**Development of a Screencast-Based Flipped Classroom, to Enrich Learning and Reduce Faculty Time Requirements, in an Animal Welfare Masters Degree**

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**ABSTRACT**

A new distance learning MSc in Animal Welfare Science, Ethics and Law was established in 2016 within our Centre for Animal Welfare at the University of Winchester, UK. Our programme recruited students worldwide, with enrolments increasing dramatically since its inception in 2016. However, despite rapid growth, our MSc has had only 1.0 full-time equivalent staff. With further projected sharp increases in student numbers, significant programmatic change was required for the MSc to remain viable. After consultation with our students and Programme Team, we decided to transition toward a flipped classroom model. Piloting a screencast-based flipped classroom in one course, our objectives were to provide a more enriched, engaging and effective student learning experience, and to increase student satisfaction, whilst concurrently saving staff time in future years. We aimed to provide enriched screencast videos of short (~ 20 minute) durations, with contents clearly signposted. The new teaching model was very well received. Within our 2021 programme survey, 100% of question respondents expressed a wish to see our screencast-based flipped classroom approach continued, and 71-86% wished to see it implemented in various additional courses. This model has greatly enriched our students’ learning experiences, increasing student engagement and satisfaction, while also freeing staff time to engage in discussion fora and additional ‘live’ sessions. Learning and achievement outcomes also appear positive. We plan to steadily integrate this model across additional courses, although initial time investment will be significant. Hence, this new model will be implemented over several semesters.

**Key words:**

Distance learning, distance teaching, flipped classroom, screencast, video-based learning, video-based teaching, animal welfare education, animal ethics education, University of Winchester

**INTRODUCTION**

As Imrie noted in 2021 (1), “Veterinary professionals have taken a “quantum leap” in digital adoption during the Covid-19 pandemic – and online CPD will only continue to innovate”. Veterinary schools increasingly offer various continuing education, masters or other educational programmes, for veterinary and non-veterinary students, and distance learning (DL) provides an exciting opportunity to educate such students, located virtually anywhere worldwide. However, such remote teaching is uniquely challenged by communication barriers, including those associated with virtual learning platforms, internet connectivity and asynchronous time zones. To fully realise its potential, we must design platforms, content and educational activities to maximise student engagement and accessibility (2). Postgraduate students are often busy, professional people. Maximising their satisfaction also requires resources that are quick and easy to use.

*Establishing a distance learning MSc in Animal Welfare Science, Ethics and Law*

In 2016 the primary author was asked to establish a new MSc in Animal Welfare Science, Ethics and Law at the University of Winchester, UK, within our new Centre for Animal Welfare. Unlike competitor institutions offering similar programmes, the University lacked a campus-based animal collection, such as a zoological collection, farm or laboratory animal vivarium. We also had only two staff members to establish two degrees (this MSc, and an undergraduate animal welfare degree), and we lacked an established reputation in the animal welfare field. To overcome some of these challenges, we decided to create an entirely DL MSc, consisting of a balance of synchronous and asynchronous learning activities. Guided readings within our virtual learning environment (VLE) would be completed by textual summaries, embedded images and videos, weekly webinars in all courses, and online discussion fora. Students would participate in or submit a considerable variety of both formative and summative assignments, through our VLE or the wider internet, including submission of academic posters, and PowerPoint presentations recorded as movies and uploaded to YouTube.

Our programme was innovative both within the animal welfare field, and at our University. It recruited students worldwide, and rapidly developed a strong reputation. In the three years from 16/17, headcounts rose by 41% annually, significantly surpassing projected growth on the programme. During recruitment for the 20/21 academic year, enrolment projections spiked, one point reaching 246% of the previous year’s level. Much as we like to think this was due to the success of our programme, we acknowledge the role likely played by significantly increased interest in DL programmes, in a pandemic-focused world.

*Resourcing challenges*

However, since its 2016 inception, our MSc has had only 1.0 full-time equivalent staff, split among two people, both of whom also had other duties. Requests for additional staffing made over several years were repeatedly denied. Our MSc is demanding, and by 19/20, rapidly increasing student recruitment meant that marking occupied 6-7 days/week through the second half of each semester, and one month beyond. Staff engagement on weekly discussion fora subsequently dropped to zero, despite the significant importance of discussion fora within DL programmes. Our dissertation supervision was less proactive than we wished. With further projected sharp increases in student numbers, and continued denial of staffing requests, significant programmatic change was required for the MSc to remain viable. Otherwise, we faced inability to meet marking timeframes, reductions in student engagement and support, and risked damage to our programme reputation and future recruitment.

