

Veterinary medical education in the 21st century: Old presumptions and new problems- On the occasion of the publishing of the book "A reflection on the veterinary medical education: from theory to practice



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Abbreviations: The veterinary education program (VEP); The veterinary curriculum (VC); the Veterinary Faculty (VF), the Iranian Veterinary Organization (IVO), “readily retrievable knowledge base” (RRKB)

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Introduction:

The veterinary education program (VEP) was critically reviewed extensively in the 20th century; first by the Committee on Education of the American Veterinary Medical Association (AVMA) in 1931, and second, by the Pew National

Veterinary Education program in 1989. Both reports emphasized on the necessity of a broad-based general education, developing skills in oral and written communication and an integrated understanding of the world, its people and their cultures. One of the interesting characteristics of these

reviews is that special attention has been paid to the social influence of the profession, rather than the number and type of credit hours of veterinary curriculum (VC). In the report of 1989, most critics are toward the futile increased duration and bulking up of the curriculum, which in turn, has created excessive pressures on the students and faculty members, as well as the disruption of the inherent dynamic cohesion of the VC; a cohesion that is an inseparable feature required to induce diagnostic competency, acceptable performance, ability to choose the timely decision in a variety of difficulty situations that the veterinary surgeons would inherently been confronted. Therefore, the revision of the VEP and VC is something more than increasing and/or reducing the specific credit hours. The educational strategy and tactic of the Veterinary Faculties (VF) should be determined, accordingly. There are several presumptions in the VEP that once were beneficial, now should be

replaced by new theories, prior to performing changes in the VEP (

Larry, P. Thornberg. Four essential components of veterinary education for the 21st century. *Journal of the American Veterinary Medical Association (JAVMA)*. 1992 Oct 15;201 (8):1180-3).

The veterinary medical institutions were established in Iran (and probably the Middle East), once about the beginning of the 20th century, when the lifestyle of the majority of the people was on a subsistence survival in the context of rural and/or nomadic manner of life. Veterinary medicine and science have played a crucial role in the modernization of the lifestyle of rural people, in the process of joining the middle class of the society. The VEP has kept the former structure, while it should be prepared itself for the address the requirements of modern societies and a globalized world.

1. A bug in the educational programs of almost all university disciplines

An important presumption was induced in the higher education system at the end of the World War I, when the modernization process of the whole country was a major program. At that time, many posts in the governmental organization were unattended. Therefore, educational programs and curricula were so designed to offer the minimum not very deep body of information to the students. At that time, almost all of the students would be employed in the Iranian Veterinary Organization (IVO), then would be sent to the many far-reaching parts of the country, have an extended internship under the supervision of experienced veterinarians, who were highly acquainted with the diseases and problems in every location. After a professional internship of about two years to get experience, they are

supposed to serve for 30 years in different parts of the country as veterinary surgeons. At the same time, they enjoyed tenure employment, settling down in organizational houses and driving organizational automobiles. At that time, holding a university degree and in this case, a Veterinary medicine degree, was a guarantee for having a secure continuous tenure occupation.

With great changes in society along with facilities for postgraduate internships in IVO clinics as well as job opportunities, the educational system has grasped that old presumption, still managing the VEP mainly on the concept that the transfer of a bulk of information, without paying attention to the real job climate, as the main duty. Without giving up this expired presumption, lots of efforts in VFs will probably fail in the revision of VEP.

2. Emphasis on the early acquaintance of students with the veterinary practice climate

The aforementioned expired presumption in section 1, caused the students to be held captive in boring classes. Besides, they will realize in the 4th year of the clinical orientation and examination course what discipline they have chosen to follow. This situation leads to the waste of time-scheduling and lowering the educational performance.

Why we shouldn't rearrange the timetable of VC in a way that some courses, e.g. "Restraint and Ethology", "acquaintance with Surgical Principles", and "Principles of Animal Husbandry and Nutrition" as practical units of study concurrent with "Anatomy", "Physiology" and "biochemistry" in the beginning years. As soon as the students are introduced to animals, clinics, teaching hospitals and industries, the performance of educational efforts will be enhanced.

In previous generations, the students had come from a rural environment based on agriculture and animal husbandry, the current out-of-context experience of students with animal medicine was not so significant. It is important, therefore, to lead the students to the practical climate of veterinary practice as soon as possible.

