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A virtual versus blended learning approach to higher education during the COVID-19 pandemic: The experiences of a sport and exercise science student cohort

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ABSTRACT

During the 2020/21 academic year most UK universities rapidly developed learning material as part of a move to blended learning, in response to the COVID-19 pandemic. This was interspersed with periods of virtual-only delivery, aligning with national lockdowns. The previous literature suggests there are both advantages and disadvantages to virtual-only and blended learning approaches, which may impact on student satisfaction. Student satisfaction scores may be especially insightful in a student cohort enrolled on an applied sport programme, whereby practical seminars and assessments would be severely impacted by social restrictions. Therefore, this study aimed to explore the experiences and perceptions of virtual and blended learning approaches in an undergraduate sport and exercise sciences cohort, during the COVID-19 pandemic. Additionally, this study aimed to explore whether student perceptions of both learning modes differed between and within-year groups. Students completed an adapted version of the national student survey (NSS), pertaining to periods of virtual learning-only (n = 81) and blended learning (n = 62). When all students were considered, blended learning yielded consistently higher satisfaction scores across all survey sub-sections (teaching on my course, learning opportunities, assessment and feedback, academic support, organisation and management, learning resources, learning community and student voice) resulting in a significantly higher overall course satisfaction score (3.93 ± 0.99 vs 3.55 ± 1.11; p = 0.33; ES = 0.36). When comparing Year 1 and Year 2 students, the former had significantly higher (p < 0.005) perception scores for teaching on my course, assessment and feedback, academic support, organisation and management, learning resources and learning community, but not learning opportunities, student voice or Covid-19-specific, for the virtual learning survey. Additionally, within-year group (Year 2) differences were found in assessment and feedback, academic support and learning community, with higher perception scores reported in the blended learning survey. No significant within-year group differences were observed in Year 1 students. This study provides the first data on student perceptions of a sport and exercise science programme during blended and virtual learning, amidst a global pandemic. The clear preference for blended learning in the current study, suggests sport and exercise science students appreciated the access to face-to-face teaching, despite the social distancing measures in place. Broadly, the findings may assist in governmental and institutional decision making, and in

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1. Introduction

The disruptive nature of the COVID-19 pandemic has influenced almost all sectors of society in the UK and Higher Education (HE) is no exception (Aucejo et al., 2020). For teaching, the COVID-19 pandemic undermined the majority of existing practices, with the exception of specific online providers such as The Open University, and forced the teaching and learning experience to change unpredictably and rapidly (Nerantzí, 2020). The response to this challenge has varied between universities in the UK and around the world. In the initial months, as observed in schools (Viner et al., 2020), developed countries largely moved to closed university campuses and relocation of all teaching online. One exception was the USA, were some instances of face-to-face teaching in HE remained (Crawford et al., 2020). Across the 2020/21 academic year, a large majority (88.5%) of UK universities, including the university and course explored in the current study (Edge Hill University – BSc Sport & Exercise Science), eventually adopted a ‘blended-learning’ approach (Student crowd, 2020), although notably, institutions such as Oxford and Cambridge committed entirely to teaching online. Each approach offers unique benefits and presents individual challenges to teaching and learning (Adnan & Anwar, 2020; Burki, 2020; Cavanaugh & Jacquemin, 2015; Means et al., 2013; Mishra et al., 2020; Shim & Lee, 2020), although the extent to which these modes impact students’ perceptions of HE remains unclear.

Virtual learning can be defined as learning that can functionally and effectively occur in the absence of traditional classroom environments (Simonson & Schlosser, 2006). Although learning from home is an integral part of HE systems, extended periods of home learning is a rare situation, described by the term ‘emergency online learning’ (Bozkurt & Sharma, 2020; Murphy, 2020). Previous research on the benefits of virtual learning is conflicted. Whilst undergraduate students may need face-to-face contact with tutors to sufficiently grasp the required contextual knowledge (Adnan & Anwar, 2020; Lane & Whyte, 2006), students may respond favourably to elements of virtual learning such as more comfortable learning environments, or efficient time utilisation via the repeatability of video content either on the university’s systems, or youtube (Mishra et al., 2020; Shim & Lee, 2020).