*The screencast-based flipped classroom*

After consultation our students and Programme Team, we decided to transition our MSc toward a flipped classroom model. The project lead (AK) had experience with the flipped classroom approach at his previous University – Ross University School of Veterinary Medicine.

In the flipped classroom model, didactic teaching content is provided prior to timetabled lecture sessions, via modalities such as readings sets (e.g. articles or chapters), textual summaries, PowerPoint presentation slides, and screencasts. Many readers will be familiar with podcasts, which are audio recordings. Similarly, screencasts are video recordings, which capture all or part of the user’s computer screen, often with sound added, e.g. from a video playing on the computer, or from an external microphone recording a presenter. In higher education, screencasts will often be videos of narrated PowerPoint presentations (i.e. including audio recording of the presenter), often augmented by webcam video of presenters. In our experience, such pre-recorded videos tend to be more stable than live webinar video, aiding students with suboptimal internet connectivity.

Prior provision of didactic teaching content frees up timetabled sessions for more interactive ‘live’ learning activities, in which the learning focus shifts from understanding and remembering information, to application, analysis and evaluation (Fig. 1). This can enhance critical thinking and higher level problem solving skills (3). These are particularly important within our discipline of animal welfare, which includes numerous controversial social issues often requiring the application of knowledge, analysis and critical reasoning. Evidence indicates such more interactive ‘live’ learning exercises can increase student engagement and attendance, knowledge comprehension and retention, and student satisfaction (3–6).

**[Figure 1]**

**Figure 1. Educational objectives of in-class activities for flipped learning.** After Hwang et al. (6).

Optimal provision of didactive teaching content online, prior to ‘live’ sessions, requires learning environments that offer interactivity and flexibility to meet learner needs. This enables self-paced knowledge acquisition, at times and locations convenient to the user (7). The ‘cognitive learning model’ notes that a learner’s attention is limited and therefore selective: “If learners can determine what to construct or create, they are more likely to engage in learning (8).”

The flipped classroom model can even be used for more practical aspects of veterinary training. Decloedt and colleagues (9) implemented such a model for pre-clinical students (n = 196) in the veterinary medicine program at Ghent University Faculty of Veterinary Medicine. Prior to clinical and surgical skills training sessions, students studied online, utilising text, pictures, instructional videos, background information, a forum, and a compulsory pre-class quiz. Tests administered prior to and after this training demonstrated significant improvements in knowledge and surgical skills.

In our MSc, we provide readings, textual summaries, still images and links to external videos, but our enriched screencast videos comprise the heart of our didactic information provision. Screencast videos provide a powerful and expressive way to capture and present methodical information (10). Videos provide a multi-sensory learning experience that improves information retention (11), and are especially helpful for visual learners (12) (Fig. 2).

**[Figure 2]**

**Figure 2. Video provides a multi-sensory learning experience that improves information retention.** After Yousef *et al.* (13) who adapted with permission from Dale (14).

Several studies have indicated that learning outcomes of e-learning with instructional videos can equal or improve upon those achieved by traditional classroom learning - e.g. (15,16). Hence, as Prober et al (5) ask, “in an era with a perfect video-delivery platform … why would anyone waste precious class time on a lecture?”

**PROJECT OBJECTIVES AND IMPLEMENTATION**

Using a screencast-based flipped classroom, our objectives were to provide a more enriched, engaging and effective student learning experience, and to increase student satisfaction, whilst concurrently saving staff time in future years. We aimed to provide enriched screencast videos of short (~ 20 minute) durations, with contents clearly signposted. This would allow easy topic selection, allowing the user to determine what to study, at times and locations convenient to them, optimising student satisfaction (17).

This new approach was partly inspired by prior student feedback. Variable internet connectivity meant that live webinars in our DL programme tended to be audio only, which was more reliable. However, in the 2018 programme evaluation survey a student commented that they “Would like to actually see the lecturers rather than just listen to them. … a short video within a lecture would be good.” We found pre-recorded videos to be more stable than live videos, and linked videos, images and readings, were already successfully used.