3. The importance of teaching hospitals

One of the cornerstones of educating veterinary students, in general and specialty levels, is the teaching hospitals. There are three major educational aims that should be expected from a typical teaching hospital, as follows:

- Providing educational subjects, i.e. sick animals, herds, etc., to induce an objective perspective in students regarding those subjects that were previously taught in the theoretical classes.
- Providing opportunities, equipment and facilities to referred cases

(probably complicated cases) by practicing veterinarians to the teaching hospitals, where the hospitalization of animals is possible, for further daily monitoring and observations.

- Providing within the hospital as well as ambulatory clinical practice to study the population, the prevalence and incidence of diseases. This is especially important in spotting emerging and re-emerging diseases at the early period of distribution. Moreover, according to the prevalence of diseases, the credit hours for every disease or body system could be devoted.

The educational program can be revised according to the variations in clinical cases, animal species, and the type of disease, as well as those competencies and skills that should be induced in students. With changes in the demographic situation of the

population (clients and animals), the programs could be re-revised. At present, the major education effort is to teach all things to the students, lest something remain untaught, without paying attention to the fact that at present, the avalanche of teaching materials is hardly manageable. At present, it would definitely be said that approximately none of the VFs are equipped with an active responsive teaching hospital or the faculties are aware of how to manage such a hospital. Now in many Faculties, teaching hospitals are lacking or not appropriately managed. On the other hand, the sick animals that are being referred to the faculty veterinary clinics of the metropolitan cities are declining, making keeping a high-quality education increasingly difficult. It is amazing that without an active teaching hospital, some VFs still continue to admit students for specialty courses. Needless to say,

without a standard teaching hospital, the quality of education and research-oriented toward diagnosis and treatment couldn't be guaranteed.

4. The main target of a teaching hospital is providing the opportunity for deep thinking, reflection and experience for the students, not financial income

The teaching hospitals, equipped labs, and necropsy salons as diagnostic centers, as well as teaching farms are very important facilities and premises to induce diagnostic competencies in newly graduated veterinary surgeons. The VFs should be obliged to establish these four components of quality education; it is the starting point to revise the VEP and VC. Without some infrastructure and premises, many educational programs couldn't be executed. For example, if an evidence-based education program is to be pursued, a teaching hospital is the major requirement for such a program. Managing a teaching hospital needs an

action plan for a 20–25-year period, e.g. communicating with the different farmers and horse studs, adsorbing clients holding pet animals, providing ambulatory services, establishing extension services, etc. The teaching hospital of the University of Veterinary Medicine, Hannover, is one of the models that could be addressed regarding these issues. As private hospitals and clinics, teaching hospitals need managerial knowledge; otherwise, the teaching hospitals and clinics of the best universities will suffer from the lack of enough patients in terms of the number of sick animals and the variety of diseases and species that are required for quality education. The best faculty members should be equipped with high-quality managerial features. The main reason for the repeated emphasis on the necessity of good teaching hospitals refers to this point that in a good VEP, the students first visit the sick animal in the hospital in the morning, followed by regarding paraclinical results, discussion and

dialogue about the patient, the attend the theoretical classes. This kind of management of the teaching hospital was executed at Shiraz University (formerly Pahlavi University) before the 1979 revolution (personal communication with Dr. Hassan Gilanpoor, the dean for education of Shiraz University at that time). This kind of education regards the tiny but important difference between quest and problem. Without practical experience with the patient and the disease, attendance of the students in the class does occur passively, with an empty mind that just tries to memorize the theoretical subjects, which will soon be forgotten. If the students visit the patient and observe the illness features at a glance, then attendance in the class with "problem(s)", actively; not accepting everything without critical review. Therefore, first show the patient, then teach the disease to the students.

5. The importance of choosing an educational strategy, before revising the Veterinary educational program

Strategy has been defined as a comprehensive plan of action designed to achieve a long-term or overall aim. Referring to the bug in Veterinary education mentioned in section 1, it could be noted that the current VEP lacks a definitive strategy, just tried to increase the volume of Veterinary curriculum along with the information explosion that occurred during the second half of the 20th century; this process couldn't be further continued. Every Faculty should select the appropriate educational strategy, according to the facilities, faculty members, etc. as well as the societal, political and economic demands and shortcomings of the real world. Some of the educational strategies are as follows:

Classic medical strategy:

This strategy set foot on the path of medical colleges. The education is based on biomedical science, and pathobiology science, is based on the body systems. It might seem that the current strategy of VEP in Iran is a classic medical strategy at first glance, however, the main core of such a program is the physiopathology that is lacking in the curriculum. This strategy seems appropriate for medical education that is concentrated on the human species, however, veterinary medicine that should address a broad variety of animal species is not acceptable and the inherent cohesion that is a necessity is not possible for such a strategy.

