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des Fachbereichs Veterinärmedizin
der Freien Universität Berlin

**Implementation, challenges and acceptance of wiki systems in veterinary
education - surveys among students and lecturers**

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List of abbreviations

CeDis	Center für Digitale Systeme
CMS	Content management system
NOVICE	Network Of Veterinarians In Continuing Education
UMMedWiki	University of Minnesota medical student wiki system
WYSIWYG	"What You See Is What You Get"-Text Editor

Meiner großen Mutter

...πάντα ῥεῖ...

1 INTRODUCTION

1.1 Web 2.0 technologies and wiki systems

The Internet has been increasingly used in recent years in university educational environments (1) and in veterinary medical education (2). Websites are moving away from isolated information silos to sources of organized content with far more developed linking of information within the site and to external resources. Users are less passive receivers of information and more active co-creators of content (3). An effective learning environment should foster collaboration among students and faculty staff and allow the student to create and share new knowledge (4). Students no longer access the web only for course information; instead they can access and create collective knowledge through social interactions with the help of Web 2.0 technologies (5). Nevertheless, computer science researchers are using Web 2.0 technologies more frequently than researchers in medicine and veterinary sciences (6). Physicians and veterinarians who need a foundation of knowledge and skills to use information resources, can profit through the active use of electronic knowledge resources, which are capable of providing quick access to evidence-based information (7). Web 2.0 technologies are driven by user contributions and interactions. Users nowadays play a more active role in information creation, because Web 2.0 technologies allow anyone to create and modify content (8). The use of these interactive technologies has significant potential to support and enhance teaching and learning in higher education (4) and to be used in universities in general (9). They usually are not designed specifically for educational purposes, but can reasonably be integrated in teaching and learning environments, because they support pedagogical approaches such as active learning, social learning and student publication (10). Sharing content among users and participants is now much easier than in the past and the way documents are created, used, shared and distributed has changed (11). Popular Web 2.0 technologies are represented by wiki systems.

Wiki systems are collections of editable pages with the option that users (registered or anonymous) can change the contents according to their own interests and knowledge. They also allow collaborative management of these pages meaning that different users can contribute or modify partial aspects to a topic resulting in comprehensive information (12).

Therefore, wiki systems can foster an interactive, collaborative learning experience for students in a media they are familiar with (4).

1.2 Wiki systems in university and medical education

The use of wiki systems in higher education courses is still relatively new (13). Nevertheless, some reports are available that describe a successful use in classrooms aiming to enable new ways of learning, collaboration and participation (14). Most existing wiki systems are flexible enough to support a variety of approaches for employing them in teaching, research and academic administration and information settings (15). A reason to use wiki systems are available tools, for instance an easy-to-use editing interface, content classification, discussion pages for every article and automatic back-up and recovery tools (16).

In addition, wiki systems are increasingly used as knowledge management systems in medical education (17). Specific advantages to use wiki systems for knowledge management include ability to create a knowledge base of linked and categorized content, to reorganize content and to upload documents and other additional material (18). Thus, databases of free, organized, updated and linked medical information can be established to support a fast finding of clinical relevant data. The daily applicability of wiki systems has been revealed by a survey of Rechenberg who could show that young resident physicians were using the Internet for daily work, especially Wikipedia as the biggest wiki system that has a significant position for obtaining important medical information on the Internet (19). Giustini lists twelve examples of Web 2.0 technologies in medicine (20). An online professional community, NOVICE, is being developed to support the use of Web 2.0 in veterinary informal lifelong learning (17). Another example is the University of Minnesota medical student wiki system (UMMedWiki) that allows students to collaboratively edit classroom notes to support medical education (21). Additionally, Web 2.0 technologies like wiki systems also can be of high relevance for scientific work. They have the potential to facilitate the management of knowledge and to foster communication and exchange of information (22). The sharing of research results with the scientific community is central to effective research and for the advancement of knowledge. Here wiki systems can simplify and speed up communication and fast exchange of research results (22). The Web 2.0 environment also features a highly

connected digital network of medical practitioners to create optimal knowledge building opportunities, for example through the implementation of medical wiki systems (20).

