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Research Article

Teaching the examination of the dog's heart in a blended learning setting – an effective way of using “new media”

Vermittlung der Herzauskultation bei Hunden und der tiermedizinischen Kardiologie als Bended-Learning – eine effektive Nutzung "neuer Medien"

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Abstract

The interpretation of acoustic findings during the examination of the heart in dogs is a great challenge for newcomer veterinarians. To raise the quality of teaching in this area a blended learning elective course was developed in cooperation between the University of Veterinary Medicine Hannover and the Szent István University Budapest to prove the acceptance and effectiveness of integrated learning in this special field of veterinary medicine. The course was divided into three parts: I. Kick-off-meeting face-to-face (approx. 1.5 h). II. Self-study with web-based training (80 courselab pages with short text passages, figures, video-clips and mp3-files of heart sounds, approx. 3 h in a 5-day period). III. Face-to-face seminar (approx. 4 h). To evaluate the learning success, a pre-test with 20 MCQ (TypeApos) was written. This test was repeated after the self-study phase and again after the final face-to-face meeting. The acceptance of the web-based training (WBT) was evaluated after part II with a survey containing Likert scale questions (1=no, bad, 2=not very good/much, 3=quite good/much, 4=yes, very good). The course was offered three times as an elective class for third-year students (group A, n=36) and for comparison, twice for fifth-year students in the clinical practical year (group B, n=33). Group B only had the possibility to participate in parts I and II. The students rated the WBT positive (3.3) with good practical relevance (3.2). They had different feelings about the learning success (2.7) and worked with the WBT for 2.3 hours (mean duration of learning). As advantages in the qualitative feedback mainly the mp3-files of the heart sounds and the possibility of independent learning were mentioned. Disadvantages were technical problems with downloading video- and audio-files and with short explanations in the text passages.

There were no significant differences between either group in the pre-test. The students in both groups raised their test-score significantly ($p<0.001$) by using the WBT. Students in group A improved significantly in the test score after the second face-to-face meeting. The feedback of the lecturer regarding the setting was also very good. The students were well prepared using the WBT. The face-to-face meeting occurred in an atmosphere of cooperation and discussion which had positive effects on the motivation of the students as well as on the teacher. In conclusion, the results of the current study showed that the blended-learning concept was not only well accepted by the students, but enhanced the learning effect, reflected in the test results. Furthermore, the face-to-face meetings with the teacher could further increase the learning success than e-learning alone.

Keywords: blended learning, pedagogical analysis, audio-files, effectiveness, veterinary medicine