Problem-based strategy:

In the "Problem-based" strategy, the major signs and symptoms of the diseases provide the confirmation of the VC. Perhaps, it could be called the "knots and streaks" strategy. Hemoglobinuria, for example, is a

"knot" that a client complains about in her/his animal; however, it is a "streak" for the veterinary surgeon to follow up the mine of diagnosis, at the same time. In this strategy, the pathophysiologic approach is the core body of the education. The classification of the diseases will be executed based on the clinical signs. Diseases that share the same major clinical signs, i.e. hemoglobinuria will be classified in the same class e.g., babesiosis, post-parturient hemoglobinuria and water intoxication. The classification of the courses is not based on the specialty disciplines of the faculty members.

Pure species-oriented strategy:

Iranian Veterinary education experienced this kind of education program before the 1979 revolution, but it has not been scientifically and critically reviewed. In this strategy, executing classic medical strategy is much easier and the students concentrate on a specific animal species. It should be considered that at

that time, all the students will be employed by the IVO.

Core and Elective curriculum or Core/elective or Core/tracking /elective curriculum

The core and elective curriculum or core/elective or core/tracking/elective curriculum is such a model of educational programming that is more consistent with the rapid expansion of the body of knowledge. In this strategy, all that should be learned by the students is classified under the term central core. Subsequently, the students were allowed to take some additional courses to deepen their knowledge, according to their preferences and professional aims, as obligatory or optionally. Several additional courses could be offered e.g., in farm animals, small and pet animals, or public health (1,2).

The central concept of this strategy is a "readily retrievable knowledge base"

(RRKB) which means the volume of knowledge in veterinary medicine that faculty members are able to teach and the students are able to learn to apply it in professional practice. It is estimated that about 30% of the total body of knowledge could be called RRKB (3). Teaching beyond RRKB (more than 30% of the body of veterinary knowledge) if diagnosed as necessary, will be facilitated by predicting optional courses in the VC. (Figure 1). Employment of enough faculty-members is a prerequisite to accomplish this kind of strategy.