1.3 Implementation of a wiki system for veterinary education and practice – Quality and quantity

A wiki system for the veterinary community should meet specific requirements regarding content structure and should be designed to also suit the thematic and didactic scenario (14). For example, a WYSIWYG text editor ("What You See Is What You Get") in that content on the screen appears as a finished product during editing process can increase the usability (23). Templates with content-specific formats addressing specific topics of veterinary medicine can give articles a consistent form. Previously defined headlines can lead to a precise organisation of content and a content-related layout can attract a certain group. A user authentication should be established to restrict access to members of a subject. The target group of the non-public wiki system Vetipedia (www.vetipedia.org) are students of the German veterinary colleges and veterinary practitioners. Users of the target group have to be registered to access the system. At the moment, the system is mainly used for several university elective courses.

Recently the project is supported by a grant from the Center für Digitale Systeme (CeDis) of the Freie Universität Berlin. In that regard the system was restructured and a new search page was integrated. Furthermore, a new registration procedure is under development that will enable the practitioner to create a personal account with help of a generalized password.

The aim of Vetipedia is to offer verified information of veterinary medicine. Thus, the quality and quantity of the information is a critical factor. To attain the status of a true encyclopaedia, a wiki system requires more formal content-inclusion and expert review procedures (24). Recently a board of specialists is about to begin its work that will review specific articles. The articles will be marked with a label that informs about the quality of the content ("not reviewed", "reviewed by a moderator", "reviewed by an expert"). The users can only modify expert reviewed articles upon request.

Aim of this dissertation was to evaluate the use of wiki systems by students and lecturers of veterinary medicine, if they consider a veterinary wiki system as a useful tool for education and exam preparation and if they are willing to contribute in writing and improving the quality of information. The objectives of the first study was to examine, how students of veterinary medicine commonly use wiki systems, whether they consider a veterinary wiki

system useful and if they would participate in writing content. The objective of the second study was to evaluate, how lecturers of veterinary medicine estimate learning management systems and the production of text or material by students in courses, if they rate wiki systems as an appropriate tool for teaching, if they would use wiki systems for their courses and finally if they are willing to improve the quality of information. The objective of the third study was to assess if veterinary students are able to write articles in Vetipedia with specifying correct literature sources and setting links to corresponding articles. Furthermore, we wanted to evaluate, if the students consider Vetipedia useful for exam preparation and if they will read articles in Vetipedia during the course and in future. Finally, it was to be assessed whether students are motivated to write additional articles in Vetipedia and whether they intend to participate in improving the information on Vetipedia in the future.

2 RESEARCH PAPERS

2.1 Use and acceptance of Wiki systems for students of veterinary medicine

Kolski D, Arlt S, Birk S, Heuwieser W. Nutzung und Akzeptanz von Wiki-Systemen bei Studierenden der Tiermedizin . GMS Z Med Ausbild. 2013;30(1):Doc10.

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Use and acceptance of Wiki systems for students of veterinary medicine

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2.1.1 Abstract

Objective: Wiki systems are gaining importance concerning the use in education, especially among young users. The aim of our study was to examine, how students of veterinary medicine commonly use wiki systems, whether they consider a veterinary wiki system useful and if they would participate in writing content.

Methodology: For data collection a questionnaire was provided to students (n=210) of the faculty of Veterinary Medicine at the Freie Universität Berlin, Germany. It contained questions regarding the use of Wikipedia in general and concerning educational issues.

Results: Most respondents, especially students in the first years, had comprehensive experience in the use of Wikipedia and veterinary wiki systems. In contrast, the experience in writing or editing of information was low (8.6% Wikipedia, 15.3% veterinary wiki systems). Male students had significantly more writing experience than females ($p=0,008$). In addition, students of the higher years were more experienced in writing and editing than students of the first year (7.4% in the 4th year). The familiarity with wiki systems offered by universities was low. The majority of students (96.2%) are willing to use veterinary wiki systems as an information tool in the future. Nevertheless, only a low percentage is willing to write or edit content. Many students, however, expect a better learning success when writing own texts. In general, students consider the quality of information in a wiki system as correct.