In contrast to virtual learning, blended learning refers to the integration of virtual learning described earlier, with elements of face-to-face teaching (Bower et al., 2015; Castro, 2019; Hastie et al., 2010). The benefits of blended learning approaches may include the facilitation of flexible learning in HE (Shim & Lee, 2020), improved student engagement, and improved self-regulated learning (Li et al., 2020; Butz, 2014; Schunk & Zimmerman, 2013). Previous authors have also noted the greater potential to transfer content into practice in this approach (Demirir & Sahin, 2013).

Sport and exercise science is a particularly applied degree, whereby sub-disciplines such as biomechanics, physiology and psychology are taught within lectures, applied seminars, sport and physical activity, and laboratory practicals (Keogh et al., 2017; Lane & Whyte, 2006). Periods of social restriction, or instances where these activities are limited or unavailable, inevitably impact such applied activity (Millar, 2004). For example, students may not immerse themselves in hands-on learning, or peer-to-peer collaboration, limiting sport and exercise science students’ exposure to the practical aspects of sport science or related fields (Gauci et al., 2009; Pedlar, 2005). In turn, this may negatively impact how students perceive the course overall (Knudson, 2020). Investigations on student perceptions in a sport and exercise science cohort are extremely limited (Keogh et al., 2017), with even fewer studies exploring this within the context of the COVID-19 pandemic. Outside of learning, the negative psychological emotions associated with social restrictions must also be noted (Brooks et al., 2020).

As the COVID-19 pandemic is a constantly moving situation, it is important to explore student perceptions of virtual-only and blended learning approaches to a sport and exercise science programme. Typically, subtle differences in the course structure and content arise as students’ progress from level 4 to level 6, and are further differentiated by individual pathway choices on the programme. Therefore, it may be interesting to explore differences between year-groups, and indeed within-year groups, to identify potential differences in the impact on student perception. One method that could be used to explore this, is survey-based research.

Survey-based research can effectively gather large amounts of data (Kelley, 2003) and has been used previously to investigate the perceptions of HE students (Adnan & Anwar, 2020; Hamutoglu et al., 2020; Mishra et al., 2020; Sukayt, 2020). Perhaps the most well-known example of a student survey, is the National Student Survey (National Student Survey, 2021). Gathering the student perceptions of teaching and learning in both virtual learning and blended learning during the COVID-19 pandemic, may be useful to assess and compare the efficacy of both modes. Further, this data could be used to influence future government and institutional policy on teaching and learning in periods of restriction, or even as alternative forms of education. Lastly, the comparison of student perceptions in a virtual or blended learning environment may assist in the course decision making of prospective students, considering the ongoing pandemic. Therefore, this study explored the following research questions (RQ):

**RQ1** - To what extent did student perceptions of both virtual learning-only and blended learning modes differ on a sport and exercise science programme, amidst the COVID-19 pandemic?

**RQ2** – Did the student perceptions of both learning modes differ between-year groups and within-year groups on a sport and exercise science programme?
2. Methods

This study utilised an online self-administered survey to examine the experiences of undergraduate students during periods of virtual learning-only and blended-learning during the COVID-19 pandemic.

2.1. Procedures

Two surveys titled “A (Virtual Learning-only/Blended learning) Approach to Higher Education during the COVID-19 Pandemic: The Experiences of a Sport and Exercise Science Cohort” were produced with Google forms software (Google, US) and distributed during the 2020-21 academic year. All participants were students enrolled on Year 1 to Year 3 of a BSc (Hons) Sport and Exercise Science degree at Edge Hill University. Specifically, students on 9 select modules where graduate teaching assistants (GTA) were responsible for teaching delivery, were given the opportunity to complete the survey. The “virtual learning-only” survey was distributed online via the institution’s learner management system (LMS) at a time when COVID-19 restrictions were in place and teaching was “virtual”. The “blended-learning” survey was distributed both online and in-person at a time where a blended approach of face-to-face and virtual learning was implemented. Both surveys could be accessed voluntarily and anonymously. The blended learning survey could be accessed via an open weblink upon scanning a QR code in class, and the virtual-only survey could be accessed by following a weblink on the universities LMS. The above methods were implemented to minimise the sharing of stationery and adhering to the governmental and institutional policy on social distancing. Students were informed of the benefits and risks of participating in the survey upon reading the accompanied information on the study procedures and provided informed consent.

