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Pitfalls and opportunities of teaching veterinary parasitology within an integrated curriculum

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ABSTRACT

The Faculty of Veterinary Medicine at Utrecht University has seen three major curriculum changes, in 1995, 2001 and 2007. The last change was made because of the European change to a Bachelor-Master system. Almost each time teaching hours tagged for veterinary parasitology have been reduced to currently a minimum of between 46 and 51.5 h, which is much less than the WAAVP-recommended minimum of 70–90 h. This results in a challenge to maintain a qualitatively adequate veterinary parasitology program in a curriculum. Following a brief historic account of previous curricula and implemented curriculum changes, experiences, limitations and opportunities are discussed, including the potential of introducing new teaching materials based, for example, on digital technologies and gaming.

1. Introduction

Since 1982, the curriculum of the Faculty of Veterinary Medicine in Utrecht (FVM) has changed several times in a relatively short period. Significant changes were made in 1995 and 2001, followed by a fundamental change to an organ-based curriculum within a Bachelor-Master (BaMa) structure in 2007. Each time, changes were driven by a need to further improve training in communication, problem-solving capacity and aspects of the profession related to non-clinical areas. The change in 2007 was also driven by a need to conform to the Bologna process in 1999. The main focus in this agreement was: (1) the introduction of a three-cycle system (Bachelor/Master/Doctorate, the latter for example PhD in Academia); (2) strengthened quality assurance; and 3) greater recognition of qualifications and periods of study (http://ec.europa.eu/education/policy/higher-education/bologna-process_en). Eysker (2002) discussed the necessity for these changes, and it was noted that teaching of the discipline veterinary parasitology (VP) became more challenging with each curriculum change. This was partly due to the decrease in student contact hours for teaching VP. Within the current BaMa curriculum, a multidisciplinary approach is undertaken, as particularly the Bachelor program is organ-oriented.

As if three major curriculum changes over the last two decades were not enough, we now face a new curriculum change proposal to combine the Bachelor of Veterinary and (Bio) medical studies into one common Bachelor, the Life sciences Bachelor. To identify limitations and opportunities in the current and proposed curriculum, we will first present an historical overview. This starts with a short introduction of our Utrecht curriculum of 1995, because that is more similar to the current bi-phasic situation than the 1982 curriculum.

2. The older curricula

2.1. 1995 curriculum

The Netherlands is a small country with a good infrastructure and only one FVM. In this context, older curricula focused on educating Dutch veterinarians for Dutch practices. Students all had the same access to teaching materials, academic staff members and opportunities to witness hospitalised patients as required. The main objective of changing the older curriculum was to improve problem-solving, communication and academic competencies of students (Eysker, 2002). The bi-phasic system then consisted of a so-called general curriculum for all veterinary students, lasting 4 years, followed by a 2-year differentiation program into farm, companion or equine animal health. Improving problem-solving and stronger communication skills was to be achieved with the introduction of (supported) self-study, small working groups of 25 students and group tasks. A core curriculum was supported by elective courses, and the latter were mainly offered to students based on choice of differentiation (from only one, two or up to three differentiations). In the second phase of this curriculum, all students had to carry out a 3-month research assignment to enhance their academic competencies. The total number of contact hours for VP in both phases taken together, was between 72 and 90 h (Eysker, 2002).

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2.2. 2001 curriculum

This curriculum involved two major changes. First, three differentiations (study paths) were created, in addition to farm animal, companion animal or equine health. These were public health, veterinary management and research. The second change was implemented in the first 4 years of the study, in which about 25% of the curriculum was taught within the chosen study path of interest. The idea behind these changes was to further strengthen academic competencies within each differentiation. This was thought to be enhanced by also further increasing the proportion of time students had to spend on self-study. Fortunately, the total number of study hours (contact and self-study) tagged for students to study microbiology and immunology, including VP, remained the same compared with the previous curriculum. This contrasted with the previous curriculum change in 1995 when hours were reduced from 164 to 72–90.

