Use of Flash Card Stations during Practical Exercises in Veterinary Anatomy

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Introduction

The veterinary anatomy course at University of Copenhagen introduces the first-year BSc Veterinary Medicine students to all structures and organs of domestic animals. The students will use the knowledge they obtain from this course to learn about pathology and treatment of diseases in subsequent courses. The course is therefore an important basic course. Historically, the course lasted two semesters but has been shortened several times to just one semester starting from the 2025/2026 academic year (1.5 semesters in the 2024/2025 academic year). Despite the time the students have to learn veterinary anatomy has been reduced dramatically, the course content amount has remained the same. Learning anatomy is a bit like learning a new language, and therefore most of it must be learned by heart using Danish, English and scientific nomenclature. The examination of the course is a closed book exam, and it tests whether the students know the correct scientific terms of different structures.

For the practical part of the veterinary anatomy course, the students are working in 18 groups of maximum 10 students set by the administration team (173 students in total in the 2024 cohort intake as of 01 October 2024, average 88% female students in the cohort intakes from 2021 to 2025) (University of Copenhagen, 2025b).

Two decades ago, we lived in a different era technology wise compared to now. Back then textbooks were hardcopies with no digital versions available, artificial intelligence did not exist, and online resources were limited. The digital development has meant that students often decide not to purchase the core textbooks despite these still being the recommended learning material by the teachers. A course like

veterinary anatomy relies heavily on the students being able to look up different structures in peer-edited textbooks instead of just asking a search engine or large language model for a quick (and perhaps incorrect) answer. But of course, students see online resources as free tools whereas textbooks cost money. For the practical exercises in veterinary anatomy, we therefore often see groups of 10 students with no books at all amongst them.

During the practical exercises, one teacher and up to three teacher's assistants are present to answer questions from the 173 students. If many groups have questions at the same time, this can mean a long wait period for the students before they get help. Additionally, it is often the same students asking questions to the teachers and teacher's assistants. There is a big group of silent students during the practical exercises. They could of course not be needing help and that would be completely fine, but the worry is that the students might not be asking questions because they do not experience these practical exercises as a safe learning environment.

Material and Methods

Flash Card Stations

To address the lack of textbooks available during the practical veterinary anatomy exercises, ensuring a safe learning environment for everybody, fostering peer-to-peer student interactions and offering a learning tool that fit all levels of preparation prior to the session, flash card stations (Fig. 1) were created for the topic "the mouth and teeth", and the use of the flash card stations were evaluated.

A flash card station consisted of three clear plastic punched pockets taped next to each other along the top edge to a surface, with each pocket containing a front side and a back side. The front side of each pocket (Fig. 2) was a scan of the figures with numbers of three commercially available flash cards (Singh, 2015) relevant to the practical exercise and selected by the author to fit the level of knowledge tested in the final examination. The back side (Fig. 3) was custom made and contained both the English in black font and official scientific

nomenclature (International Committee on Veterinary Gross Anatomical Nomenclature, 2017) in blue font in three columns corresponding to the three flash cards on the front side. Danish terminology was included where relevant in red font.

Fig. 1. Flash card station next to specimens used in a practical veterinary anatomy exercise on the mouth and teeth.