The content of the surveys was adapted from the National Student Survey (NSS), with select questions added specific to the COVID-19 pandemic (National Student Survey, 2021) (see appendix A). The NSS was chosen as it is the most recognised survey on student perceptions. There are some limitations of the NSS survey which should be noted, such as the assessment of average scores for a particular survey element, despite the inter-individual differences in learning orientation and engagement in students (Bennett & Kane, 2014). Likewise, module feedback may be influenced by student perceptions of the university as a whole (Bennett & Kane, 2014). Nevertheless, the current authors agreed that the NSS survey was an appropriate survey to administer due to its consistency, unambiguous and concise wording of questions, and a lack of leading questions. The 28-item survey anonymously assessed nine aspects of student satisfaction (teaching on my course, learning opportunities, assessment and feedback, academic support, organisation and management, learning resources, student voice, COVID-19 safety, overall satisfaction) using a 1 (definitely disagree) - 5 (definitely agree) Likert-scale. The final, open-ended question further assessed student perception of the virtual/blended experience. Participants were required to answer all questions. Notifications of duplicate responses enabled the researchers to omit such responses from the analysis. Ethical approval for this study was provided by the University’s Research Ethics Sub-committee (URESC) and was conducted in accordance with the Helsinki Declaration. The current study adhered to the BERA guidelines and GDPR regulations in relation to participants privacy and data storage (Bera, 2018).

2.2. Statistical analyses

The majority of questions were 5-point Likert-scale. Comparisons between the two learning modes (virtual and blended) in addition to the between and within-year group differences were analysed via independent samples t - tests (Howell, 2010, pp. 141-144). Where Levene’s test for equality of variances was violated, the appropriate statistical corrections were applied. Regarding the final table:

| Sub-section scores for all respondents. Values closer to 1 represent lower satisfaction, with values closer to 5 representing greater satisfaction. |
|-----------------------------------------------|
| Virtual learning-only (n = 81) | Blended learning (n = 62) | Diff | P value | ES (d) |
|-----------------------------------------------|
| **Teaching on my course** | 3.85 0.83 | 3.97 0.64 | 0.12 | .288 | 0.16 |
| **Learning opportunities** | 3.80 1.05 | 4.04 0.69 | 0.24 | .059 | 0.27 |
| **Assessment and feedback** | 3.97 0.95 | 4.16 0.62 | 0.19 | .108 | 0.24 |
| **Academic support** | 3.81 1.02 | 4.10 0.69 | 0.29 | .030* | 0.33 |
| **Organisation and management** | 3.74 1.08 | 4.03 0.81 | 0.28 | .046* | 0.30 |
| **Learning resources** | 3.84 1.05 | 4.17 0.78 | 0.33 | .020* | 0.36 |
| **Learning community** | 3.56 1.00 | 3.90 0.91 | 0.34 | .043* | 0.36 |
| **Student voice** | 3.65 0.92 | 3.95 0.74 | 0.30 | .015* | 0.36 |
| **COVID-19-specific** | 4.30 0.79 | 4.42 0.71 | 0.12 | .335 | 0.16 |
| **Overall course satisfaction** | 3.55 1.11 | 3.93 0.99 | 0.38 | .033* | 0.36 |

Data are Mean ± SD. * denotes a significant difference between learning modes. (p ≤ 0.05). ES = Effect size (d = Cohen’s d).
open-ended question, a 6-stage thematic analysis process (Braun & Clarke, 2006) was performed by the research team. This comprised; data familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and lastly producing the report. Specifically, short narrative text was analysed and coded, prior to identifying and reviewing patterns in the data, and defining themes. All data was presented as Mean ± SD. Significance level was set at P ≤ 0.05. Cohen’s d effect size was also calculated, comprising the following thresholds: trivial = 0.20, small = 0.20–0.49, moderate = 0.50–0.80, and large = ≥ 0.8 (Cohen, 1988).

3. Results

Table 1 provides the overall survey responses, whilst Table 2 provides a breakdown of responses by year group. Table 3 highlights the main themes, sub-themes, definitions and example answers from the thematic analysis. In total, 203 undergraduates enrolled on a Sport and Exercise Science course were invited to complete both the virtual learning and blended learning surveys. Of those invited, 81 participants (Year 1 = 37, Year 2 = 31, and Year 3 = 13) and 62 participants (Year 1 = 51, Year 2 = 11, Year 3 = 0) completed the virtual learning and blended learning surveys, respectively. Total response rate for the surveys was finalised at 35%. Given the unsatisfactory response rate within Year 3 students, the decision was made to reduce the comparison of each teaching mode to Year 1 versus Year 2 students only, prior to statistical analysis. Additional detail on this is provided in the limitations section below.