2.3. Limitations and opportunities of the 1995 and 2001 curricula

With the 1995 curriculum, a separate examination in parasitology was lost. Although there still were specific questions on parasitology in most exams, these represented only a small proportion of the total exam. Students were able to develop a calculative learning behaviour for exams, and could exclude the parts of a course that they perceived as difficult. This situation invariably resulted in low scores for the parasitology questions in most exams throughout the first 4 years of the study. Consequently, the level of knowledge on parasitic infections decreased. This process was enhanced because an emphasis was placed on other skills, rather than remembering factual information. The increased focus on self-study in the 2001 curriculum implied a further reduction in contact hours, which obviously also applied to VP. The general idea was that once a student entered the study, this equated to participating, and then equated to passing their exams.

The changes in the curricula also had benefits and produced opportunities. Students learned better how to cooperate within the working groups. This offered students the opportunity to improve their social skills, a desired competency within a veterinary practice. Integrating parasitology into courses taught by teachers from different departments created shared responsibilities for the teaching of a discipline, particularly within the second phase (differentiation) of the study. This situation resulted in more communication between parasitologists and colleagues from clinical departments.

3. The current 2007 curriculum

The current curriculum, the so-called Bachelor-Master (BaMa) system, was implemented in September 2007. The" Bologna process" aimed to improve compatibility between education systems, which would make it easier for students and job seekers to move between countries in Europe. The Bachelor and Master programs both take 3 years. Our Bachelor consists of 25 block courses that are predominantly organ-based, with 5 separate consecutive lines, running parallel to blocks (https://www.uu.nl/bachelors/diergeneeskunde/studieprogramma). These 5 lines are spread over the first three years and cover diagnostic methods, clinical reasoning, academic skills, environmental issues, legislation and ethics. Each block starts with aspects of healthy cells, organs and animals, followed by pathogenic responses in cells, organs and animals. With the introduction of the Bachelor program, a new quality system was implemented simultaneously. A chair group for 'Improving the Quality of Veterinary Education' was set up, with the mission of optimizing the educational environment and building bridges between evidence-based education and the daily practice of teaching. This focus included student and teacher evaluations of courses to allow for a yearly update as well as improvement of course design and content.

After the Bachelor program, there is a choice between three Master programs: Companion animal health, Equine health, or Farm animal and veterinary public health. Within each Master program, there is an option for further differentiation by following one of five specific paths most suited to a student's desired professional pathway: Clinical, Veterinary management, Science, One health or Animal Welfare Management. Teaching in the Master program is intended to prepare students for their later profession, and is based on the competency profile for a veterinarian. To aid this goal, students need to reflect and obtain feedback on seven competencies, which are registered in an electronic portfolio. The competencies are Veterinary practice, Communication, Cooperation, Entrepreneurship, Health and welfare, Scholarship/Academic practice and Personal development (Bok et al., 2011).

3.1. Limitations of the current curriculum

The envisioned exchange of students with other veterinary faculties, let alone other faculties, is challenging, because the Bachelor program is organ-based, and other veterinary faculties in European countries do not necessarily have the same curriculum structure. In addition, the prevailing language within the FVM Bachelor is Dutch, although parts of the study materials and of the Master are in English. Any curriculum change appears to be accompanied by further reductions in contact hours between students and teachers. An ever-increasing reliance on self-study time is promoted by the Faculty and Education boards through, for instance, e-learning modules. Contact hours clearly marked for teaching VP to all students are limited to ~29 h in the Bachelor and 17 to 22.5 in the Master phases. Students may be taught subjects or specific issues in VP beyond these fixed hours, but this depends on choices of teachers involved in integrated topics and on student's own choices to study or discuss a subject for their literature thesis, evidence-based case reports (EBCR) or research topics. This constitutes a highly variable and minimal amount of time spent on VP, or involves just a minority of students. The tagged VP contact hours are now less than the WAAVP advised minimum of 70–90 h (Krecek, 2002).