Zusammenfassung

Die Interpretation akustischer Befunde bei der klinischen Untersuchung von Hunden ist eine große Herausforderung gerade für Anfänger. Um die Qualität der Lehre in diesem Bereich zu verbessern, wurde ein Blended-Learning-Wahlpflichtfach als Kooperation zwischen der Stiftung Tierärztliche Hochschule Hannover und der Szent István Universität Budapest entwickelt. Ziel der vorliegenden Arbeit war es, die Akzeptanz und Effektivität eines integrierten Konzeptes in diesem speziellen Bereich der klinischen, tiermedizinischen Lehre zu überprüfen.
Der Kurs lief in drei Phasen ab: I. Kick-off-Meeting in Präsenz (ca. 1,5 h); II. Selbststudium mit einem WBT (80 Courselab-Seiten mit kurzen Texten, Abbildungen, Videos und mp3-Herztonaufnahmen, ca. 3 h innerhalb von 5 Tagen); III. Präsenzseminar (ca. 4 h).
Zur Evaluierung des Lernerfolgs wurde während des ersten Meetings ein Eingangstest mit 20 TypA MC-Fragen geschrieben, der jeweils nach der Selbstlernphase und dem zweiten Präsenzseminar wiederholt wurde. Die Akzeptanz des WBTs wurde anhand eines Fragebogens mit Likert-Werten (1=nein, schlecht, 2=nicht so gut, 3=in Ordnung, 4=ja, sehr gut) nach der Selbstlernphase evaluiert.
Der Kurs wurde bisher dreimal als Wahlpflichtfach für Studierende des 5. Semesters (Gruppe A, n=36) und zum Vergleich zweimal für Studierende aus dem klinisch-praktischen Jahr der Kleintierklinik (10. Sem., Gruppe B, n=33) durchgeführt. Die Studierenden der Gruppe B konnten nur an den Phasen I und II teilnehmen. Die Studierenden bewerteten das WBT gut (3,3) und empfanden den Kurs als praxisnah (3,2). Das subjektive Lernempfinden war unterschiedlich (2,7). Es wurde eine durchschnittliche Selbstlerndauer von 2,3 Stunden angegeben. Im qualitativen Feedback wurden als Vorteile vor allem die Herztöne als mp3-Dateien, die praxisnahen Videos und das unabhängige Selbstlernen genannt. Nachteilig wurden technische Probleme beim Download der Audio- und Videodateien sowie zu kurze Texterklärungen empfunden.
Zwischen den Studierenden beider Gruppen konnten im Pre-Test keine signifikanten Wissensunterschiede festgestellt werden. Die Studierenden beider Gruppen verbesserten ihre Testergebnisse nach der selbständigen Nutzung des WBT hoch signifikant ($p<0,001$) Die Studierenden der Gruppe A konnten durch das Präsenzseminar eine weitere hoch signifikante Verbesserung erreichen.
Auch die Einschätzung der Kursleiter erwies sich als sehr gut. Durch die gute Vorbereitung fand im Abschlussseminar eine lebhafte Kooperation und Diskussion statt, die sich positiv auf die Motivation der Studierenden und Dozierenden auswirkte. Die Ergebnisse zeigen, dass ein Blended-Learning-Konzept von den Studierenden gut angenommen wird. Die Effektivität dieses Kurses ließ sich durch die Testleistung der Studierenden deutlich ablesen. Auch die Kontaktstunden mit dem Dozierenden im Gegensatz zu reinem E-Learning erwiesen sich als notwendig und nützlich.

Schlüsselwörter: Integriertes Lernen, didaktische Analyse, Audio-Dateien, Effektivität, Tiermedizin

Introduction

In Germany, a specialization during the curriculum of veterinary studies is allowed in a maximum of 20% of teaching hours [1], [2], [3], [4], [5]. Elective courses provide certain possibilities for students to specialize in a certain area of veterinary medicine and are a recognized way to help students to learn more about their field of interest [6]. Studying propedeutics in veterinary medicine is considered to be the basics for all clinical subjects [7]. The goal is to learn examination techniques, collect findings and to differentiate between physiological and pathological alterations [8], [9]. Cardiological examination plays a significant role within clinical propedeutics. Here, the clinical findings have to be collected by applying four basic techniques: inspection, auscultation, palpation and