Results highlighted in Table 1 indicate that students overall reported significantly (p < 0.05) higher scores for academic support, organisation and management, learning resources, learning community and student voice for the blended learning approach, as compared to the virtual learning approach.

Independent t-test analysis revealed no significant differences between survey sub-sections across Year 1 and Year 2 students for the blended learning survey (Table 2). Analysis did, however, reveal significant differences in responses between Year 1 and Year 2 students for “teaching on my course” (t = 3.744, df = 68, p < 0.001; ES = 0.85); “assessment and feedback” (t = 2.616, df = 68, p = 0.011; ES = 0.32); “academic support” (t = 0.003, df = 68, p = 0.003; ES = 0.57); “organisation and management” (t = 2.467, df = 68, p = 0.016; ES = 0.72); “learning resources” (t = 1.996, df = 68, p = 0.05; ES = 0.50) and “learning community” (t = 2.769, df = 68, p = 0.007; ES = 0.44) for the virtual learning survey. However, no significant differences were found for questions on learning opportunities, student voice or Covid-19-specific.

Within-year group analysis revealed no significant differences for responses between the online and blended learning for Year 1 students. For Year 2 students there was a significant difference between blended and virtual learning for assessment and feedback (t = 3.744, df = 68, p = 0.003; ES = 0.86) (see Table 2).

Table 3 presents the main themes and sub-themes associated with the thematic analysis. Examples of short-text answers are also provided. The main themes identified were teaching, learning, student wellbeing, and other (where it was not possible to attribute a response to a specific category). The main themes were divided into 2 categories, positive and negative responses. The example answers in Table 3 reflect the general preference for blended learning, due to reasons such as the opportunity to partake in applied sessions, whilst several students told of the difficulties with virtual learning.

Table 2

|                          | Virtual learning | Blended learning |
|--------------------------|-----------------|-----------------|
|                          | Year 1          | Year 2          | Year 1          | Year 2          |
| Mean                     | SD              | Mean            | SD              | Mean            | SD              |
| Teaching on my course    | 4.05            | 0.61            | 3.53            | 0.61            | 3.97            | 0.71            | 3.89            | 0.91            |
| Learning opportunities   | 4.08            | 0.70            | 3.45            | 0.96            | 4.04            | 0.69            | 3.86            | 1.11            |
| Assessment and feedback  | 4.07            | 0.71            | 3.88            | 0.46            | 4.16            | 0.61            | 4.41            | 0.44            |
| Academic support         | 4.02            | 0.85            | 3.56            | 0.77            | 4.10            | 0.96            | 4.36            | 0.64            |
| Organisation and management | 4.00            | 0.91            | 3.36            | 0.87            | 4.03            | 0.80            | 4.03            | 1.0             |
| Learning resources       | 4.08            | 0.92            | 3.66            | 0.75            | 4.17            | 0.78            | 4.21            | 1.04            |
| Learning community       | 3.74            | 1.31            | 3.19            | 1.16            | 3.90            | 0.91            | 4.18            | 1.15            |
| Student voice            | 3.85            | 0.72            | 3.44            | 0.61            | 3.95            | 0.74            | 3.91            | 0.88            |
| COVID-19-specific        | 4.53            | 0.73            | 4.13            | 0.79            | 4.27            | 0.98            | 3.73            | 1.21            |
| Overall course satisfaction | 3.72            | 1.08            | 3.25            | 1.19            | 3.94            | 0.71            | 4.27            | 0.75            |

Data are Mean ± SD.
Table 3
Main themes and sub-themes identified from the thematic analysis, inclusive of definitions and example answers.