Conclusion: In conclusion, wiki systems are considered a useful tool to gain information. This will lead to a successful implementation of wiki systems in veterinary education. A main challenge will be to develop concepts to activate students to participate not only in reading but in the writing and editing process.

Keywords: e-learning, wiki, university, veterinary education

2.1.2 Introduction

The Internet offers a wide variety of opportunities to handle and organize information. In the context of e-learning, the internet has also been increasingly used in recent years in veterinary medical education (1). Widespread tools for academic knowledge management are content management systems (CMS). In contrast to static applications of Web 2.0, content

management systems are software tools to manage existing information. They function mostly without linking content and do not give top priority to communication between users (2). The students' need for more interactivity, creativity and communication brought about a social change in Internet-based teaching and led to the development of Web 2.0 applications (3). The term Web 2.0 describes the situation where people on the World Wide Web work together collaboratively and interactively, e.g. in the context of social software and share and publish information with other Internet users or groups. Therefore the Web 2.0 is a contrast to static Web pages and the hierarchical structures of the early days of the Internet (4). Corresponding applications such as Facebook, blogs and wiki systems are becoming very popular among younger users. Web 2.0 applications have great potential to be used in university (5). This is due to the fact that they enable students to actively create content by means of their increased participation and own initiative. Therefore, the use of Web 2.0 technologies can help to change the traditional teaching model "lecturer-student" (active transmitter, passive recipients) and can enable students to collaborate more actively in creating content. This will result in students having a better understanding of information and achieving more success in their studies. In this sense, wiki systems can also be used throughout students' university education.

Wiki systems are collaborative software platforms, where their contents can be edited (6). They enable collaborative and communicative work and a fast, effective and easy modification of text (7-9). The attributes Encyclopedia and social software are significant for wiki systems. Encyclopedias collect factual knowledge, thus they are particularly suitable for the neutral and detailed presentation of information (10). The term social software describes the common participation in the creation of content and their public availability on the Internet (8, 11). Talk pages are important additional items of many wiki systems to enable communication and hence improve the information.

These features are also used by Wikipedia ([http:// www.wikipedia.org](http://www.wikipedia.org)), the largest, most popular and free encyclopedic wiki system (12). It currently contains more than 20.9 million articles in about 260 languages, with over 3.9 million articles in English Wikipedia and over 1.4 million articles in the German Wikipedia (Wikipedia January 2012 [http://stats.wikimedia.org/DE/ TablesArticlesTotal.htm](http://stats.wikimedia.org/DE/TablesArticlesTotal.htm)). The voluntary participation of all the editors involved is crucial to Wikipedia's success (13).

The use of wiki systems in the university and related publications has significantly increased in recent years (9, 14). The potential of wiki systems in teaching includes the collaborative finding, creating and exchanging of knowledge (15) and the initiation of self-

organized collaborative learning processes (16, 17), which have great importance in the educational context. In courses wiki systems are primarily used as a platform for the collaborative creation of content and as an information source (18).

Up to now only a prototype in the German language is available for veterinary medicine ([http:// www.vetipedia.org](http://www.vetipedia.org)). Research on the extent to which alternative wiki systems have been used and accepted in German-speaking veterinary education has been barely done. The aim of this study was to find out how students of veterinary medicine have used wiki systems for private and veterinary questions up to now. Furthermore, it should be clarified whether a subject-specific wiki system is considered to be useful in veterinary medicine and how high the willingness to participate is.

2.1.3 Materials and Methods

For data collection, an empirical investigation with a questionnaire was used. During the winter semester 2011/2012, written questionnaires concerning the evaluation of wiki systems were given to students at the Faculty of Veterinary Medicine, Freie Universität Berlin. The students were in their first, third or seventh semester, respectively. 260 of the 500 students enrolled in the courses were present. Of those 260 students, 210 students participated in the questionnaire.