We were initially challenged by lack of any existing university software well suited to screencasting, and by our lack of knowledge of software options. However, one of us (AC) is a videography consultant. AC surveyed and assessed the range of software options. The subsequent report assessed strengths and weaknesses, and provided costings for both personal and university-wide licences. The most suitable and affordable in late 2020 were Screencast-o-matic (USD 48/yr) and Doodly (USD 67/yr). The former would be used to produce our screencast videos, and the latter to produce occasional animations for inclusion within these. We choose Screencast-o-matic as it was very user-friendly, included a simple but powerful video editor, and a stock library of video clips for insertion, along with numerous tutorials to help users quickly create engaging, professional videos. It was also very affordable.

We were also challenged by our personal inexperience utilising the software. We anticipated this would also challenge most academics who might wish to follow in our footsteps. Accordingly, we prepared a simple, user-friendly guide to screencasting using the chosen software. We refined this with experience during the following semester.

We discussed our planned approach at staff-student meetings, and piloted it the first semester of 2021, in a single animal welfare course (‘module’ at Winchester), named ‘Animal Welfare Issues II’. Fulltime students complete our MSc in one year, and take three courses of equal weighting, per semester. Each semester comprises 12 teaching weeks, and additional assessment weeks. The chosen course covered a diverse range of animal welfare topics, including the use of animals in entertainment, and in zoos, as companions, animal abuse and forensics, the welfare of equines, birds, exotic and aquatic animals, hunting, velveting and whaling, animal disaster management, climate change and biodiversity loss.

One of us (JM) implemented the flipped classroom model within this course, creating enriched screencasts. These comprised PowerPoint presentation videos of around 20 minutes, enriched with embedded webcam video of the lecturer, other illustrative videos, animations, and interactive polls and quizzes (Figs. 3 - 6). Three screencasts/week were interspersed with readings, and with quizzes to test knowledge acquisition, highlight problem areas, and increase engagement.

We found that time required to create these enriched screencasts in the first year exceeds the time required to deliver traditional webinars, due to the creation and embedding of extra resources such as those above, and screencast video editing. We estimate that a lecturer who is otherwise well-prepared, with PowerPoint presentations ready to deliver, should allow approximately 30 – 60 minutes more per 20 minute screencast video, depending on their experience level. Substantial faculty time savings will result in future years when screencasts are re-used, however, with only annual updates being required.

**[Figures 3-6]**

**Figures 3 - 6. Webcast slides with embedded animations, images, videos and polls/quizzes.** Fig. 5. Is taken from an embedded video, showing a pangolin rolling itself into a ball. Pangolins are able to perform this behaviour quickly when threatened.

Each week the lecturer (JM) reviewed results from embedded polls and quizzes (Figs. 7 - 8). A question in the final weekly screencast video asked whether students had any questions relating to the week’s teaching content. An optional live session of around an hour or slightly longer was provided every two to three weeks, in which the lecturer would address the most common questions asked. Students could also ask additional questions at these sessions.

**[Figures 7-8]**

**Figures 7 - 8. Results from polls and quizzes embedded in videos.**

**STUDENT EXPERIENCES**

Annual surveys of student experiences were conducted within all courses, and for our MSc overall. In 2021, some extra questions were added, asking about experiences with our new screencast-based flipped classroom model. Our survey response rate for this course was 37% (13/35), which was broadly consistent with response rates in all other MSc courses that year (27% - 40%). Our overall programme survey response rate of 26% (9/35) was lower than the range of 38% - 46% over the previous three years. However, this may have been a positive sign, as experience has indicated that our students are normally more likely to respond when there is something they’re unhappy about.

Overall, the new teaching model appeared to be very well received. Combined student feedback from our programme and course surveys indicated common themes (Table 1).

**[Table 1]**

Students stated that they were more able to manage their workloads, because these were more flexible, enabling self-paced study:

“Having pre-recorded lectures available allows flexible learning where required or a concentrated session so it provides choice” (Garratt 2021, pers. comm.).

“I like that you can pause or rewind to go over again”, and “I prefer this way of doing things, it gives me time to think. [Previous one hour] lectures can be quite full on” (course evaluation feedback).

