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How do we learn?

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Almost all veterinary surgeons teach, whether they are involved in undergraduate extra-mural studies, veterinary nurse training, mentoring inexperienced colleagues, or educating clients. However, very little training is provided to veterinary surgeons in how to teach effectively. This article forms the first in a series of articles published in *In Practice* aimed at providing veterinary staff and students with tips and tools to enhance the teaching moments which occur on a daily basis in practice with students, colleagues and clients. Future articles in the series will give tips on fitting teaching into a busy working day, giving effective feedback, small group teaching, teaching practical skills and giving a presentation or lecture.

This article will set the scene for future topics by providing an overview of 'how people learn', drawing from both the literature and the authors' experience. Many 'student-centred' educational techniques may be unfamiliar (and even uncomfortable) to those of us who underwent more traditional 'teacher-centred' methods of education ourselves. The article aims to provide a brief overview of selected learning theories that have most relevance to colleagues, clients and students in a veterinary practice context, and to then introduce practical ideas for helping people to learn. The word "student" is used throughout, but the ideas discussed could apply equally to any learner, whether student, staff member or client.

So how do adults learn…?

1. Principles of adult learning

Learning in adults is driven primarily by the needs and motivations of the learner (Duhl Glicken 2004). For veterinary students this may be the need to pass examinations, as well as a desire to be a competent clinician. Clients may be motivated by a desire to provide optimal care for their pet. Adult students often bring extensive knowledge and experience to a learning situation, and need opportunities to question, discuss, debate, and interact, so that they can explore differences between their existing knowledge and their emerging understanding of a new topic.

2. Learning Styles

Everyone learns in different ways and has different preferences for how they learn (their 'learning style'). For the teacher, it is important to realise that people we are teaching may not learn in the same way that we do, and where practical, it is beneficial to provide a variety of resources to aid learners with differing learning styles (Schumacher et al, 2013). This has relevance to both students and clients e.g. explaining hip dysplasia to a client may benefit from different approaches with different people – for example, some may find a verbal explanation to be adequate, whilst others may appreciate diagrams being drawn for them (on paper or a whiteboard), written or diagrammatic information sheets, comparing normal and abnormal radiographs, or using 3D models of the hip joint to explain the condition.

3. Key Educational Concepts

Amongst the myriad of education theories described in the literature, two have particular relevance for veterinary practice, and can help teachers understand the skill level of their students. Five educational 'domains' are recognised for students on professional degree programmes, namely knowledge and understanding, generic skills, cognitive skills, subject-specific skills, and professional attitudes and behaviour. Within the 'knowledge and understanding' domain, a hierarchical system named **Bloom's taxonomy (Box 1a)** is used to help define progression at appropriate and increasingly complex levels. Similarly, a hierarchy called **Miller's Pyramid (Box 1b)** is used for teaching and assessing practical skills (rather than knowledge).

Practical tips to help learning…

1. **Starting with the 'big picture'**

If students are new to a topic, it is a good idea to start with the "big picture", making sure that they have this clear in their mind before tackling small details about the topic. It's also important for the student to identify meaning within a topic for themselves, rather than just memorising details without understanding their context, as this is likely to result in details being forgotten more quickly (Martenson 2001).

2. **Active Learning techniques**

Simply reading notes or textbooks and turning pages is not likely to be effective and may result in very superficial (or short-term) learning. Deep (or long term)learning happens best by "doing", "engaging" and "questioning", often when the student has a pen in their hand to write down summary points, diagrams or mindmaps, or their own questions about a topic. It is therefore helpful to encourage students to think and then explain how the theory they have been taught can be applied to particular clinical cases (see Box 2).

3. **Brainstorming**

It can be extremely helpful for a student to brainstorm 'what they know already' and identify 'what they don't know' about a topic before exploring it further. In educational terms this is 'activating their prior knowledge' and this subsequently helps them to connect new knowledge to what they already know. Brainstorming is also very useful for identifying gaps in existing knowledge, so that it is then easier for the brain to 'look out for and identify' this information when it encounters it. It might be helpful to think of the brain as a filing cabinet full of files containing prior knowledge, and brainstorming locates the right files and brings them to the front of the filing cabinet, ready to mix with and receive further relevant information about a topic.

4. **Structure and Organisation**

For students who are new to a topic it is important to have obvious structure within a learning activity so that they can work systematically through it in a guided stepwise manner. Similarly, it is also important that a learning activity follows an appropriate sequence, from the basic to the increasingly complex, with key concepts and topics being revisited and having additional layers of

complexity added to them to enable the student to gradually build up their knowledge or skills with confidence. Whilst this is relatively straightforward to implement during structured sessions such as a client education evening, the nature of clinical placements means that such structure may be challenging to implement. Longitudinal, individualised plans may be possible when students undertake longer placements, or return to the same practice on a regular basis.