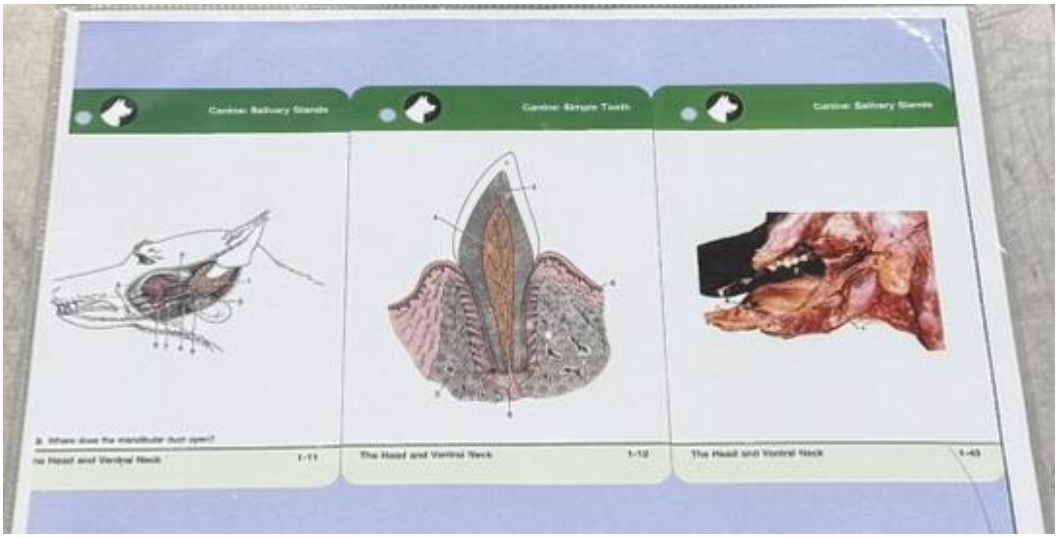

Fig. 2. Example of a front side of a flash card station plastic pocket with three figures relevant for the practical exercise in veterinary anatomy.

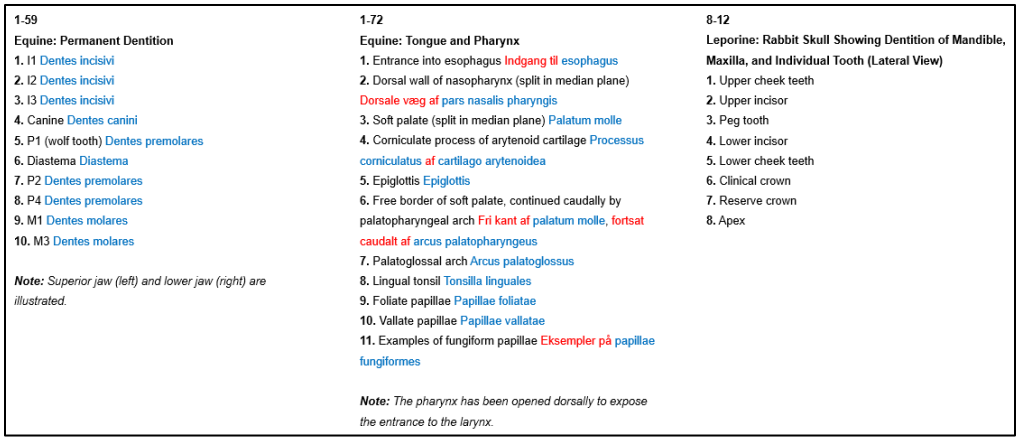

Fig. 3. Example of a back side of a flash card station plastic pocket with answers to the three corresponding figures on the front side. English (black font), scientific (blue font) and Danish (red font) nomenclature is used.

How to use the flash card stations was explained to the students at the beginning of the practical exercises. The stations did not replace any real animal specimens the students could use but were rather offered to the students as an additional learning tool.

The students were exposed to the same flash cards stations twice. Firstly, on 25 March 2025 where they had a practical 1.5-hour exercise about the topic following two lectures about the topic (all 173 students using 3 stations at the same time). Secondly, on 28 May 2025 during practical recap exercises 29 days prior to the examination (6 groups of 30 students having 3 flash card stations to use for 1 hour).

Evaluation

On 28 May 2025 during the six 1-hour practical recap exercises, the students were asked to evaluate the flash card stations using a QR code (Fig. 4) that took them to an online survey (Google, 2025). The survey included up to 15 questions in 6 sections depending on previous responses. The students were reminded about completing the survey through announcements sent to their email addresses via Absalon (University of Copenhagen, 2025a) later the same day and again on 09 June 2025. The survey was closed on 19 June 2026.

