Undergraduate veterinary education

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Abstract

When planning a veterinary curriculum the following aspects must be considered: The changes and challenges in the profession? How long should it take to train a veterinarian? How much repetition or reinforcement should the curriculum contain? Is every component of the curriculum relevant and is the inclusion justified? Are students just being lectured to or are they being educated? Is the assessment relevant? Are graduates made to fit (all employment sectors and ideally possibly internationally)? Educators must critically evaluate their personal pedagogy. Do students see a module as another hurdle to conquer in an overloaded course to obtain the ticket to enter the profession or do they realise how relevant the module is?

Keywords: Veterinary curriculum planning; Knowledge retention; Peer instruction; Peer assessment; Group assessment

1 Introduction

The veterinary profession is very diverse. Graduates are employed by the state and private sectors. In both sectors there are opportunities to work with companion animals, production animals and wildlife. There are many facets to successfully educating veterinarians:

1. The selection of students should include the following criteria:

– knowledge of the profession in all its facets

– passion to become a veterinarian

– integrity towards the profession and clients

– intellectual quotient (IQ)

– emotional quotient (EQ)

2. Needs of the profession:

– predictions of how veterinary science will develop in the next 10 –20 years – what the country and its communities require with regards to veterinary services

3. A well planned curriculum must:

– be outcomes based

– ensure limited or appropriate repetition between subjects – include subjects dealing with professional life and health – encourage self-driven (guided) learning

– allow for peer instruction

– have carefully planned lecturer ~~/~~ /student contact time

– use relevant assessment to drive learning and can include computer based, group and peer assessment

4. Appropriate use of technology:

– this facilitates communication with students

– encourages illustration during instruction

– uses case studies

– a computer laboratory is a key requirement

– skills laboratories will streamline skills acquisition

– assessment must be appropriate

2 Discussion

Little has changed within the classroom since the first university in the western world was started in Bologna in 1088. The painting of a scene by Laurentius de Voltolina depicting a classroom from that era illustrates that during a lecture a few students were sleeping, a few were talking to each other while some were or seemed to be paying attention. The class appeared to be well attended. Today, absent students may be sick or may have decided the lectures are a waste of time. Technology (photocopy machines, audio visual recording machines and computers) aids absenteeism. Some students may elect to surf the world wide web or search the library for information on the lecture topic that may be relevant.

A well planned curriculum should not allow for too much duplication but rather facilitate reinforcement except for the necessary continuity between subjects. Students should not be forced to memorise information readily available via technology. I hate hearing: “I had to suffer doing this as a student so my students must also suffer…~~.~~”. If the information is really important, it will automatically be remembered because of regular use.

A veterinary curriculum traditionally consists of a pre-clinical component followed by a clinical component. The pre-clinical component is mainly theoretical with minimal exposure to practical ~~/~~ /clinical aspects. The clinical component has increasing practical ~~/~~ /clinical aspects with greatly reduced theoretical input – with the final year being almost solely clinical.

Students are exposed to technology during clinical years at most veterinary faculties which includes diagnostic equipment, skills laboratories and operating rooms. This technology also facilitates research required from academic staff. Some of this equipment may have been purchased via research grants. Research is an income generating avenue for universities.

Unfortunately, preclinical education frequently involves educators merely down-loading facts in point form for students to memorise via teaching aids such as overhead projectors, slide projectors and Microsoft PowerPoint. Often reluctance to radically modify the preclinical training is because:

– these methods worked for decades i.e.: pedagogy lecturers received

– students are accustomed to being spoon-fed, facilitating easy recall from short-term memory and resultant good grades

– funding to upgrade/modify lecture facilities is a problem

– funding/remuneration formulae at tertiary institutions is pushing educators to become researchers, resulting in less time spent planning and preparing for educating

A consequence of this is that students may have difficulty adapting from cramming theoretical facts in the preclinical courses to techniques more often used in the clinical years requiring understanding, reasoning, synthesising, decision making and implementation.

Fig. 1 has been constructed assuming that following a theoretical module presented in the form of lectures, a student will retain 30% of the information presented in long term memory (TR) while a practical ~~/~~ /clinical module will result in approximately 70% of the information being retained in long term memory (PR). The summation of the information retained in long term memory for theoretical and practical ~~/~~ /clinical components for each year results in the line (Sum). This illustrates the necessity for educators to utilise and apply appropriate innovative techniques to maximise long term memory retention throughout the curriculum.