Apart from reductions in contact hours per se, timing of teaching general principles in parasitology has changed from second-year to first-year students. VP is taught within a course "Infection and Immunology", which includes the basics of immunology, bacteriology, virology, mycology and parasitology. Naturally, students experience this as a massive course, and student evaluations invariably indicate that they find parasitology difficult. VP is perceived as very difficult because of the diversity of parasite groups and species, different terminologies for separate groups of parasites (e.g. protozoology versus helminthology) and lifecycles as well as parasite population dynamics outside of the host. Knowing that most courses involve many different disciplines (including histology, anatomy, pathology, parasitology and virology), a "calculating student" may decide not to study specific disciplines and still pass exams. As a consequence, the specific threat for VP is that students with a very limited basic knowledge in VP are able to and actually do proceed from the Bachelor to the Master phase. The increased emphasis on making more topics available for self-study (e.g., e-learning modules) puts a heavier responsibility on individual students to plan their time allocations.

3.2. Opportunities in the current curriculum

Though it could be further intensified, the positive effect of line and block courses as a teaching model is that line education is able to support a parallel taught block course. The organ-based block courses, starting with healthy cells and organs, proceeding to pathogenic processes and resulting in diseased cells and organs, provide a better context for veterinary students to study diseases and also enhance the interest of students. A line course taught in the same period can offer even more context or take a topic to a higher level. Because each organ can, in principle, be affected by an infectious (including parasitic)

disease, this offers the possibility to recurrently point out basic principles of VP with reference to previous courses.

Another motivating aspect is that all blocks and lines are evaluated by students every year. They can point out perceived negative and positive aspects in a block, and can identify the most interesting and challenging parts of a subject within a course. This, in principle, allows annual updates and improvements in courses. Students are offered the opportunity to influence their curriculum, which should be a motivational aspect, and teachers are motivated by students that are actively involved in continuously improving the curriculum.

The inclusion of mandatory activities such as writing a literature thesis, writing several EBCRs and fulfilling a 3-month research assignment helps to enhance academic competencies of students, although improvements can still be made both by students and teachers. But also voluntary extra-curricular activities, organized by student communities, such as going on excursions or following lectures on current topics in veterinary medicine are now rewarded with extra-curricular credit points and can result in a certificate. This approach stimulates students to actively pursue subjects of interest and current relevance. Though this is a very motivating aspect in the study, it should be kept in mind that these activities do not cover all (infectious) diseases, as outlined in the education goals and set out in the blueprint of the curriculum.

In general, students' perception of the importance of VP does increase towards the Master program. This is reflected in the fact that Master students regularly choose a VP subject for their research traineeship and EBCRs. This is mainly due to the fact that during the Master program students become deeply involved in the daily routine of veterinary practices and, consequently, experience dealing with parasitic infections on almost a daily basis.

4. Contemporary technologies, trends and opportunities

Students are using on-line devices for their daily activities to explore video channels, social media and various digital-based technologies to discuss, express and exchange views and opinions. This has a challenging side-effect for educators, as it appears that many people these days can only maintain their focus if subjects are presented in concise and engaging ways. Digital technologies are very well suited for this purpose. This approach also facilitates ready and rapid access to study materials, and allows exposure, at any point in time, to a variety of ways to learn and teach a subject (e.g., plain text complemented with e-learning modules, videos, links to web-sites of interest, quizzes, self-assessment questions with instant feedback). Such combinations of teaching methods are encapsulated within the term 'blended learning' (Shaffer and Small, 2004; Gregory and Di Trapani et al., 2012), although this is just another level of blended learning, as teachers usually try to teach students in different ways to get their message across.

New technologies are welcome in times where a serious limit is put on the amount of time teachers can be interacting with students through direct contact and where cut-backs have created a smaller teaching staff. They can also include virtual reality, simulation and games. For instance, virtual microscopy can aid students greatly in improving their microscopy skills, and can be practised outside of the classroom or at home. Games could offer great opportunities to teach basic principles of VP, and how these work in practice. It is questionable, however, to what extent technology can substitute this loss of contact time, as face-to-face contact with the teaching staff is still valued by students, and still may be one of the most effective ways of motivating and teaching students who desire direct contact and interaction. Allowing students to learn on the digital highway still requires an assessment of knowledge and skills. It is challenging to envisage that such examinations can be done without a laboratory (skills lab for practising) or the physical presence of experienced teachers/educators.