| Main theme       | Sub-theme | Definition                                                                 | Virtual learning example                                                                 | Blended learning example                                                                 |
|------------------|-----------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Teaching         | Positive  | Students reported a positive experience of teaching                       | "Staff have been very helpful in putting on extra drop-in sessions, break out rooms were ok." | "Practicals have been good, the lecturers have tried to make it as fun and educational as possible despite masks and restrictions to labs." |
|                  | Negative  | Students reported a negative experience of teaching                       | "Lack of practical sessions."                                                               | "The online element of blended learning is useless."                                     |
| Learning         | Positive  | Students reported a positive experience of learning                       | "All sessions being uploaded to blackboard to go back on and review. Think this should continue after." | "Good use of practical sessions following theory when able to."                         |
|                  | Negative  | Students reported a negative experience of learning                       | "Dissertation has been heavily impacted by the move to online."                           | "Online content is pretty pointless, can’t concentrate at home"                          |
| Student wellbeing| Positive  | Students reported positive experiences regarding mental health, motivation and work ethic | "Enjoyed the home working environment, reduced travel."                                   | N/A                                                                                     |
|                  | Negative  | Students reported negative experiences regarding mental health, motivation, work ethic etc. | "Mental health, motivation and work ethic has decreased as we are struggling and need more support at times." | N/A                                                                                     |
| Other            | Positive  | General positive comments that may not be categorised as a specific theme. | "Many positives."                                                                        | "Much better"                                                                           |
|                  | Negative  | General negative comments that may not be categorised as a specific theme. | "Mostly negative."                                                                       | N/A                                                                                     |
4. Discussion

This current study aimed to utilise survey-based research to explore undergraduate sport and exercise science student perceptions of virtual and blended learning modes during the COVID-19 pandemic (RQ1). Additionally, this work compared between-and-within-year group differences in student perceptions of each learning mode (RQ2). Addressing RQ1, overall course satisfaction was higher in the blended as compared to virtual learning. More specifically, scores were significantly higher for academic support, organisation and management, learning resources, learning community and student voice in support of blended rather than virtual learning.

To understand the differences in overall satisfaction between blended and virtual learning modes, it is necessary to explore survey responses for each survey section. Unsurprisingly, three of five sections where significant differences in satisfaction scores were observed had ‘social underpinnings’ (academic support, learning community and student voice) and in this regard, the isolation imposed by COVID-19 during periods of virtual learning, likely contributed to some of the differences observed. For example, Laffey et al. (2006) contend that education is a social practice and successful learning is facilitated by consistent social interactions (i.e., peer to peer and instructor to student) (Kim et al., 2011). This social constructivism view, whereby learners “learn” within a proximal zone of development where the task is challenging and where the learner can attend to important aspects of information wherever viable (Subban, 2006), does not separate cognitive and affective learning and emphasises the learning community and student bonds which can support academic success (Delfino & Manca, 2007). The present study’s results suggest that students may have experienced poorer social interaction with virtual learning as compared to blended-learning approaches due to the lack of face-to-face interaction with peers and teaching staff. Yet, previous research has suggested that some students, perhaps those who may be particularly shy, may feel more comfortable and exhibit higher learner engagement in a virtual environment, compared to face-to-face (Caspi et al., 2006; McBrien et al., 2009). Interestingly, and perhaps in contrast to the above statement, numerous students surveyed in the current study told of a lack of communication and engagement in virtual sessions (i.e. seminars), whereby a lack of camera and microphone use was noted, for example:

“certain online learning tasks such as when we use breakout groups are difficult to complete, with some other students not turning on their webcam.”

Communication is central to the usual timetable of laboratory and physical activity sessions for sport and exercise science students (i.e., “academic support”, “learning community”; “student voice”) and is crucial for the development of competent professionals (Keogh et al., 2017; Lane & Whyte, 2006). Thompson and Zeuli, 1999 talk about the classroom as a scientific community, one that is ideally governed by the same norms of argument and evidence as governs discussion in the discipline itself. These small communities use such a form of communication and other conventions to help them struggle through challenging problems, developing systems of shared knowledge that gradually evolve in the direction of the knowledge held by those at the heart of the discipline. Removing the typical laboratory sessions is, in a simple way, removing a large part of the scientific or ‘learning community’ and in doing so, significantly alters the development of Sports Scientists which may have partly contributed towards the negative perceptions of virtual learning, for example:

“Some work is hard to understand from a lack of lab sessions, but we are still expected to know what to do.”

Millar (2004) argues that practical work is essential to developing students’ scientific knowledge, given that the subject matter of science is of the material world, it seems natural, and rather obvious, that learning science should involve seeing, handling and manipulating real objects and materials. Where there is an attempt to convey practical skills in an online environment, the challenge becomes how to retain the authenticity of the course content in the absence of tangible examples (Britt, 2015) and directly assessing students’ applied skills (Lane & Whyte, 2006; Pedlar, 2005), i.e. blood sampling. The effect of this would vary through each of the general sub-disciplines (Biomechanics, Physiology and Psychology). Supporting this, the following comment also stands out in criticism of virtual learning:

“Couldn’t put learning into practice and little relevance to the real world.”