Overall, the questionnaire contained a brief introduction to the study and questions about gender, age and semester. The first part of the questionnaire dealt with the general and specific veterinary use of Wikipedia. Wikipedia was chosen because it is the most famous wiki system worldwide (12). The questionnaire contained 8 statements and questions on the previous use of wiki systems. Participants were asked to state how often they had to date carried out special passive and active activities as part of their use of Wikipedia (see table 1). The second part of the questionnaire dealt with the acceptance and use of a specialized, i.e. veterinary wiki system. It contained 7 statements and questions that should be evaluated using a five-point Likert scale. Alternatively, respondents could choose the statement "I cannot evaluate this statement" (see table 2).

The analysis was performed using the statistical program SPSS ® (SPSS ® Statistics IBM ® version 20). Descriptive variables were analysed, for example frequencies of answers and frequency distributions. Furthermore, cross-tabs were used to analyse the students' answers according to the response of their particular group (gender and semester). The data of the tables were tested using the chi-square test, expected frequencies and standardized residuals

for correlations. The significance level of the chi-square test was set as $\alpha=0.05$. The population represented (n) varied depending on the number of students who had answered the respective questions.

2.1.4 Results of the questionnaire

A total of 210 students completed the questionnaire, 179 women (85.2%) and 30 men (14.3%). One participant did not specify the gender. The average age was 23 (+/- 3.7).

Male and female respondents did not differ in the answers they provided. Exceptions were the statements dealing with creating and editing articles and finding satisfactory veterinary information on Wikipedia. More male participants stated that they have already created or modified an article on Wikipedia ($p=0.008$, 6 of 30 (20%) male respondents) compared to only 6.7% of women. Furthermore, more male participants stated that they have found satisfactory veterinary medical information on Wikipedia ($p=0.004$, 13 of 30 male respondents (43.3%) on more than 10 articles). Regarding the finding of satisfactory veterinary medical information on Wikipedia, students from higher semesters found more relevant information than students from the 1st semester (7th semester = 57.8%, 1st semester = 22.2%).

Among the female respondents, 10.1% (part of all female respondents) stated that they had never found relevant information.

The questionnaire showed that the majority of students (99.5%) had already read articles on Wikipedia. Veterinary medical information was also looked for (98.1%) and found (91.4%) on Wikipedia. The search for veterinary information was affected by the year of study. The number of statements that students had already searched for veterinary information on Wikipedia more than 10 times increased with the year of study: 1st semester = 38.6%, 3rd semester = 53.0%, 7th semester = 72.2% ($p=0.039$). The writing and editing of articles on Wikipedia was carried out by 8.6% of the students. 1.9% of the articles edited by these students comprised of veterinary topics. In this context, edits of veterinary information were only done by students in the 7th Semester (7.4% of the 7th semester).

When searching for articles, a veterinary wiki system was used by 61.7% of the students. Of these students, only 15.3% had also created or modified articles. Reading articles in veterinary wiki systems, especially a number higher than 10, was mostly done by students in early semesters (1st semester = 46.1%, 3rd semester = 38.5%, 7th semester = 15.4 %). Wiki systems, which were provided by the university as part of their teaching program, have not

previously been used by 64.6% of respondents. However, the integration of wiki systems into teaching at university is welcomed by more than one third of students (41.6% of respondents).

Most students (96.2%) stated that they want to read articles in a veterinary wiki system. The establishment of such a system is considered to be useful (95.7%). However, only 10.6% of the respondents agree with the statement that they are willing to create or edit articles. 40.9% chose the statement "moderately agree". However, the willingness ("Strongly agree") increases the higher the year of study (1st semester = 14.3%, 3rd Semester = 28.6%, 7th Semester = 42.9%, $p=0.026$). Nearly half the students (46.2%) state that they achieve more success in their studies when they write their own texts. In total, 1.4% strongly agree with the statement that there are doubts about the quality of information in a wiki system. In addition, 12.9% agree and 49% moderately agree with this statement.

