

Lessons learned from the Learn!Biolongitudinal reflection on STEM learning before, during, and post pandemic lockdowns.

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Introduction:

The start of the national lockdown in March 2020 forced all higher education establishments into Emergency Remote Teaching (ERT), where campus-based lecturers were left to adapt to virtual teaching methods with no planning, preparation or, in most cases, no experience in Online Learning and Teaching (OLT)¹.

It was feared that the move to OLT would strongly affect those in Higher Education Biology, due to the need for proactive engagement, and obtainment of critical-thinking, problem-solving, and practical skills ^{2,3}. As well as this, there were concerns that pandemic safety measures could be detrimental to the development of authentic interpersonal relationships, negatively affecting students' mental health.

This study aimed to evaluate student perceptions of their learning and associated coping mechanisms as they navigated their way through the changing teaching environments during the COVID-19 pandemic. These results were then compared with results from the previous Learn!Bio surveys (December 2020 and May 2021), in an effort to improve learning experiences and outcomes.

Methods:

An anonymous, computer-based survey was sent to Edge Hill University undergraduate biology students enrolled at levels 4-6 in the academic year 2021-2022 using JISC Online Survey. Out of 277 students, 130 students responded (23.1% level 4, 45.4% level 5, 31.5% level 6).

Questions were designed to discern how students coped with the return to face-to-face learning, their mental state, and learning preferences. Questions pertaining to degree programme, year of study, accommodation, care obligations, and commuting information was asked. From these answers it could be possible to identify a particular participant. Participants were made aware of this bias in the Participant Information Sheet, along with how to mitigate this risk, prior to consenting to participate.

The results from the Learn!Bio 3 study were then compared to the previous Learn!Bio studies to compare STEM learning throughout and after the pandemic lockdowns.

Learning Preferences:

The majority of students stated that they preferred face-to-face lectures (48.5%) or a blended learning approach (48.5%). Most respondents were excited to return to face-to-face teaching (53.1%), though this is lower than the 62.5% of respondents that were eager to attend all face-to-face lectures in 2021.

Most felt that remote teaching in the past has affected their learning in some way (86.9%), with 31.5% of respondents stating that it depended on the module or session content. This contrasts with the 2021 cohort, where all respondents felt that remote teaching had affected their learning (figure 1). This suggests that the past year of increased face-to-face teaching has helped students recover from the previous remote teaching.

