



**Louisa Mitchard RVN**  
Specialist Technician

Louisa worked in first opinion small animal practice for several years after obtaining her veterinary nursing qualification. She joined Bristol University in 2004 and worked primarily in research. In 2018, she joined the Clinical Skills Lab (CSL) team as a teaching technician and is currently working as a specialist technician. She is involved in teaching practical animal handling and clinical skills to veterinary nursing and veterinary students, is responsible for setting up practical classes and examining Objective Structured Clinical Examinations (OSCEs). She has a particular interest in developing flipped classrooms to help students prepare for practicals.

Email: [louisa.mitchard@bristol.ac.uk](mailto:louisa.mitchard@bristol.ac.uk)



**Alison Catterall AFHEA**  
Specialist Technician

University of Bristol, UK, Alison is an experienced Teaching Technician and has worked at Bristol Vet School since 2003. She has responsibility for the day to day management of the Clinical Skills Labs (CSLs) and ensuring efficient delivery of teaching and assessments for staff and students. She is heavily involved in teaching practical skills and running and examining Objective Structured Clinical Examinations (OSCEs). She has also been involved in several research and development projects focussed on enhancing student learning of clinical skills e.g. making innovative models, evaluating new approaches to teaching and gathering feedback on ways to improve the CSL as an active learning space for students.

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# Flipped classroom resources to help students prepare for animal handling and clinical skills practicals

**Louisa Mitchard, Alison Catterall, Sam Brown, Lucy Gray, Lucy Squire, Sarah O'Shaughnessy and Sarah Baillie**

**Bristol Vet School, Langford House, Langford, Bristol, UK**

**ABSTRACT:** This article describes our experiences developing flipped classroom resources to help veterinary nursing and veterinary students prepare for animal handling and clinical skills practicals. The process involved planning, deciding what to include in the flipped component, providing training for the team, adopting a standardised template for the design and developing resources for the learning activities. A series of flipped classrooms has been developed for use by our students and these are being added to our open-access website for the wider community.

**Keywords:** flipped classroom; clinical skills

## Introduction

Flipped classroom is an educational approach where some of the material previously delivered face-to-face is repurposed as preparatory work for students to do in advance of classes (O'Flaherty & Philips, 2015). There has been an increasing uptake across the health professions including medicine (Moffett, 2015), nursing (Shatto et al., 2017) and veterinary medicine (MacDonald, 2014; Matthew et al., 2019). There are well established benefits of the flipped approach such as better exam results, greater student engagement and satisfaction, and more flexible learning (O'Flaherty & Philips, 2015; Chen et al., 2018). The flipped approach also improves student preparation for clinical skills practicals and allows instructors to spend more in-class time demonstrating and providing feedback (Frendo Londgren et al., 2020). With the challenges presented by the pandemic, we recognised an opportunity to utilise a flipped classroom approach to ensure that

our veterinary nursing and veterinary students were better prepared for practicals.

## Designing flipped classrooms

### Planning

At the beginning of lockdown (March 2020), the clinical skills team embarked on a project to create flipped classroom resources that would help students prepare for animal handling and clinical skills practicals in the upcoming academic year. Initially, all practicals were listed in a spreadsheet together with any existing learning resources e.g. instruction booklets, videos. For each practical, the team identified what should be included in the flipped classroom. Typically, the flipped material covered basic knowledge, how to perform a skill and tips on avoiding common pitfalls. If students were known to find a particular skill difficult, this was also included.



**Sam Brown RVN**  
Specialist Technician (Teaching)

Qualifying as a RVN in 1992, Sam started working for Bristol Vet School in 1999 where she worked as a Veterinary Nurse in the Small Animal First Opinion practice at Langford. In 2017 Sam joined the Clinical Skills Team at Bristol as a teaching technician bringing her experience and knowledge of clinical skills. Her role involves teaching practical skills and running and examining Objective Structured Clinical Examinations (OSCEs). She has been involved with research projects including; 'Evaluating the Clinical Skills Lab'. Sam has chaired and lectured at BSAVA Congress. She is a Personal Tutor to veterinary nurses and is a qualified clinical coach.