percussion [10], [11]. During regular lectures and courses a lack of time prevents interested students from getting acquainted in depth with these techniques [12].
Since 1995 e-learning has been used in veterinary medicine in Germany [13]. Since 2005 the University of Veterinary Medicine Hannover, Foundation has been increasingly using e-learning techniques with the accepted strategy that new media should not completely replace traditional teaching but should supplement it and create the possibility of new courses [14]. There are several advantages of e-learning: self-learning is independent of time, place and teacher and students can study at their own pace. Further advantages consist of collaborative learning, interactivity and flexibility, use of multi-media, self tests, easy updating as well as being time- and cost-saving for continuing education. However, several disadvantages are found when e-learning is used as a sole teaching method: use of technical equipment, need of internet access, risk of isolation, incurred costs, loss of motivation, no possibility for questions and consultation, and a lack of information literacy [15], [16], [17], [18], [19], [20]. At the University of Veterinary Medicine Hannover, different methods and techniques of e-learning are used. Computer and web-based trainings are offered for self-learning purposes [21] and lecture presentations are distributed in a learning and content management system [22]. As a supplement to the lectures and courses, recorded online-lectures and podcasts can be used by the students [23]. Diagnostic reasoning can be trained in CASUS learning-cases [24] and discussion-based learning finds its place in a discussion board used across Germany, Switzerland and Austria [25]. To assist collaborative learning online, a virtual classroom is used [26]. During the presence lectures, a feedback-system gives opportunity for formative assessment. Main parts of the exams have been done by electronic assessment on tablet computers [27].
Therefore, students are more and more prepared to use new media techniques. Blended learning is the composition of e-learning and presence learning. It provides the advantages of both learning methods and avoids their disadvantages which occur when used separately [28], [29]. In the elective course of cardiological propedeutics information for students about the examination techniques should be provided and students should have the possibility to become acquainted with acoustic findings generated by auscultation and percussion. Therefore, it seemed reasonable to choose a blended learning scenario to give the students the opportunity to acquire basic knowledge about cardiology by self-learning web-based training. Heart sounds could be presented as mp3-files and learned by listening to them as often as needed comparing physiological sounds to pathological ones. Discussion about the clinical findings and hands-on practice should follow in a presence seminar afterwards. The *aim of the current study* was to prove the usefulness of a blended learning concept to teach cardiological propedeutics. Students should be able to see how to examine dogs, interpret findings and diagnose heart sounds by using multimedia teaching materials, i.e. video- and audio recordings in a self-learning manner. Thereafter, a personal consultation was provided to discuss and extend the subject. The acceptance and effectiveness of the course scheme was examined.

Methods

Framework

The course was developed as a cooperation between the University of Veterinary Medicine Hannover and the Faculty of Veterinary Medicine of the Szent István University Budapest during a guest-professorship of one of the authors (KV) provided by the German Academic Exchange Service (DAAD). Veterinary propedeutics are taught in the second and third year as a regular course in the curriculum (Literatur TAppV). Since the whole clinical examination, special examinations and several clinical procedures have to be covered, the time to teach cardiology is limited. It is not possible to explain the whole examination and the interpretation of cardiac auscultation and percussion in detail. Therefore, an elective course dealing with these topics in depth was created for interested students. Cardiac sounds of dogs with various cardiac diseases were recorded, digitized and stored with an Analyser Meditron Master Elite Stethoscope System (Welch Allyn Corp., Skaneateles Falls, NY, USA) as described elsewhere [30], [31], [32]. The recorded cardiac sounds were stored as special wav files of the Meditron software which could be replayed only with this dedicated software either as audio-recordings and/or as digitized phonocardiograms together with their simultaneously recorded ECG signals. The sound recordings produced with the software were then converted into conventional wav and mp3 sound files with a freely available shareware program (Audacity 1.2.6, http://audacity.sourceforge.net/) in order to play them on any computer with Windows Media Player (Microsoft R). Video recordings of healthy animals were made to present the most important techniques of the cardiological examination.

Course concept

As a result of a pedagogical analysis [33] it was decided to teach cardiological propedeutics as an elective course for third-year students in a blended learning scenario (Figure 1). The deciding circumstances were: a target group used to work with computers, a subject that can be easily shown by using multimedia and an foreign expert with a limited time budget.
The course was divided into three phases. The course started with a one-hour meeting in presence, the students being shown the course scheme, the techniques and the possibilities of communication for the self-learning phase. Instructions were provided by one author (JE) being present in the course, whilst the cardiology expert (other author, KV) communicated with him and with the audi-