**“**I just wanted to say that I am really enjoying the new style of lectures. Makes me feel a little less overwhelmed and more interactive! The splitting of the lesson into three 20-minute videos has not only held my attention for longer but allows me to digest the information better. … due to constant distractions in my household I would usually end up breaking concentration and forgetting a lot of information from the beginning of lectures. It was also quite daunting when it came to revising for exams to do the 1-hour lessons in one go plus the reading. Overall, the shorter videos with the commenting and the little bits of reading in between the videos have helped me feel less overwhelmed, and I really appreciate that. When Andrew first sent the message out that lecture styles were changing, I was sceptical, but the small difference to learning style has made quite a big impact!” (Barnes 2021, pers. comm.).

Time previously used delivering live webinars was repurposed to substantially enrich the student experience over the 12 weeks of semester. Building on pre-existing guest speaker plans, we provided four guest speakers, three Q&A sessions, one topical discussion/debate using breakout rooms, and one focused on assignments. Most proved popular, especially the topical discussion/debate, with multiple requests for more. A student commented in the course survey, “The topical discussion was enjoyable and a great idea - it makes you think in a different way when you have to work in a team, discuss live and feedback views - very interactive and good life skills to practice.”

Some students felt enabled to participate more: “I must say the recoded [webinars] are very good and I especially like that they are interactive, asking about our opinions etc. I am mostly quiet during the webinars (cannot really explain why 😄) but this new type of webinar actually motivates me to participate which is very nice!” (Vasileva 2021, pers. comm.).

Interaction also increased with tutors and peers in the discussion fora, which became much more active. This seems to have been caused by the lecturer repurposing time previously spent delivering routine weekly webinars. Instead, the lecturer was able to participate in, and encourage discussion fora engagement. Students commented that, “the discussion forum was much more fun this semester. Knowing that what we write will actually be read and commented by others (by Jenny at least at the end of the week) and not just get lost somewhere in Nirwana [sic.] was a real incentive to participate! I think, this module [course] was actually the nicest of the whole course for me! Very demanding but in a good way.” (Course evaluation feedback). Another student commented on “… more opportunity for student interaction. This really makes us feel part of the course and this semester is wonderful because there is so much opportunity provided to interact with peers!”

Negative feedback or requests for change were very few. One concerned the provision of PDF slides accompanying webinars. During the first half of semester these were provided as a single weekly set. We later split these to correspond to the three shorter weekly screencasts. Another student missed the social ‘chat’ during live webinars. Working with student organisers, we supported students to establish regular ‘virtual coffee breaks’, and advertised these to all students. These have since proceeded fortnightly and have helped overcome some of the isolation experienced by our DL students. In the course and programme survey, students occasionally expressed concerns that the extra live sessions could add to student time demands. We have taken care to limit these, and ensure all extra sessions remain optional.

**LEARNING OUTCOMES**

Formal course and programme surveys of students were conducted later in the semester. Responses to the course evaluation survey were encouraging (Fig. 9).

**[Figure 9]**

**Figure 9. Response of students to course evaluation survey.**

Notes: 13 of 35 (37%) students responded. ‘Module’ refers to a course within our MSc, at the University of Winchester. Only one additional question was included: “What was good about this module and what could be improved?” Free text answers were provided to this question, as summarised within Table 1.

Assessment outcomes were also positive, and increased slightly compared to the previous three years (Table 2), although it must be noted that there was also an assignment change in 2021 (from an essay to a multiple choice test) which may also have affected these results.

**[Table 2]**

One indicator of student engagement is page views within the VLE. These were broadly similar to those of the previous years, indicating similar levels of engagement with our VLE pages containing the course teaching content, even though students were additionally engaging in a range of additional, optional ‘live’ sessions. The analytical tools in our institution’s VLE are currently limited to page views, and do not provide direct data regarding duration of activity, for example, which would allow assessment of engagement with screencast videos, or with extra ‘live’ sessions. Enhanced tools for monitoring online engagement would allow a more nuanced assessment of engagement.

We also assessed our new teaching model against University of Winchester teaching 2020 objectives and strategic priorities. The University ‘Approach to blended learning’ asserted the importance of varied teaching activities, manageable workloads, flexible, self-paced study, and interactive opportunities. Our screencast-based flipped classroom model achieved all of these objectives. It allowed greater diversity of live teaching activities. Students were more able to manage their workloads, which became more flexible, enabling self-paced study. These outcomes appear to have optimised student learning and enhanced student satisfaction.