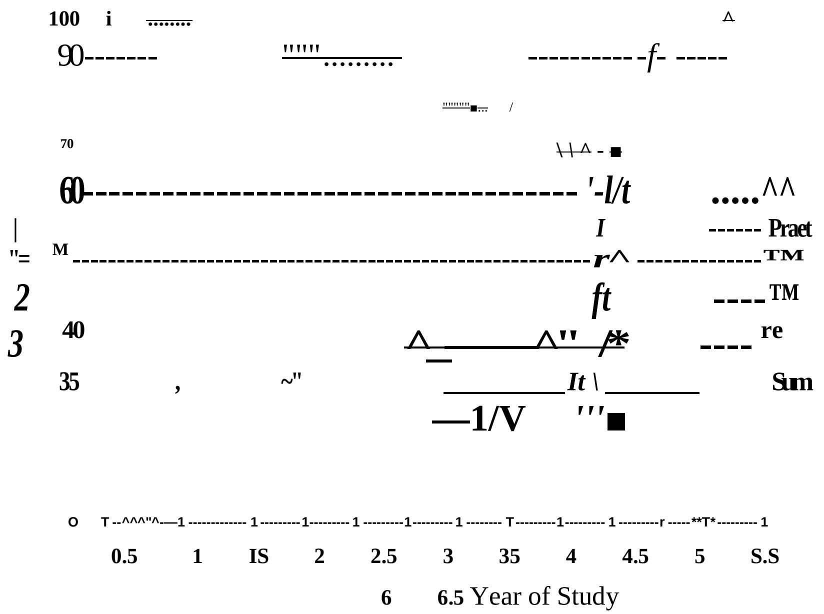

Fig. 1 Hypothetical 6.5 year undergraduate veterinary curriculum and memory retention of content. Theory = % of curriculum based on theory; Pract = % of curriculum based on practical /clinical exposure; TR = theoretical content retained to memory (assuming 30% is retained); PR = practical /clinical content retained to memory (assuming 70% is retained); Sum = summation of retention to memory of the theoretical and practical content.

Peer instruction is a useful tool that can be utilised but must be implemented correctly. As with any change, resistance is likely from students and staff. Effort must be invested in motivating students to participate and training staff to be proficient in peer instruction. A lot of determination and planning is necessary from the educator and the student is required to prepare for the session by reading or listening to or watching audio-visual material. If this is not done, there will be minimal benefit! Appropriate ConcepTests are essential for success. They should be designed to give students a chance to explore important concepts, rather than testing cleverness or memory, and to expose common difficulties with the material (Crouch and Mazur, 2001). In a survey where more than 700 instructors participated, 384 of whom were identified as using peer instruction, results indicated that most of the assessed peer instruction courses produce learning gains commensurate with interactive engagement pedagogies, and more than 300 instructors (greater that 80%) consider their implementation of peer instruction to be successful. Over 90% of those using peer instruction indicated that they will continue or will expand their use of peer instruction (Fagan et al., 2002).

An added advantage of peer instruction is that it has been shown to reduce student attrition in science programmes (Lasry et al., 2008).

Once implemented, student reaction is generally positive (Crouch and Mazur, 2001).

All educators would like their “pearls of wisdom” to be retained in long term memory. Part of the problem could be related to what was termed “disuse atrophy” when describing the fate of basic science knowledge once the medical student entered the wards (Cole, 1932). Later, it was speculated that most students “retain a mere 10% of the anatomy or biochemistry offered in the traditional first year course” (Miller et al., 1961). Medical student's attitudes towards the basic sciences have also been characterised as: “passing the examinations, forgetting the whole business and then getting on with the job of becoming a doctor (Blizard et al., 1975). Many authors tend to agree and one goes as far as to state that “the great bulk of what is taught is neither useful nor remembered” (Bond in Anderson, 1993). I am tempted to agree but realise that in a carefully planned and compiled curriculum, there is an important thread that logically binds the modules and subjects together similar to the cement in a path bonding the paving stones (subjects) together leading whoever takes the path to the destination (degree). Anyone who walks the path for a second time even decades later will recognise the important parts of the path even if the paving stones have been replaced (updated) and the surrounding trees and shrubs (buildings and venues) have changed! These courses should be based on what will be required by clinical subjects later on in the curriculum and ultimately after graduating (outcomes based) and not contain superfluous content!