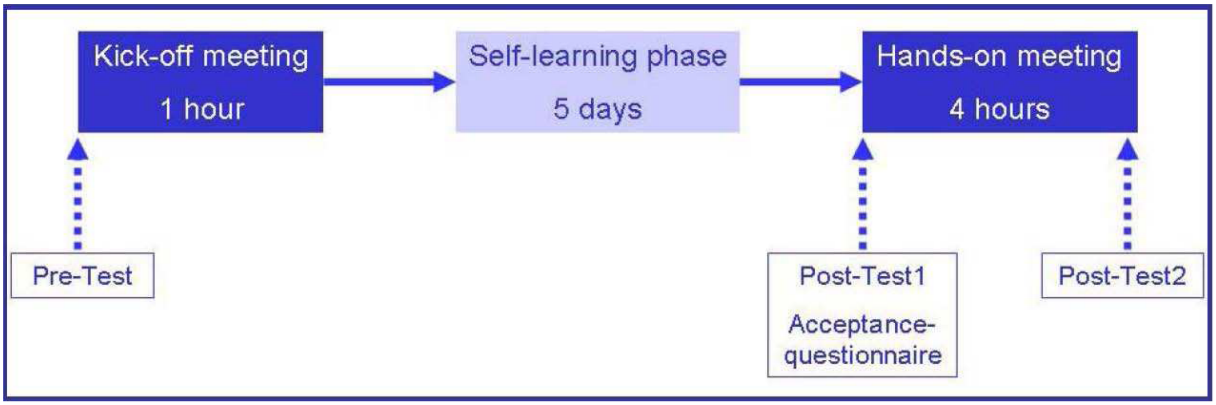

Figure 1: Course scheme of the blended learning scenario "Cardiological Propedeutics"