**Lucy Gray RVN**  
Teaching Technician

Lucy worked in first opinion and referral small animal practice for several years after obtaining her veterinary nursing qualification. She joined Bristol University in 2020 to work within the Clinical Skills Lab (CSL) team as a teaching technician. She is involved in teaching practical animal handling and clinical skills to veterinary nursing and veterinary students, is responsible for setting up practical classes and examining Objective Structured Clinical Examinations (OSCEs). She has a particular interest in developing interactive online learning material to help students prepare for practicals.



**Lucy Squire BSc BVSc MRCVS FHEA**  
Teaching Associate

Lucy graduated with a BVSc from Bristol Veterinary School in 2015 and as student led the development of a peer-assisted learning initiative, involving students teaching other students clinical skills and revision topics. After 2 years in small animal practice,

## Training

An important part of the project was to equip our team with the required skills. We ran workshops on the pedagogy of flipped classroom design, video production (including setting up a YouTube channel) and MCQ writing.

## Using a template

A template was used to design each flipped classroom to ensure a standardised approach and a consistent appearance in the virtual learning environment (VLE). The template had four sections:

1. Learning objectives: Describe what the student will be able to do having completed the flipped classroom. The verbs used are cognitive (e.g. name instruments, describe steps of a skill) and psychomotor, if a skill could be practised at home (e.g. perform a hand tie).
2. Learning activities: Content includes videos, photos and diagrams, interactive image labelling ([www.xerte.org.uk](http://www.xerte.org.uk)), short text descriptions, short voiceover slide presentations, and how to practise at home (where feasible). Brief text describes each learning activity and

provides instructions e.g. to practise writing down the steps of a skill after watching a video.

3. Quiz: Multiple choice questions for students to self-test. Each has detailed feedback.
4. Other useful learning resources: Includes links to additional resources that students may wish to access e.g. a book chapter, instruction booklets for related skills.

An example of a flipped classroom using the template is shown in Table 1. It was designed to help students (veterinary nursing and veterinary medicine) prepare for a bandaging practical.

## Implementing the flipped classroom

As creating each flipped classroom was time consuming, a prioritised approach was adopted to ensure there were resources for every practical, although not every skill within the practical was covered. The long-term aim is to continue to develop flipped classrooms until all skills are included. In the meantime, individual videos of skills were produced or sourced from YouTube or other open-access sites.

**Table 1.** An example of a flipped classroom for students to prepare for a bandaging practical.

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| <p><b>1. Learning outcomes</b></p> <ul style="list-style-type: none"> <li>• List materials for a foot bandage</li> <li>• Describe steps to apply a foot bandage</li> <li>• Apply a foot bandage</li> </ul>   |
| <p><b>2. Learning activities</b></p> <p><b>2.1 What is a bandage used for?</b></p> <ul style="list-style-type: none"> <li>• Brief text examples of when and why bandages are used</li> </ul> <p><b>2.2. Bandage layers</b></p> <ul style="list-style-type: none"> <li>• Table listing bandage layers, types, images, common makes and tips</li> </ul> <p><b>2.3. Preparing to apply a bandage</b></p> <ul style="list-style-type: none"> <li>• Brief text describing selection of equipment and a Xerte quiz</li> <li>• Brief text and photos illustrating preparation: yourself (handwash, your position), an assistant and the animal.</li> </ul> <p><b>2.4 Applying a foot bandage</b></p> <ul style="list-style-type: none"> <li>• Video: Apply a foot bandage (<a href="https://youtu.be/RzBa98utTck">https://youtu.be/RzBa98utTck</a>)</li> <li>• Direct students to write down the steps and practise applying a bandage*</li> </ul> <p><b>2.5. Checking the bandage once it is applied (and what can go wrong...)</b></p> <ul style="list-style-type: none"> <li>• Brief text on how to check a bandage, a bullet point list about bandages being too tight or loose, and a link to an online tips sheet</li> </ul> <p>* Students are provided with bandages to use before and after the practical e.g. preparing for placements or OSCEs.</p> |
| <p><b>3. Quiz</b></p> <p>MCQs for self-assessment, with feedback:</p> <ul style="list-style-type: none"> <li>• Identifying bandage types</li> <li>• Selecting bandages for a particular clinical context</li> <li>• Bandaging technique</li> <li>• Checking a bandage</li> </ul>   |
| <p><b>4. Other useful learning resources</b></p> <ul style="list-style-type: none"> <li>• Links to booklets on other bandage types</li> <li>• Chapter 14: BSAVA Manual of Practical Veterinary Nursing</li> </ul>  |

she returned to Bristol Vet School as a Veterinary Clinical Demonstrator, teaching first opinion skills to veterinary nursing and veterinary students. Lucy is involved in teaching a wide variety of practical skills and is the staff lead on several practicals including small animal handling, surgical preparation and surgical skills. She has a particular interest in maximising student engagement in practicals through flipped classrooms and peer-assisted learning.