2.1.5 Discussion

In the context of the increasing importance of Internet and Web 2.0 applications at university (19) and in medicine and veterinary medicine (20), it was evaluated whether veterinary students take advantage of wiki systems to obtain information. Furthermore, we wanted to clarify whether they consider wiki systems to be a useful source of reference. Finally, an aim of this study was to clarify if students are motivated to use wiki systems in the long term and if they trust this type of information. A German-language, subject-specific wiki system for veterinary medicine (<http://www.vetipedia.org>) is currently being established. The results of this study are important to appraise the significance of such a wiki system and to develop strategies for its establishment. So far, the influence and the use of Web 2.0 applications for students have barely been investigated (19). 210 students answered the questionnaire, roughly half of the students officially registered in the respective semesters. For surveys of this type, this is a relatively high response rate, even if the survey cannot be regarded as being totally representative. It must also be noted that only students at the Freie Universität Berlin were asked. It remains open whether these results represent the opinions of students from other universities.

The results of the questionnaire confirm that wiki systems are welcomed and used by students. The active use of wiki systems, i.e., as part of creating and editing an article, is primarily done by students in higher semesters. According to our survey, Wikipedia was also used for the search of veterinary topics. According to the students' answers, satisfactory information on veterinary issues on Wikipedia was found to be limited. Students in higher

semesters, however, found the information to be more satisfactory.

More students in higher semesters use Wikipedia to search for information than students in the first semester, but they use less veterinary wiki systems. There may be several reasons for this, which should be explored in more detail in future projects. On the one hand, it is possible that veterinary wiki systems are more known among students in the first semester. For example, Vetipedia currently contains more articles on preclinical topics than on clinical topics. On the other hand, Wikipedia contains many articles on medical terminology and human diseases. Some of these articles are also relevant for veterinary medicine (e.g. topics such as bacteriology). In addition, Wikipedia also contains some articles on veterinary medicine. This is particularly relevant for students in higher semesters. It is possible that the higher the semester the student is in and the more clinical knowledge they possess, the greater their desire is for high-quality, illustrated and linked articles, which are currently more likely to be found on Wikipedia than in veterinary wiki systems.

The English Wikipedia is, compared to other providers of online health information (21), a widely used source of health information available online. Many physicians use Web 2.0 contents, especially Wikipedia. In particular, young physicians are the most productive in their use of the Internet and Web 2.0 technologies (22). The quality of the information remains a challenge (23). Medical information of Wikipedia does not sufficiently meet the internationally recognized criteria for evidence-based patient information (24). However, according to a study by Mühlhauser, the quality of information on Wikipedia and the quality of information provided by two large German health insurance companies is similar (24). Nevertheless, recently there has been a lack of comparable data on the quality of veterinary information.

Information provided by medical and veterinary wiki systems must be critically assessed before use, especially if they are created mainly by students. One solution may be a two-way quality management. On the one hand, there could be a permanent quality control by specialists (lecturers), who check the contents of the articles written by students for errors. On the other hand, student moderators could supervise specific subject categories, in order to eliminate errors, verify compliance with scientific standards and send technically advanced or clinically important articles to lecturers for review. Furthermore, peer-reviewed and revised articles could be protected from further editing. Wiki systems, that do not establish a professional and permanent quality management, run the risk of creating a collection of articles, where the quality of information is inadequate for medical claims. This can result in a less confidence in the quality of information on the part of veterinarians. This would mean a

less use of veterinary wiki systems. Some medical wiki systems already claim to provide evidence-based information on medical knowledge to health care professionals (25).

In future it will be necessary to clarify whether the free creating and editing of content and the controlling and correcting of information by lecturers in university-orientated wiki systems is useful and effectively feasible.