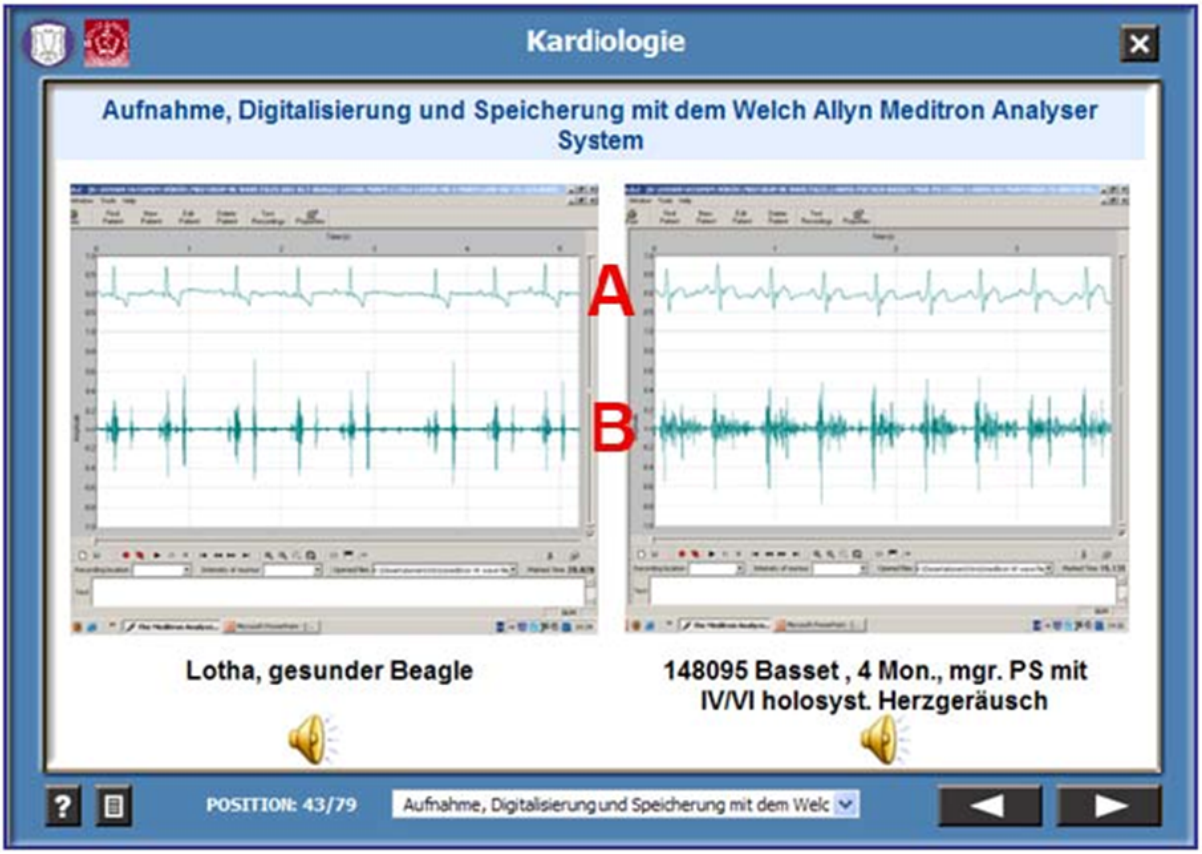

Figure 2: Screenshot of the e-learning module showing the comparison of physiological cardiac sounds (Lotha) and moderate pulmonary stenosis (PS). A: ECG and B: phonocardiogram on these digital recordings of heart sounds. By clicking on the "speaker" icons, students can play and listen to the sounds

ence via Skype connection from Hungary. By Skype it was possible for the students to get to know the expert and additionally to keep his time and travel effort rather small. The second part consisted of the self-learning phase where the students had a five-day period to work on their own with the e-learning module. It was suggested to the students that they work about three hours with the teaching material. The third phase was a hands-on presence meeting of about four teaching hours (i.e. 4x45 minutes with three breaks) where detailed consultation and discussion was provided in presence by one of the authors (KV) as an expert on small animal cardiology. Pre- and post-tests should provide information about the knowledge gained by the students (Figure 1).

E-learning module

The online based e-learning module was created with the open source software Courselab. It contained 80 interactive and hypertextual pages with text boxes, several pictures and schematic illustrations, 9 video clips and 28 heart sound audio files (Figure 2). The technical requirements for the students to work with the module were a personal computer with internet access, Internet Explorer

Table 1: Answers of the questionnaire on acceptance of the e-learning module (n=52, Likert scale from 1=no, very bad, 2=not very good/much, 3=quite good/much, 4=yes, very good.) The numbers in the horizontal rows under the columns 1–4 contain the numbers of students giving that answer.

1		2	3	4	Mean
Did you learn well in the e-learning module?	–	18	26	5	**2.7**
Was the e-learning module practical?	1	4	29	15	**3.2**
Did you need too much previous knowledge?	25	10	10	2	**1.8**
Would you like to get more modules like this?	2	4	23	21	**3.3**
Have you done an additional literature search on the topic?	13	18	13	5	**2.2**
Did it run technically without problems?	22	12	7	9	**2.1**
Did the video clips run well?	15	5	8	20	**2.7**
Do you like online courses?	3	4	20	25	**3.3**
Did you feel left alone by the tutors?	34	10	5	2	**1.5**
Is it important for you to learn in groups?	32	13	5	1	**1.5**
Is access to the internet expensive for you?	46	3	2	1	**1.2**
How many hours did you work with the module?					**2.3**

as browser and good quality headphones to hear heart sounds with proper quality sound.

Evaluation

To evaluate the course settings, it was decided to perform two steps of the 4-step-evaluation [34]. The acceptance of the course scenario and the learning success was checked. The other two described steps (transfer and business success) were not part of this evaluation. For evaluation purposes, the course was held for third-year students who elected the course. To compare this to advanced learners, the course was also held for fifth-year students during their 10-week long practical training at the Small Animal Clinic of the University of Veterinary Medicine Hannover. The acceptance of the e-learning module and the course setting was checked by means of a questionnaire with quantitative four grade Likert scales (1=no, very bad, 2=not very good/much, 3=quite good/much, 4=yes, very good) and the possibility to give qualitative “free-text” feedback (Table 1). The testing of the learning success was performed with 20 multiple choice questions, with each correct answer representing 1 point (Type Apos, one right answer, two distractors). This test was given once at the beginning of the course in the first presence meeting, again at the beginning of the second presence meeting after the self-learning phase, and a third time after the expert discussion (Figure 1). With the results of the tests, it was possible to statistically evaluate the learning success in the two learning phases and to compare results between the two groups of learners using the paired t-test.