Additionally on 28 May 2025, all students were encouraged to sign up for oral group interviews with the author about their experiences of the use of flash cards during the practical anatomy exercises (Fig. 4). The

interviews took place on 11 June 2025. Microsoft Copilot (Microsoft, 2025) was used to summarise the opinions of the surveyed and interviewed students.

Fig. 4. QR code to online survey and form to sign up for oral interviews about the flash card stations.

Results

Survey

63 students completed the survey. The stations were used more times per student during the first practical exercise compared to the recap exercises. The students generally found the flash card stations highly useful, with 95.5% rating them as helpful during the first practical exercise and 100% during the practical recap exercises. They primarily used the flash card stations for repetition, self-testing (Fig. 5), and gaining an overview of structures that were hard to see on real specimens, such as teeth and tissue layers. The flash card stations also supported exam preparation and occasionally encouraged peer discussion (Fig. 6). Some suggested to have more stations to use and to expand flash card station use to other topics in the veterinary anatomy course.

Fig. 5. A single student using a flash card station during a practical recap exercise in veterinary anatomy for self-testing. Photo credit: Sandra Gentin.

Fig. 6. A group of students during a peer discussion fostered by a flash card station. Photo credit: Sandra Gentin.

Interviews

Six students put their names on the list for interviews, and five students attended two interviews with one and four students, respectively, in interview groups chosen by the students themselves to ensure a safe environment. All five students interviewed agreed that flash card stations were a valuable teaching tool during the practical anatomy exercises because the flash cards make learning more visual, structured, and manageable compared to textbooks. The students highlighted benefits such as clarity, prioritization of essential content, and support for active recall through quizzes or paired exercises. Flash cards were seen as especially helpful for beginners, for checking and comparing information, and for reducing mistakes. However, they cautioned against overwhelming students with excessive detail and suggested improvements like organizing cards for progressive learning and adding interactive elements to enhance engagement. Overall, the flash card stations were considered effective when designed for collaboration and focus on core concepts.

Discussion

Veterinary anatomy is a big subject for first-year students to comprehend. The practical part of the course is where the students get a chance to connect theory to real specimens and is generally well-liked by the students, but the practical exercises can still be overwhelming. In this study, the author created an additional inductive learning activity for the students to use as a learning tool in the ways they saw fit which allowed differentiated learning. From the online survey, it was clear that the majority of the respondents used the flash card stations and found them useful.

Creating activities during teaching sessions in higher education is generally recommended to, among other things, develop students' skills and competencies, promote critical thinking and foster a place where students can learn from each other (Rienecker et al., 2015). However, it is a fine balance not to overload students with optional activities when time during a session is limited. For future exercises, it would be good to

further emphasise that the flash card stations are truly optional and created to foster active engagement and student-to-student discussions.

From a teacher's perspective, the flash card stations acted as additional teacher's assistants to some extent. Students could use the stations to get a quick answer to some of their questions. This gave up more time for the teacher and teacher's assistants to answer more detailed questions in depth from other students.

Haptic exploration has been shown to increase learning (Novak & Schwan, 2020). The design of the stations was therefore purposely chosen so that they allowed the students to view the front side of the pockets while trying to remember or guess the anatomical structures depicted before flipping the pocket over along the top edge to either check or find the answers. This meant that to get to the back side with answers, the students would have to use active touch. The author's experience was also that not having the answers displayed right next to the front side of the pocket fostered small group discussions, yet the stations could still easily be used by single student wishing to check their answers on their own. This allowed a diverse group of students to use the same learning activity which was highly beneficial (Ulriksen, 2014).

The use of flash card stations during practical veterinary anatomy exercises is worth exploring further to investigate how many stations are needed, whether they work equally well across multiple organ systems or if having flash card stations at all sessions could potentially become too boring for the students to use them actively.

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