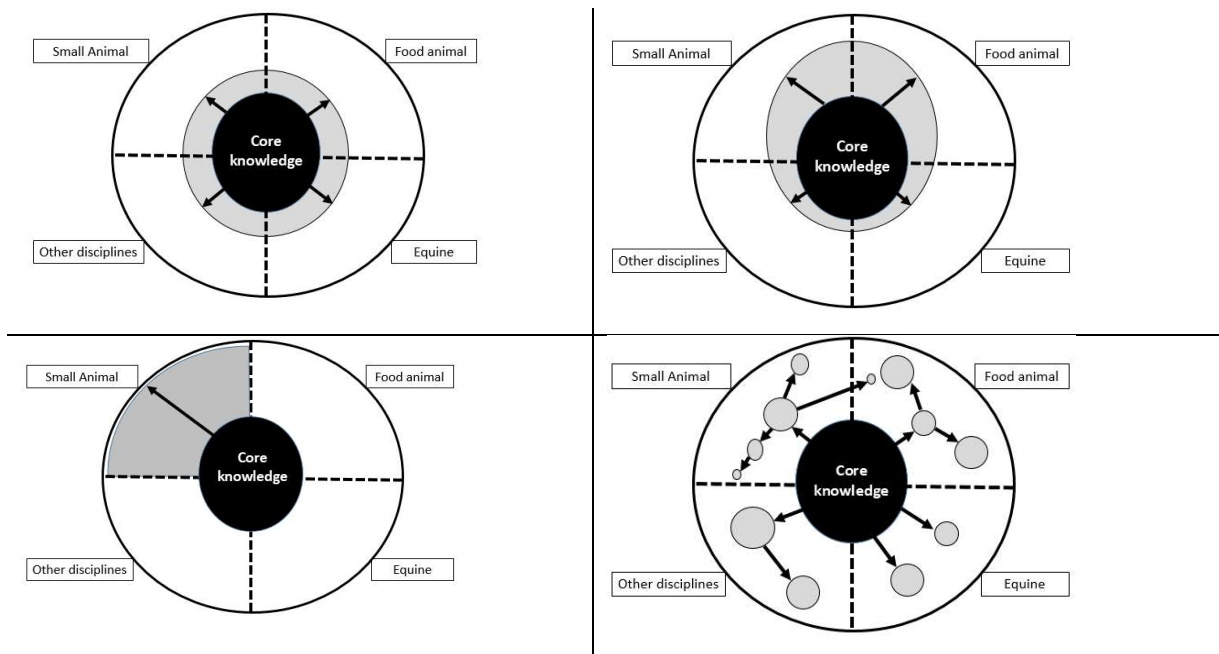


Figure 1- Illustrative description of the effect of each strategy on the distribution of a "readily retrievable knowledge base" (RRKB) for the students. The term RRKB means the volume of knowledge in veterinary science that the faculty members are able to teach and the students are able to learn and apply it in their own practice. It is estimated that 30% of the total knowledge of veterinary science could be regarded as RRKB (Hubble, & Shaffer, (1998). In these illustrations, the amount of RRKB in the graduates of several Faculties has been depicted. Upper left illustration: a faculty that lacks optional courses and credit units has been distributed equally, among major domains. Upper right illustration: a faculty that follows the principles of core knowledge strategy with optional courses. Lower left illustration: a faculty that follows a species-oriented approach (in this case, small animals). Lower right illustration: a faculty that follows problem-based learning. Every Faculty should follow the strategy that is appropriate for its specific geographic area requirements and demands. The illustrations were adopted and inspired by Hubble, & Shaffer, (1998).

6. The importance of Internal cohesion and integration of the job-oriented veterinary educational program that takes societal requirements into consideration

- Internal cohesion and integration are an undeniable feature of VEPs. In the current situation, the faculty members of different departments and even within departments are not aware of the detailed subjects of course contents that are taught; it is almost executed personally dependent. Subsequently, the internal cohesion and integration of VEP will be lost and the students will confront an avalanche of unmapped subjects that could merely be managed by memorizing and forgetting after taking the relevant exams.
- The cohesion and integration of VEP is very important. At present, the classification of job

opportunities for veterinary surgeons is as follows:

- Establishing clinics and hospitals
- Establishing a vaccination center
- Establishing a veterinary drugstore
- Employment in food-producing farms (daily, small ruminants, aquaculture enterprises)
- Employment of horse studs
- Employment in IVO
- Employment as a technical health supervisor in feed and food manufacturing plants and centers
- Other miscellaneous opportunities

At present, the specific requirements of the abovementioned job opportunities have not been predicted in VEP. At the same time, it is anticipated that huge changes are on the way in farm animal industries, especially poultry farms, dairy farms, and small animal farms, and the introduction/expansion of other species, e.g. ostrich and new world camelids. Up to now, a major part of

accomplishment and progress in food-producing animal industries is due to the artistic integration of concepts and criteria of the welfare of animals, due to the performance of production as well as disease prevention in all aspects of the practice of production medicine of food-producing animals. "Precision livestock farming", is potentially a strategy to mitigate the bioenvironmental dangers of the industries of food-producing animals (4), is the future of the evolution of the industry of animal husbandry. All of these concepts bring the development of rural activities into relevant industries into reality; i.e. the development of pig husbandry in rural piggeries to huge economic enterprise of pig production in Muyuand foods hog enterprise (Nanyang, China), from poultry raising in the backyard into California Egg City, and from keeping animals in stables to Mudanjiang City Mega Farm (Heilongjiang, China), as well as huge enterprise of dairy production and dairy cattle farms of

Almarai in Saudi Arabia. These examples are the perspective of the future of the production of food-producing animals locally in Iran and globally around the world. The rural and subsistence animal husbandry will gradually be replaced by these super industries.

The economic advantage of rural and subsistence animal production for veterinary surgeons and students is gradually going to fade. At present, it seems that trends in selecting paths for veterinary students are oriented towards disciplines other than food-producing animals. Concerns are arising that a lack of experienced veterinary surgeons shortly, to serve the super industries of food-producing animals, will be encountered.

Radostits (2002) raised the question at a conference in the faculty of veterinary medicine, at Kansas University as follows: Is the generation of veterinary surgeons in the field of food-producing animals

going to be extinct (5). From a national perspective, it seems that we will encounter the same problem, not very late. The population of food-producing animals in rural areas; is a process that is accelerated by economic pressures. Moreover, the urban origin of today's students who apply to the faculties of veterinary medicine might have less enthusiasm to pursue their careers in rural areas or food-producing animal sectors. Additionally, from a demographic viewpoint, due to the rapid expansion of small animal clinics in addition to the increasing tendency to keep pets in the population, the availability of enough specialists in the field of food-producing animals could be an important concern. To address this concern, an appropriate strategy should be considered to educate the veterinary surgeons serving the super industries of food animal production. Those Faculties that follow this policy should revise their VEP, to ensure that

the following basic competencies and skills will be induced in the students:

- Comprehensive patient diagnosis (problem-solving skills), appropriate use of diagnostic testing, and record management
- Comprehensive treatment planning including patient referral when indicated
- Anesthesia and pain management, patient welfare
- Basic surgery skills and case management
- Basic medicine skills and case management
- Emergency and intensive care case management
- Understanding of health promotion and biosecurity, prevention and control of disease including zoonoses and principles of food safety
- Client communications and ethical conduct

- Critical analysis of new information and research findings relevant to veterinary medicine.