Results

Framework

It took two members of the staff about three months alongside their normal workload to create the course and the e-learning module (calculated with 8-hour working days). It was important to create a tailor-made course to fit to the target group of students without a lot of clinical experience. The most complex work was to record the heart sounds because relevant patients were needed in the clinic. It seemed to be an advantage to have a fixed deadline for the start of the elective course to put more pressure on teachers and speed up the completion of writing the course.

Course concept

Up until now the course has been held three times as an elective course for third-year students (winter 08, summer 09, winter 09) and twice for fifth-year students in the practical clinical year (winter 08, summer 09). Altogether 36 third-year students and 33 fifth-year students have taken part in these courses. Because of the main lecturer (KV) being back in Budapest between courses, two of the kick-off meetings were held with added support from Skype. The students and a helping lecturer (JE) were in the Lecture Hall in Hannover and the main lecturer was connected to them by Skype. The video stream was projected and his voice could be heard over loudspeaker. With this setting, it was possible to explain the course concept to the students and to answer questions, which made the meeting similar to a live, on-spot conversation.

Table 2: Results of the two student groups at the beginning of the course (Pre-test), after the self-learning phase (Post-test1) and after the presence meeting (Post-test2). Maximum: 20 points. 3rd year students n=36, 5th year students n=33. P = significance by the t-test comparing the test-results to the previous results. 5th students did not take part in the presence meeting.

Pre-test		Post-test 1	Post-test 2
3rd year students	12.6	14.6	18.3
P		0.0003	1.9×10^{-10}
5th year students	12.9	15	---
P		0.000006	

Evaluation of the e-learning module

All of the 69 students used the e-learning module before the presence lecture and 52 of them answered the questionnaire (return rate: 75.4%). The analysis of the acceptance showed that the students had different feelings about the learning success (mean = 2.7, Table 1) with the e-learning module but they considered it to be practical (mean = 3.2). They did not need too much previous knowledge (mean = 1.8), and the module was comprehensive enough that they did not have to do a lot of own searching for basic information (mean = 2.2). The students judged this course format positively (mean = 3.3) and requested more online courses like this one (mean = 3.3). However, there were still some technical problems running the module (mean = 2.1), mainly concerning the video clips (mean = 2.7), i.e. some of the clips were too long for a fast download or proper running. During the self-learning phase, the students did not feel left alone by the tutors (mean = 1.5). The students did not think that learning in groups was important for them (mean = 1.5). On average, they worked 2.3 hours with the learning module and stated that access to the internet was not expensive for them (mean = 1.2).

In the qualitative "free-text" feedback the students named most positive that the module contained very good quality of mp3-files of normal and abnormal heart sounds. They also commented that the video clips were very good, practical, and demonstrative. The advantages of the module were that they could learn at home in a relaxed atmosphere and with their own learning speed and habits. They also liked the good structure und summaries of the module. Many of the students judged positively the amount of good quality pictures and clear, informative schematic illustrations.

As negative aspects, the students named technical problems they had running the module. Mostly these were problems with the mp3- and video-files on computers with processors of lower speed, because of the size of these files. Some students asked for more comprehensive explanations in text format. Particular problems with the module design (e.g. yellow text-boxes) were mentioned. Another problem was alluded to by Mac-users. The module did not run platform-independently.

Evaluation of the learning success

On average, the third-year students answered 12.6/20 questions correctly during the pre-test at the kick-off meeting (Table 2). The fifth-year students in their practical year answered 12.9/20 questions in the same test correctly which did not show any significant differences. Both groups demonstrated a highly significant increase of correct answers after the self-learning phase by using the e-learning module. The third-year students reached 14.6/20 points ($p<0.001$), and the fifth-year students 15/20 points ($p<0.001$). Again, there were no significant differences between the results of both groups regarding the second tests after the self-learning period. The fifth-year students did not take part in the last presence meeting because of time-table problems during internship. The third-year students further enhanced their results in the final test after the presence consultation to 18.3/20 points which shows a highly significant difference ($p<0.001$) compared to the second test after the self-learning period.