5. Some examples of contemporary technologies currently applied in teaching

Currently, several means of contemporary technologies are incorporated in the daily routine of students at the FVM (e.g., available videos of recorded lectures, e-learning modules as preparation for courses that include veterinary diagnostic skills, quizzes for self-assessment, examples of theoretical exams, tutorial video footage, links to instructive videos on YouTube, and discussion fora on the electronic learning environment (ELE)). More digital study materials are under construction, but assessing the effect on an individual student at the FVM (grading of different digital assignments) or on a cohort compared with those for whom the materials was not yet available.

In 2017, an on-line lecture on infectious diseases, including a parasitological topic, followed by an e-learning module was used for introducing aspiring, new students to FVM. Once students are enrolled in the curriculum, they have access to our ELE, for which footage of almost all the lectures of that year is available. Programs such as Educate-it, for example voting with peers on various subjects, are used at FVM, but has not yet been implemented for teaching VP. A board-game is mandatory for the infectious diseases and immunology course. This mainly deals with immunology, virology and bacteriology topics, but VP can be readily included. VP lecturers developed a website at www.parasietenwijzer.nl, both for students and veterinarians, to further study epidemiology of helminths and measures that can be taken to reduce chemotherapy in food-producing animals (Ploeger et al., 2008). Study clips in an e-learning module on diagnostic procedures (including the Baermann, McMaster and centrifugal sedimentation and flotation methods) are made available for students to help them prepare for the practical courses. Although students are quite capable of retrieving information from the internet, they do not necessarily critically appraise the information. Therefore, websites that are considered reliable are brought to their attention and are sometimes implemented, including, for example, the cartoonesk videos about companion animal parasites, fact-checked by Dr Eva Fok (https://www.youtube.com/user/elsevetchannel), which are humorous, appeal to the perception of most students and are very informative.

Students enrolled in the Master program take several standard exams, but are also graded for various assignments and on how they work professionally as individuals or in a group. Scores are kept in their electronic portfolio in which the feedback and evaluations that they have received, for example by their peers and teachers regarding assignments and their development in veterinary competencies, is collected.

Education does not stop after students graduate. Veterinarians are interested in Post Academic Education (PAE), because particularly practical courses provide them with the information that they require and share with colleagues. The new techniques in teaching diagnostic procedures, such as video clips, quizzes and discussion fora, are very helpful to introduce blended learning in PAE for practising veterinarians. For example, in 2015, the platform Elevate was used to introduce an international course on donkey health for veterinarians, which included parasitology topics.

6. Future perspectives

After finishing their Bachelor in Veterinary Medicine, students do not possess a Bachelor degree that allows much opportunity to pursue another Master program than a veterinary one. Conversely, it is almost impossible for students from other faculties to enroll in a veterinary Master program if these are mainly focused on delivering practitioners. Currently, there is an ongoing discussion regarding a "Life Sciences Bachelor" degree. In this context, veterinary and (bio)medical students should follow largely the same or a similar program. In such a program, integration of the (bio)medical and veterinary disciplines could either lead to a further loss of the identity of or to an emphasis on the basics of

parasitology in which veterinary examples (epidemiology, host-parasite interaction, control programs) could be used. It would also have major consequences for the veterinary Masters as it probably would need a much stronger involvement of veterinary parasitologists than currently is the case. With such a major change in the curriculum, the improvement and development of current and new teaching materials must aim for a flexible format to make it possible to also teach VP in a "Life Sciences Bachelor" in different faculties. This again might challenge the ability and willingness of teachers to adapt once more to a new curriculum.

Finally, the development of digital teaching materials in any form might benefit from cooperation between veterinary faculties or parasitologists across a continent or even globally. It would, therefore, greatly help if there was an international platform, where newly developed materials were posted for feedback or use by others.

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