Eager to find out how much retention of information was taking place in the course I present in the 5th year, I coerced the students to rewrite a test (theoretical recall of facts) 3 weeks after the test had been written by telling them that I had lost their scripts. The class was expecting a lecture and was not given any time to prepare for the rewrite. I had already marked the scripts from the first sitting where 100% of the class had passed. Only 22% of the class passed the second sitting!

This exercise illustrated how flawed such an assessment is. My findings obtained from this once-off re-write of a test fits into an “Ebbinghaus’ curve of forgetting” – a negatively accelerated forgetting function (Ebbinghaus, 1966). This function is characterised by large losses at short retention intervals after which the curve levels off to smaller losses at longer intervals. Ebbinghaus’ retention curves are the same for meaningless and meaningful materials, but the level of retention is considerably higher in the latter case and the time scale is much more expanded.

I have now implemented group assessment (including peer assessment) in the class which requires a lot more effort on my part (and many other staff members) but supplies me with a mark that better reflects the student's aptitude with regards to what is required in the subject. Student feedback has been extremely positive and included comments regarding the experience being educational and helping to prepare them for the future. The group assessments are based on case studies where each group of 10 students is given a scenario and then allowed 45 min to formulate a proposal and presentation before returning to the lecture room. The presentation is evaluated by at least 3 staff members and every student in the class according to a predetermined memorandum. All evaluation forms are collected and the scenario is then fully discussed with the class. Each student receives a mark for his / /her participation in the group and for what was achieved as well as for comments and report of other groups that he / /she assessed.

During the clinic year, I have repeated a real-time, case study with every group of 8 -12 students who have moved through the small stock clinic. In the scenario I represent a retired photographer who has invested all his savings and retirement funds into a smallholding and stud sheep flock. The flock is depicted by 40 small sheep made from clay positioned on a table in a venue containing all the drugs and equipment that a private practitioner would have at his / /her disposal. The students are the veterinarians who the farmer phones after discovering 2 critically sick sheep lying on a severely wilted pasture. To indicate to students which sheep are affected, I placed sick sheep onto their sides and as they die, into a plastic container. I expect good communication from the students and precise description of what they are doing as if they are busy with such a problem. The correct diagnosis of prussic acid poisoning is usually made by groups while obtaining the history telephonically from the farmer. The antidote (hypo = sodium thiosulphate) is also quickly identified by most groups. Although prussic acid poisoning has been discussed a number of times in other subjects such as pharmacology, toxicology, pathology, ruminant medicine and herd / /flock health, the majority of groups still don' not suggest or do the following:

- request the farmer to get plenty of hot water ready (to dissolve hypo – endothermic reaction) before arriving at the farm. I require students to mix the hypo in the correct proportion with water.
- carry out a quick necropsy to confirm the diagnosis on arrival at the farm (check colour of the blood – cut jugular vein and puncture rumen to detect almond aroma)
- inject hypo intravenously. Other routes such as dosing, stomach tubing and intra-ruminal and sub cutaneous injections are attempted first on the downer sheep, probably due to the reluctance to inject hypo IV because it does not originate from a sterile vial indicating IV administration! The reaction to treatment will confirm the diagnosis and lead the students on to dealing with possible relapses and future prevention.

Poor student performance prompted me to implement two 15 min rewinds students can elect to take at any time whereby they go back 15 min (or 30 min if the 2 rewinds are combined) with the knowledge already gathered. This gives students the opportunity to observe what impact each step has regarding the survival of patients.

I have met graduates at congresses 10 years after they experienced this case study. Most remind me of the exercise and inform me that they still remember the critical steps! I assume that this is a meaningful exercise with a high level of retention and a much expanded time scale.

3 Conclusion

Student numbers increase and budgets tend to get smaller. Universities MUST consider implementing innovative educational methods and modern technology throughout the curriculum to ensure quality educational standards are maintained, resulting in capable graduates, employable internationally.

An educator with passion and vision will remain relevant!

Lecturers may become redundant … educators will always be needed!

Conflict of interest statement

I wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

I confirm that I have studied the manuscript and there are no other persons who satisfy the criteria for authorship.

I confirm that I have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property.

In doing so I confirm that I have followed the regulations of my institution regarding intellectual property.

Uncited references

Custers (2010) and Kerfoot et al. (2007).

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