**CONCLUSIONS AND RECOMMENDATIONS**

The screencast-based flipped classroom teaching model has the potential to save substantial amounts of faculty time in subsequent years, as time is no longer needed to prepare for, nor deliver, live webinars or lectures. Where updating course content is necessary, this process is likely to become much more efficient, as this will involve only re-recording or editing a short, e.g. 20-minute, video, as opposed to an entire lecture. However, preparing pre-recorded screencast videos, enriched with embedded videos, images, animations, polls and quizzes, does take significant additional time in the first year, although the process also becomes smoother with experience. Hence, extra time should be allowed in the first year, and unless extra capacity is available, traditional lectures should only be adapted for a manageable proportion of the programme, to avoid overburdening faculty.

In order to compensate for the loss of live interaction in traditional lectures or webinars, it is important to create an enriched learning experience using other delivery formats. We ensured that time was allocated to clearly communicate the extra sessions and discussion fora engagement that were to be offered in flipped classroom courses, and we then aimed to deliver consistently on these expectations. Initial scepticism of some students may reverse when they experience the increased flexibility of flipped learning, and once they participate in the extra learning and engagement opportunities. Conversely, to ensure students (who still have to cover all of the original learning content), do not become overloaded by extra sessions, we recommend keeping these limited in time and number, and also potentially optional, as we have done.

Finally, it’s important to use software that is very user-friendly, and allows basic video editing. As mentioned, screencast-o-matic also includes a stock video library, which can be helpful, although videos in the public domain can also be used, with acknowledgement of the source.

Practical considerations and prior practice are important. These include the use of a good quality webcam (at least 720p HD quality), an uncluttered background, good lighting on the lecturer’s face, a good quality external microphone the lecturer can plug into their computer, and a quiet room to record in. To maximise flexibility of screencast usage in the future, it’s also important to minimise mention of specific dates or specific content ordering, in favour of more generic terms (e.g., use ‘as discussed previously’ instead of ‘… in week 2’).

**FUTURE PLANS**

Our screencast-based flipped classroom teaching model has been a major programme enhancement for our 100% DL MSc. By enabling faculty to repurpose their time away from traditional lecture/webinar delivery, to engagement within discussion fora, and running additional ‘live’ sessions, we have greatly enriched our students’ learning experiences, and increased student engagement and satisfaction, without any additional staffing. Learning and achievement outcomes also appear positive.

Within our 2021 programme survey, 100% of question respondents expressed a wish to see our screencast-based flipped classroom approach continued, and 71-86% wished to see it implemented in various additional courses. We plan to steadily implement this within additional MSc courses. However the initial time investment is considerable; hence this will need to occur at a manageable rate, over several semesters, refining the process as we go.

We’re keen to encourage and support colleagues within and outwith our University, who may be interested in creating their own customised versions of our approach. Our software review and screencasting software guidance booklet are available from the authors, and other, free options, such as Open Broadcaster Software, also exist, and will continue to emerge. We’re also offering presentations summarising our experiences, facilitated, of course, by virtual presentation platforms.

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Table 1; Common themes identified among programme and course survey respondents, concerning our new flipped classroom teaching model.

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| --- |
| Some preferred live sessions due to ability to ask questions immediately |
| Most preferred the new model |
| Most felt the new model did not hinder learning or impact assignment performance |
| Flexibility of the new model was popular, and decreased pressure |
| Some felt learning to be ‘more immersive and engaging than the previous term and enables more opportunities for discussion/interaction with staff and other students’ |
| Questions embedded within pre-recorded screencasts were appreciated |
| The ‘topical discussion/debate’ was particularly appreciated |
| The ‘responses to feedback’ live sessions were also popular |
| The guest speakers were appreciated  |
| The more active discussion fora were popular |
| Concern was expressed that extra ‘live’ sessions could increase student time demands |

Sources: Programme survey respondents: 9 of 35 (26%), and course survey respondents: 13 of 35 (37%).

Table 2; Average course grades from 2018 - 2021.

|  |  |
| --- | --- |
| 2021 | 69 |
| 2020 | 60 |
| 2019 | 65 |
| 2018 | 60 |

Note: The grading criteria applied to all Master’s programmes at the University of Winchester may be summarised as: 0-49: fail, 50-59: good, 60-69: very good, 70-100: outstanding. Most work is graded 50-69.