251: How did online material contribute to high absenteeism? They were not allowed to come! And on which results do you base the conclusion that they were disengaged?**

We understand that this paragraph may have been misunderstood, and requires further clarification. We were addressing the issue of the association between high absenteeism and disengagement within medical schools associated with the increasing accessibility of online educational resources prior to the pandemic, in order to justify the importance of synchronous learning for student engagement. However, we now realise that this was an unnecessary way of explaining this and have therefore removed this sentence, referred to additional papers, and restructured our paragraph to better express this (see page 14, lines 253-256).

- d. It is rather strange that you use old literature in this paragraph. The sources you cite are from times that synchronous online interaction was very difficult. There has been a lot of change and research since, to support your claim that synchronous interaction is preferable, when possible.**

We agree that methods of synchronous learning have transformed over the past two decades; we have now updated our citations to reflect this, and given examples of methods to implement synchronous learning (see page 14, lines 253-255).

### **3. Details:**

- a. Line 153/220: these lines are double. Please remove overlap**

We thank the reviewer for highlighting this; the paragraph from line 220 has now been removed (see page 12).

- b. Line 154/221: 'YouTube/Osmosis appeared to be the most effective...': It would be more precise to make clear that this is the students perception (they think, in their opinion). As an educationalist I doubt that videos are more effective for learning than some of the other forms, but I have no doubt that (many) students think so.

We thank the reviewer for highlighting this; we have now clarified that these results are the students' perceptions of the most effective online teaching platforms (see page 9, line 153).

- c. Line 232: some awkward sentences in this paragraph. Please check.

We thank the reviewer for highlighting this; we have now reworded the sentences to improve the readability of this paragraph (see page 13, lines 233-240).

#### VERSION 3 – REVIEW

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| <b>REVIEWER</b>         | Daniëlle Verstegen<br>Maastricht University, The Netherlands                         |
| <b>REVIEW RETURNED</b>  | 19-Oct-2020  |
| <b>GENERAL COMMENTS</b> | Thank you for your revised version. You have addressed previous comments adequately. |