**Sarah O'Shaughnessy**

Sarah graduated with BVetMed (Hons) from the Royal Veterinary College in 2013. After 3 years in primary care practice, she completed two small animal rotating internships; one in a private referral centre in the South of England and another with the University of Bristol. From this point onwards she stayed with the University as a teaching associate. Sarah's teaching focus is upon small animal medicine and diagnostic imaging, and she currently lectures on fluid therapy. She is involved in teaching a wide range of practical skills from canine physical examination to abdominal ultrasonography and is particularly interested in the role of simulation and interprofessional learning within veterinary education.



**Professor Sarah Baillie BVSc, PhD, PFHEA, MRCVS**

Emeritus Professor of Veterinary Education

Sarah worked as a vet in clinical practice for many years before doing a PhD in computer science when she developed virtual reality simulators for training veterinary students. Recently, Sarah led a major curriculum review at Bristol Veterinary School. Sarah is passionate about clinical skills teaching and was responsible for opening the clinical skills laboratory at Bristol and integrating associated teaching and assessment throughout the curriculum. She has a diverse portfolio of educational research including clinical skills, work-based learning, flipped classroom and mental wellbeing. Sarah is now an Emeritus Professor and enjoys dedicating more time to veterinary education research and collaborations around the world.

Each flipped classroom was built as a module in the VLE. Although most content was created by the team, when including external resources, care was taken to give appropriate attribution and that the use conformed to the license. A slot was assigned in the weekly timetable for students to do the flipped classroom, with the aim of specifically protecting time in their busy schedules. The expectations and benefits of completing the flipped classrooms were communicated to students both on the VLE and by a staff member. Informal feedback about the flipped classrooms from both students and the staff involved in the practicals has been very positive. The overall process for designing flipped classrooms is shown in **Figure 1**.

## Outputs

During the project, a large set of flipped classrooms was developed to support preparation for practicals. For animal handling examples include small animal restraint, basic clinical techniques, and physical examination; exotics handling and basic techniques; equine restraint and bandaging; and farm animal handling techniques. For clinical pathology and laboratory skills examples include personal protective equipment (PPE) in a laboratory, preparing a blood smear and urinalysis. For clinical skills examples include surgical preparation, basic surgical skills, injection techniques, bandaging, anaesthesia, fluid therapy, physical examination of various species, diagnostic imaging, dermatology and ophthalmology.

The team developed an open-access website several years ago to share our instruction booklets for animal handling and clinical skills under a creative commons license (<http://www.bristol.ac.uk/vet-school/research/comparative-clinical/veterinary-education/clinical-skills-booklets/>). The flipped classrooms are being added to the site to allow others to benefit from

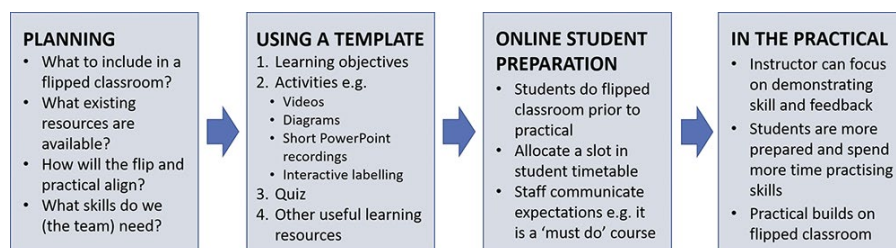
the work, by integrating the resources into their teaching or using the template structure to inform their own flipped classroom development.

## Conclusions

The team learned a great deal during the process and now run workshops on flipped classroom development for colleagues within and beyond the university. There is no doubt that spending time in the planning phase, is time well spent! Additionally, using a standardised template was helpful and led to a consistent design being adopted. After a busy year, a useful set of resources has been produced to help students prepare for and make better use of the face-to-face practical time.

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**Figure 1.** Flowchart describing the implementation of flipped classrooms to help students prepare for clinical skills practicals.