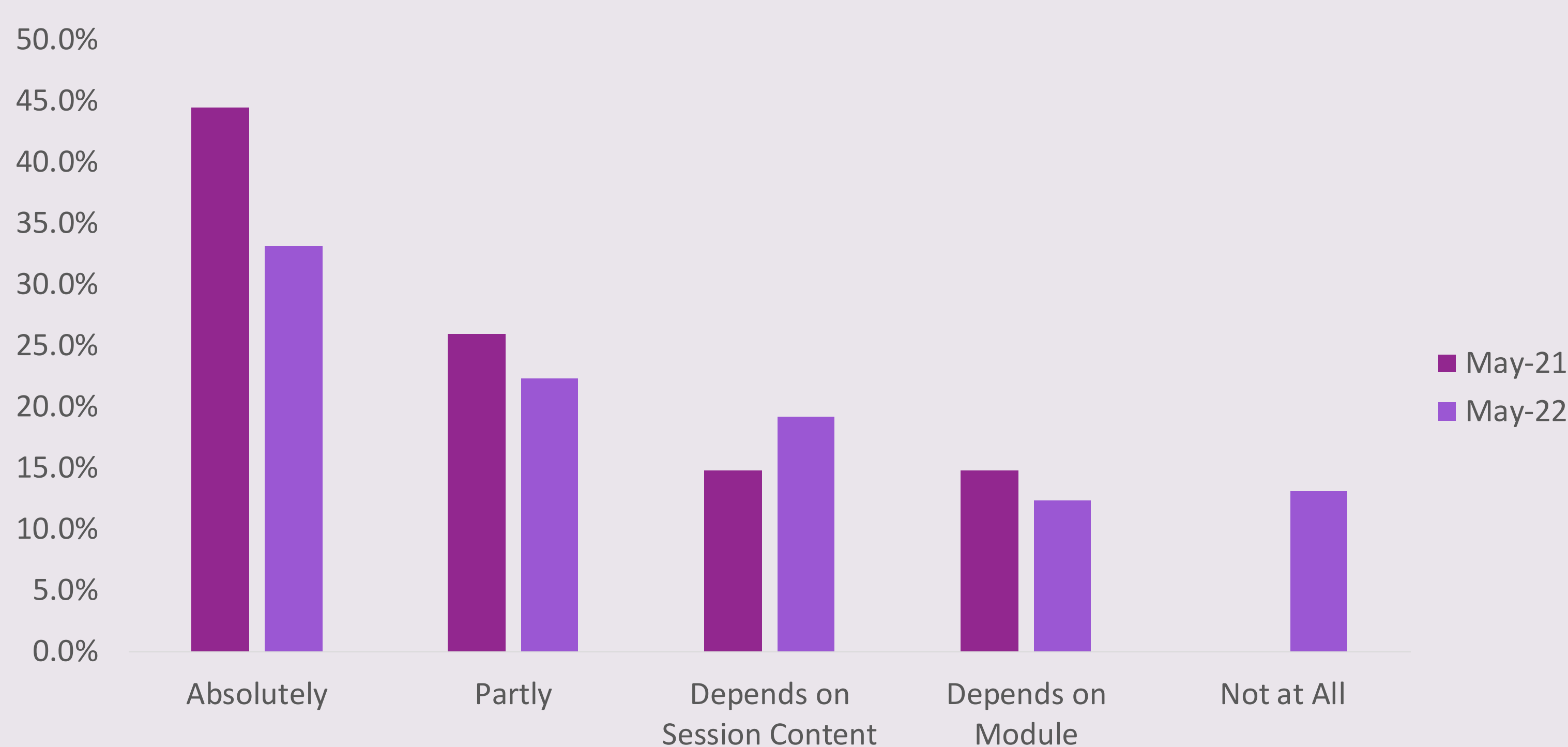


Figure 1: Students were asked if they believed that remote teaching has affected their learning in their current academic year.

When asked about meeting with staff, the majority preferred in person meetings, either one-to-one (40.8%) or in a group (13.1%). Online video calls were preferred compared to online messaging (16.2% and 11.5%).

While ERT has had obvious negative impacts on students and their learning, there are also some positives. When asked how online learning has affected their technological advancement, 60% felt that they were more technologically advanced than previously. This is a large increase from 2021 and 2020 (20.1% and 44.4%). When asked for their preference in online learning technologies, YouTube was the most preferred technology (50.8%) with no preference (43.1%) and Padlet (18.5%) coming second and third. Many students also added that they enjoyed Kahoot quizzes and would like to see it implemented more in sessions.

Overall, 91.5% of students rated leaning experience good , very good, or excellent. This may be due to the high level of good and above rated support provided by the respondent's personal tutors (83.8%), module tutors (88.5%), and other EHU departments (66.2%). This suggests that staff had a large role in mitigating the negative impact of ERT.

The Effect of pandemic on Mental Health:

When asked how they would currently rate their mental health, 36.6% of respondents rated it good to excellent while 31.7% of students rated it poor or very poor. This shows fluctuations in mental health ratings compared to 2020 (35.7% and 41.4%) and 2021 (41.2% and 50%). Most students believed that the pandemic affected their mental health (70.7%) which is higher than in 2020 (62.9%) (figure 2). This may be due to difference in time the students spent affected by pandemic or possibly due to the time of year the surveys took place.