The lecturer's impression of this hands-on meeting with the students was very good. Compared to experiences with normal lectures the students were very well informed and highly motivated in the topics, collaborated well in the discussions and asked well thought out questions. This caused great motivation for students as well as for the lecturer.

Discussion

Veterinary medicine is a rather small discipline which makes it important to cooperate internationally not only in the field of research, but also in education. This project was done as a collaboration between the universities of veterinary medicine of Budapest (HU) and Hannover (D). E-learning is quite a new field in veterinary studies, enhancing the possibilities of cooperation and enforcing cooperation to speed up the process of creating new teaching materials. Such cooperations are performed for example between all German-speaking veterinary universities [35], in a Network of Veterinary ICt in Education funded by the EC [36] and ViEW – Veterinary Education worldwide as a subgroup of AMEE [37]. In our case, the cooperation provided a broader spectrum of the illustrating materials developed both in Hannover and Budapest. E-learning and blended learning have already been used in several medical and veterinary disciplines with success regarding both acceptance and effectiveness [9], [38], [39]. Jenkins et al. [40] stated that the effectiveness of e-learning was comparable to face-to-face teaching. Howlett et al. [41] achieved with a blended learning

scenario even more learning success. The creation of e-learning courses requires high production costs [42] which can be reduced by reusing modules, rapid production, ease of updating and cost-effective paedagogy. The named costs for e-learning vary a lot. The Virtual University of Bavaria (VHB) names about € 50,000 to € 100,000 for e-learning-modules of two hours per week per semester [43]. Witte [44] and Kerres [45] named costs depending on the grade of interaction and used media between € 9,000 and € 32,000 per learning hour. It was decided by the universities involved in this cooperation that such costs for the professional production of e-learning modules should not be spent. A suitable alternative was the solution with an acceptable workload to create the web-based training on our own, driven by the main principle "the content is more important than the look". By using mp3-files for the distribution of heart sounds in the web-based training, the students also gained the possibility to download the files and to use them on their mobile mp3-players. When listening to them on their computer or laptop the students were told to use good quality headphones because the normal speakers were not able to transmit all of the frequency components of normal cardiac sounds and murmurs, usually between 30–20,000 Hz. Headphones also simulate the stethoscope, and the sounds are recognized as sound and vibration [46], [47], [48].

To prove the efficiency and effectiveness of this blended learning setting, a method based on the four-step-method of Kirkpattrik [34] was used. Two steps were evaluated: the acceptance and the learning success. It was not possible to check the transfer and business success in this elective course setting. A comparison with the grades in the final examination and an interview with Alumni could be conducted later to prove these effects [49]. To test the learning success, multiple-choice questions were chosen because they offer the best reliability and validity [50]. According to Rodriguez [51], TypeApos with two distracters were chosen to fulfil these criteria. The survey of acceptance was done with even Likert scales [52] and the possibility to give qualitative feedback per free text. When applying e-learning, it is important that the users have the possibility to access teaching materials via internet. In Germany, this was proven both for students [53] and veterinarians [54]. For teaching veterinary medicine in Germany a steady increase in the voluntary use of e-learning tools by students from about 25% [55] to about 50% in 2003 [56] and over 60% in 2008 [57] was found. A current study at the Veterinary University of Hannover shows an even higher percentage of use and great demands for more e-learning classes by students [58]. Preceding self-learning courses using e-learning modules via internet can shorten the duration of presence meetings in postgraduate education. This can have a positive economical impact regarding time and costs of postgraduate courses. Emami et al. [59] name five key success factors for the use of e-learning in medical education: departmental interest and potential, task performing potential, e-teaching development, suitable cultural environment and infrastructures. All factors were present in our study due to the interdepartmental and international cooperation which might have contributed to the success of the course. In our study, the evaluation demonstrated a high acceptance rate of the e-learning module by the students. It seems that the target groups were hit very well. The comments also showed that the media corresponded to the content and the students appreciated the design of the web-based training. The subjective learning success was proven as objective later in the study. The students also gained self-confidence by using the web-based training, and they had the feeling that they learned a lot. From the teacher's point of view it was easy to work with students having learned the subject before the presence seminar.