5. Memorising information/Making connections/Repetition

Repetition is also an important principle for learning, however, if the repetition is built into learning activities it must be made explicit to students that this is intentional so that they don't simply think 'I've covered this already, so I don't need to concentrate' (Duhl Glicken 2004). In general terms, if a student can interact with the same piece of information 3 or 4 times within a period of 2-3 days, they have a much better chance of retaining it in their long term memory. The idea behind this is that the new information enters their 'working memory' (which on average lasts for 2-3 days), then combines on multiple occasions with any relevant prior knowledge that they have about the subject.

6. "Common things are common"

Experienced clinicians bring their knowledge and experience to every new clinical situation and use it to make clinical judgements and decisions (Martenson, 2001). However, students rarely have enough clinical experience to be able to effectively prioritise clinical information (e.g. a list of abnormalities on clinical examination, or differential diagnoses for a given problem), so it can be very useful to explicitly discuss this with them as often as possible during an EMS placement.

References / Further reading

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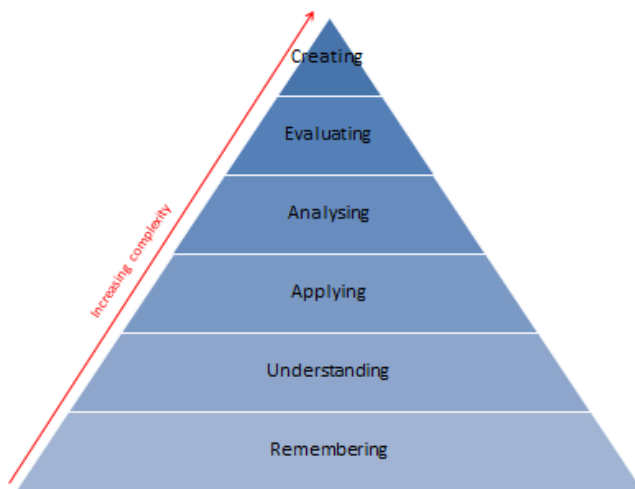
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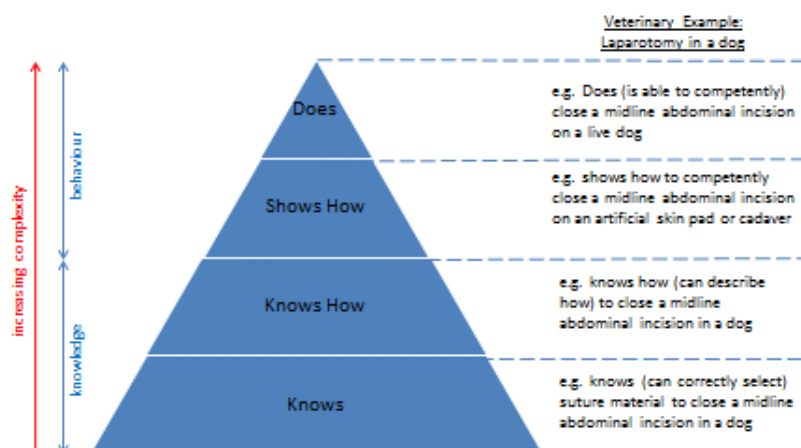
Further references are available from the authors

Box 1

a) **Bloom's taxonomy: As students develop their knowledge and understanding of a concept they "move up" the pyramid (Bloom 1956; revised by Anderson and others 2000)**

b) **Miller's pyramid: Used for teaching (and assessing) practical skills (Miller 1990)**

Box 2

Ideas for activities to stimulate learning amongst EMS students

- Ask the student to brainstorm what they know already (and what they don't know) about a particular topic e.g. 'We've got a call this afternoon to investigate an abortion outbreak in a 500 ewe indoor lambing flock. Brainstorm what you know about ovine abortion, and bring it with you in the car so we can discuss it'.
- Ask the student to formulate a Differential Diagnosis list (subdivided according to the age of the animal) for a common presenting sign e.g. weight loss in a cat
- Ask the student to formulate a problem list for one of your hospitalised cases. Once they have done this and you've had a chance to discuss it with them, ask them to formulate a differential diagnosis list for each of the problems, and to then prioritise this list.
- Ask the student a question about a case that you discussed yesterday.
- Ask them to summarise key learning points at the end of their week with you