The required competencies and skills that should be induced in veterinary graduates, based on the requirements of every geographic area must be defined by the faculties. The following skills and competencies should be induced in veterinary surgeons, in addition to the 9 basic skills and competencies described above (6):

- Animal production systems, including agricultural economics, agricultural engineering and facility design, and globalization
- Disease control through strategic management, treatment, metaphylaxis, and vaccination
- Food security, biosecurity, and bioterrorism
- Nutrition for high-production
- Population health, including evaluation using clinical epidemiology

- Public health, zoonotic disease, ecosystem health, and waste management
- Research methodology, including good clinical practice, good laboratory practice, study design, and biostatistics
- Risk assessment and risk management, including application of hazard analysis and critical control points

7. Response to the demands of a globalized world

World Animal Health Organization have held several sessions entitled "evolving veterinary education; the first one was in 2009. According to these sessions, the characteristics of a veterinary surgeon who should be able to address the demands of the business of animal products in a globalized world have been determined. Taking these considerations into consideration is the duty of the faculty members,

responsible for revising and planning VEP.

Conclusion:

Veterinary education cannot ignore the needs of society and stubbornly continue its classical path. Before changing the educational system, however, one should learn the necessary lessons from successive failures in changing the educational system by the Ministry of Education. It is a major prerequisite that a majority of faculty members should reach this belief that changing VEP is an urgent and important task. Otherwise, many action plans designed to start the changes in VEP would be already doomed to failure. For many years, the Ministry of Education failed to contribute the teachers proactively in the revision of the education program. It should be noted that in any revision, there are few leaders and a large number of active contributors should collaborate; Of course, a few might not

cooperate as actively as the majority of other faculty members (7). No predetermined formula is available to follow to make changes in VEP. The first step is to establish a "Center for Strategic and Future Studies" to study the situation and provide road map plans. Any imitation without study is doomed to failure. The geographical, temporal, economic, political, social and most importantly, our human elements determine the method of revision, of course by experimentation and estimation of the outcomes. The strategies that were described in section 5, could be executed in several Faculties in the country and evaluate the outcomes based on criteria like the level of competencies, job satisfaction and professional success of graduates in 20-year intervals. Similar studies have been accomplished by Vanguard Veterinary Faculties. The faculty of veterinary medicine, at Illinois University sent questionnaires to

veterinary surgeons and asked them to declare the required abilities for the success of graduates in the field. The results were used to revise VEP (8,9). The faculties of veterinary medicine at Missouri University (10), as well as in North Canada (11) have done the same studies and revisions. As far as the author is aware, the same studies were done by Salmanzadeh et al. (1995) in the medical science in Iran (12).

Faculty of Veterinary Medicine, North Carolina, has codified an internship booklet, as a guideline for students to enforce their professional abilities and skills to be eligible as qualified graduates. The booklet is updated periodically (13). In other words, the expected abilities of veterinary graduates are a dynamic matter, according to the requirements of the society and job market. The same is true for other Veterinary Faculties especially, the developing countries; and in this case, Iran. All revisions of VEP should be research-based, not

intuitively. Otherwise, there is no guarantee that the revision based on intuition creates a better VEP. The same study has been done by Ethiopia, as a developing country (14). The need for an aim-oriented approach to defining the desirable characteristics of a typical veterinary graduate is undeniable. The desirable features of veterinary graduates that have been published in the report of a national program of Pew Foundation (15) are as follows:

- Skill in written and verbal communication
- A comprehensive and integrated understanding of the world, cultures and people of the world
- Understanding the concepts and principles of biological sciences
- Being equipped with the basic knowledge of veterinary science and comparative biological medicine
- Being equipped with the principles of scientific and professional

- behaviour to include the characteristics of perfection, reliability, efficiency and critical analysis
- Mastering problem-solving and critical-thinking skills
 - Having experience in scientific experiments and scientific processes
 - Skillful in information retrieval and application and information management
 - being skilful and enthusiastic for continuous and persistent scholarship and a lifelong commitment to learning and growth of the profession
 - Having professional and managerial skills, including managing personal affairs
 - Commitment to improving humanity and improving the condition of people, society and the profession

- Having strong character and high moral standards
- A sense of humour
- The last character seems to be the most important feature of a veterinary surgeon.

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