The Likert scales and the comments showed some technical problems and that the web-based training was not platform independent. Some technical improvement has already solved these problems and improved the quality of the e-learning subject during the last courses. As such, the new version is running in a smoother way. For example, the video clips are smaller in size, text, figures and, schematic illustrations have been adapted and sometimes even new sound recordings have been added or have replaced the old ones. The self-learning period of the students included a time period with a mean of 2.3 hours for inexperienced and more experienced students. This was the expected time. The advantage of the self-learning module was that students had the possibility to arrange their learning over the whole period and did not have to do it at once [60]. This independent learning was named as a great advantage of the e-learning part. The students also appreciated the mixture of learning methods as they consisted of behaviourist learning (recapitulation and tests, [61]), cognitive learning (explanations and summaries, [62]) and constructivist learning (case studies, web links and request of own literature research, [63]). Students get used to the cognitive learning as it turned out from the comments asking for more explanations and summaries. In this study, not only the acceptance and the subjective learning success were examined but also an objective learning success represented by the results of the pre- and post-tests. The two groups (3rd and 5th year students) did not show any significant differences in the pretests. This indicates that there is not enough time during the regular curriculum to increase the competencies in cardiological examinations. This proves how important elective courses are to give students the opportunity to practise their skills in specific veterinary fields. Even though the pre- and post-test were done anonymously, it seemed that this type of assessment increased the students' extrinsic motivation. However, they already showed their intrinsic motivation by choosing the elective course. Therefore, the tests will be performed further on in the courses even when the evaluation study has ended to achieve the highest possible motivation [64]. Both groups showed a significant improvement in their knowledge from the pre-test to the first and also to the second post-tests. The results on the

effectiveness proved the importance of a blended learning scenario. The learning success was higher because of the combination of the self-learning phase and the live discussion. E-learning alone would only have partly increased the learning success. A blended learning scenario is considered to be the best solution to solve the problem of time restriction in the curriculum and to enforce a certain specialization of the students. Garrison and Kanuka [28] and Choules [65] came to the same conclusion, stating that blended learning enhances effectiveness and efficiency of learning. The usefulness of multi-media in teaching cardiology was also shown in the study of Criley et al. [66] where a group with e-learning support showed significantly better results than a traditionally taught group. In human cardiology tutoring systems are a well known tool for teaching students and doctors [67], [68]. A future purpose for the use of multimedia in veterinary cardiology could be a library with heart sounds [69], training with virtual patients [70], [71] and simulators [72], [73] or telecardiology [74]. In addition, these e-learning modules will be translated from German into English and into Hungarian. As such, they will be offered as elective subjects also in Budapest by the main lecturer in the University of Veterinary Medicine in Budapest, where a Hungarian and an English veterinary curriculum has been running for several years. The chosen blended learning course in veterinary cadiological propedeutics showed a high grade of acceptance and effectiveness. It gave the students the opportunity to choose a field of interest to achieve and practise their skills. Due to the success of this course and similar courses done with students of several universities [26] another elective course in "Echocardiography in dogs and cats" has been created and will be held in the summer term of 2010, again with the main contribution of the guest lecturer (KV) from Budapest. Teaching two elective subjects in blended learning during the same week makes the presence of this lecturer more effective regarding both the amount of the transferred knowledge and the costs (e.g. travel and accommodation). Although e-learning or even blended learning will not replace the real clinical practice on patients, they can provide very good and standardized basic knowledge for all students at any time and can be utilized in practice very well. As a further step, our courses will be extended with some hours practising on real patients.

Notes

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Competing interests

The authors declare that they have no competing interests.

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