Nevertheless, despite the potentially socially isolated nature of virtual learning, Soffer and Nachmias (2018) found that online modes of learning resulted in better understanding of course structure, better communication with staff and as a result higher satisfaction. Yet in the present study, perceptions of ‘organisation and management and academic support were higher for blended as compared to virtual learning. These differences in perceptions could be influenced by the lack of organisational cohesion, due to constrained learning designs (Hodges et al., 2020) between tutors on the sport and exercise science programme, with one student highlighting:

“Every lecturer uses blackboard differently, so the online content is in different places in each module. Some are really easy to find, others are extremely difficult.”

Some students may have limited access to technology or may struggle to adapt to changes in an online learning structure (Martin & Bolliger, 2018; Vaughan, 2007). This may partly explain the lower perceptions of “academic support, “organisation and management” access to “learning resources” and “learning community” in the current study, during the periods of virtual learning only. Conversely, students may value having more time to process information in virtual settings, such as recorded content (Mishra et al., 2020; Hrastinski, 2008). Indeed, this was a commonly held view reported by students in the current study, whereby the opportunity to learn flexibly and complete assessments from home was welcomed by some students who did have access to appropriate technology. This may partly explain the lack of negative responses associated with ‘teaching on my course’, ‘learning opportunities’ and ‘assessment and feedback’ reported during virtual learning.

Perceptions of teaching and learning in HE are unique to each individual and so, in this way, it is difficult to generalise each
student’s own perceptions (Lowe & Cook, 2003). In the present study for example, some students responded positively to certain aspects of the survey (i.e. ‘academic support’) whilst others did not, in one case a student remarked:

“Support from tutors was really helpful.”

Whereas another student responded:

“Online learning didn’t help and certain staff were unhelpful.”

These differences were ever apparent in the analysis of year group differences. In relation to RQ2, 1st year students had significantly higher perception scores in the following sections of the virtual learning survey; teaching on my course; assessment and feedback; academic support; organisation and management; learning resources and learning community, when compared to their 2nd year counterparts. There may be many reasons for these findings, one of which could be explained by the slight differences in the course structure and content. At Edge Hill University, there is an emphasis on the development of fundamental knowledge through introductory modules. In contrast, subsequent years typically form the development of the applied skills required of a sport and exercise scientist (Lane & Whyte, 2006; Pedlar, 2005). As such, 2nd year students may be exposed to greater disruption, when compared to 1st years. Indeed, when exploring within-year differences, 2nd year students had more positive perceptions to assessment and feedback, academic support and learning community during blended learning, when compared to virtual learning.

An additional factor that may explain differences, may be the fact that 1st year students had no prior HE experience of a ‘normal’ academic year. In contrast, 2nd year students were afforded the experience of a year of “normal” face-to-face teaching prior to the COVID-19 pandemic. Therefore, 2nd year students may be better suited to compare the virtual-only and pre-COVID-19 or ‘normal’ experience, and would likely perceive any change of approach to virtual learning in a negative way. This could also conceivably apply to 3rd year undergraduates, that specific cohort was not directly compared. In the context of teaching on my course, assessment and feedback, learning resources, and learning community, a typical academic year in the sport and exercise sciences would include participation in practical sessions and assessments, such as those mentioned throughout the study. Again, the sudden switch to virtual learning may affect those students who had prior experience of practically learning and applying the skills of a sport and exercise scientist. Likewise, those students who were familiar with face-to-face contact with teaching staff, which may involve informal assessment feedback or general support, could conceivably view virtual contact and correspondence as inferior.

4.1. Limitations

The authors note several study limitations. Firstly, as mentioned previously the findings are limited to a sport and exercise science cohort at a single HE institution. This was constrained to 9 select modules whereby the authors, as GTA’s and PhD students, were responsible for teaching delivery. It is worth noting the variation in the % of respondents across year groups, whereby only 1 of the 9 modules taught by a GTA, was a Year 3 module. Thus, comparisons between Year 3 students and other year groups was not possible. Nevertheless, the findings provide an insight into student perceptions of blended and virtual and may be used to inform future pedagogical approaches. Additionally, there may be wide ranging inter-individual interpretations of the survey’s content. For example, how students deem something as interesting, intellectually stimulating or fair feedback, is down to each individual (Bennett & Kane, 2014). Furthermore, many students could not be reached for reasons such as periods of self-isolation. Lastly, it is possible that the ordering of learning modes in the academic year (virtual learning followed by blended learning), may have had an influence on student perceptions. Future research could expand on the current analysis and explore potential trends in student grades and attendance in virtual or blended learning settings as per Nieuwoudt (2020), specifically during the pandemic. This could offer a more thorough analysis further to student perceptions, on the effects of learning during both virtual and blended learning approaches.