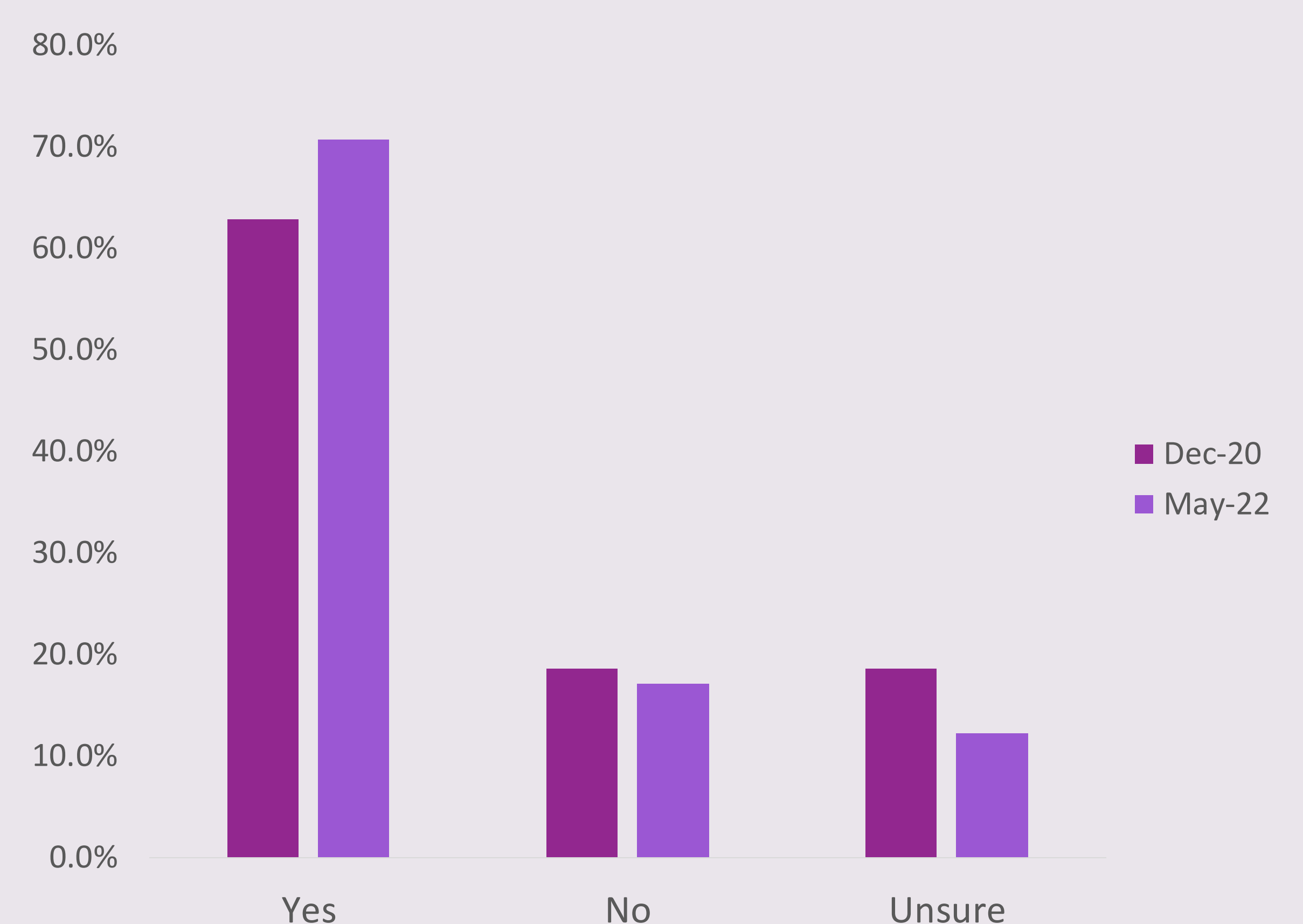


Figure 2: Students were asked if they believed that the pandemic pandemic has affected their mental health.

Most students were excited to meet their cohort in person (43.8%) though some stated that they were self-conscious about everyday social situations since the pandemic (36.2%). Other anxieties students faced were contact with large groups during a pandemic (23.8%), reduced safety protocols (10.8%), and lack of practical knowledge (45.4%).

Conclusion:

From the 3 Learn!Bio surveys it can be concluded that face-to-face sessions are vital for students, though integrating technology that was previously used during ERT can enhance students' learning. As well as this, the surveys show that students' mental health has been impacted by ERT and students may need further assistance with integrating to post-pandemic study.

Further research is needed in other STEM degrees, other Universities, and other higher education levels to determine if these patterns are consistent for all STEM students and to determine how students can best be supported in the transition back to traditional face-to-face lectures.

1. Rapanta, C., et al., *Balancing Technology, Pedagogy and the New Normal: Post-pandemic Challenges for Higher Education*. Postdigital Science and Education, 2021. **3**(3): p. 715-742.
2. Serrano-Perez, J.J., et al., *Traditional vs. Virtual Laboratories in Health Sciences Education*. Journal of Biological Education, 2021: p. 1-15.
3. Krathwohl, D.R., *A Revision of Bloom's Taxonomy: An Overview*. Theory Into Practice, 2002. **41**(4): p. 212-218.