5. Conclusion

This paper highlights perceived differences between a virtual learning-only and blended learning approach of UK students during a global pandemic. Overall, the findings of the study suggest that sport and exercise science students at Edge Hill University had higher perceptions of blended as compared to virtual learning. The limited opportunity for social interaction and the difficulty to maintain authenticity of the practical course elements likely contributed to poorer perceptions of virtual learning. Nevertheless, student’s perceptions of “teaching on my course” and “learning opportunities” did not differ between learning modes highlighting that virtual and blended learning appear to satisfy student’s expectations at least from a teaching and learning opportunity perspective. Moving forward, this study highlights that virtual learning environments need to actively engage students to facilitate social interaction and be delivered using coordinated approaches to ensure consistent use of learning technology across sub-disciplines of sport and exercise science. Listing such approaches may not be relevant to the current study; however, for a more detailed view of strategies used by the GTA’s in the present study, see Tinnion et al. (2021). An important challenge for pedagogical design is to ensure that the authenticity of practical course elements (e.g., blood sampling, maximal exercise procedures) are maintained through periods of social restrictions (i.e., due to Governmental and institutional COVID-19 policies). Although the findings are limited to a single programme at one HE institution, the findings from this study could be used to inform and enhance future pedagogical approaches to optimise students’ learning and academic experience during periods of social restrictions.

Author statement

Mitchell Finlay: Study conceptualization, methodology, survey distribution, statistical analysis, writing of original draft, writing of
manuscript revisions. Thomas Simpson: Study conceptualization, methodology, survey distribution, statistical analysis, writing of original draft, writing of manuscript revisions Daniel Tinnion: Study conceptualization, methodology, survey distribution, statistical analysis, writing of original draft, writing of manuscript revisions.

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Declaration of competing interest

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Appendix A

| Sections and Questions |
|------------------------|
| S1 Teaching on my course |
| Q1 Staff are good at explaining things |
| Q2 Staff have made the subject interesting. |
| Q3 The course is intellectually stimulating. |
| Q4 My course has challenged me to achieve my best work. |
| S2 Learning opportunities |
| Q1 My course has provided me with opportunities to explore ideas or concepts in depth. |
| Q2 My course has provided me with opportunities to bring information and ideas together from different topics. |
| Q3 My course has provided me with opportunities to apply what I have learnt. |
| S3 Assessment and feedback |
| Q1 The criteria used in marking have been clear in advance. |
| Q2 Marking and assessment has been fair. |
| Q3 Feedback on my work has been timely. |
| Q4 I have received helpful comments on my work. |
| S4 Academic support |
| Q1 I have been able to contact staff when I needed to. |
| Q2 I have received sufficient advice and guidance in relation to my course. |
| Q3 Good advice was available when I needed to make study choices on my course. |
| S5 Organisation and management |
| Q1 The course is well organised and is running smoothly. |
| Q2 The timescale works efficiently for me. |
| Q3 Any changes in the course or teaching have been communicated effectively. |
| S6 Learning resources |
| Q1 The IT resources and facilities provided have supported my learning well. |
| Q2 The library resources (e.g. books, online services and learning spaces) have supported my learning well. |
| Q3 I have been able to access course-specific resources (e.g. equipment, facilities, software, collections) when I needed to. |
| S7 Learning community |
| Q1 I feel part of a community of staff and students. |
| Q2 I have had adequate opportunities to work with other students as part of my course. |
| S8 Student voice |
| Q1 I have had adequate opportunities to provide feedback on my course. |
| Q2 Staff value students’ views and opinions about the course. |
| Q3 The students’ union (association or guild) effectively represents students’ academic interests. |
| S9 Overall satisfaction |
| Q1 Overall, I am satisfied with the quality of the virtual learning-only experience on my course. |
| S10 COVID-19-specific |
| Q2 To what extent did I feel safe in a virtual learning-only environment, during the COVID-19 pandemic? |
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