The survey shows that most students of veterinary medicine regard wiki systems to be a useful source for veterinary information. Students also regard as positive the fact that they achieve more success in their studies when they write their own texts. Wiki systems enable an active creation of texts. The writing of texts often seems to be lacking in veterinary teaching. The study of medicine and veterinary medicine encourages and places more emphasis on acquiring knowledge and carrying out hands-on activities (26). Wiki systems offer students a new medium for alternative ways of learning, collaboration and participation (7). The non-linearity, dynamic and linking of wiki texts provides a suitable basis for the collaborative, interactive and argumentative work of students.

A key problem is the discrepancy between the passive and active use of Wikipedia and wiki systems. The students state that they are less willing to create content for wiki systems. Almost all students (99.5%) have already read articles on Wikipedia, but only 8.6% have also created or edited articles. The editing was done only by students in higher semesters and especially by male respondents. That men are more involved in the editing of wiki articles than women has been confirmed in other studies (27). However, other authors point out that the gender difference related to the frequency of editing of wiki articles is not as high as is often assumed (28). These hypotheses cannot be conclusively assessed in this survey because of the large proportion of women in veterinary medicine studies. The low proportion of men in this survey (n=30) does not allow general conclusions to be made. Nevertheless, the presented results indicate that female students, in particular, should be encouraged to participate more in veterinary wiki systems. In order to develop relevant strategies, one idea could be to hold focus group discussions.

There is also a lack of active participation in Wikipedia. A mere 2.5% of registered users do half of all edits (29). Likewise, only a few physicians are actively creating content for Wikipedia (30). The reasons for this may be due, on the one hand, to the amount of time taken up by work and to the high workload involved in producing high quality products. On the other hand, the reasons for this may be due to a lack of interest in the editing of articles and to a lack of confidence in the medical information provided by Wikipedia.

Wikipedia is an open, editable encyclopedia and offers the possibility to edit veterinary

topics by lay people. This greatly limits the usefulness of the information for academic education and practice.

It is difficult to determine how qualified the authors of an article are (31). However, in Wikipedia professional efforts are being made by the "WikiProject Medicine" (group of editors in Wikipedia from medical and non-medical fields) to provide high quality medical information, e.g. by providing guidelines for verifying information (32).

The widespread experience students have with Wikipedia provides some familiarity with wiki systems. This prior experience reduces the learning curve and thus facilitates the active start with a wiki system.

Furthermore, the results showed that 61.7% of the surveyed students have already used a veterinary wiki system. It was mainly used to search for information and it was more frequently used by students in early semesters. 15.3% of respondents stated that they had actively used a veterinary wiki system. This number is roughly seven times higher than the number of those who edit veterinary articles and twice as high than the number of those who edit general articles on Wikipedia. Although Wikipedia is more popular, the higher use of veterinary wiki systems by students may be due to several factors. Firstly, wiki systems have been actively used by lecturers at the Freie Universität Berlin in several courses between 2007 and 2012. In these courses, students were asked to write an article or edit articles on clinical cases. Secondly, a restricted, subject-specific wiki system focusing on veterinary topics may be more attractive to students than Wikipedia which contains articles covering every sort of topic. This survey confirms the high acceptance of veterinary-specific wiki systems. It highlights the potential contained in wiki systems to help students deal with information early in their studies. However, they are used more at home by students and less at university. So far, only 35.5% of respondents have used a veterinary wiki system during their studies, even though the survey shows that their integration into university is desirable. Possible reasons for this could be that the integration of wiki systems into university teaching has not yet been carried out intensively. In addition, corresponding wiki systems may not yet be sufficiently known.

Wiki systems used at university are usually non-public wiki systems (33) with a specific focus (20). Their use is usually limited to one semester in the context of specific university courses. Most students (96.2%) would welcome a veterinary wiki system and use it passively, because they regard it as a useful source of reference.

The flexibility of wiki systems accounts for a wide range of applications at university. Wiki systems can be used effectively (34), in fields ranging from research to teaching. They

even allow a simple, logical and profitable connection between research and teaching. Further advantages of wiki systems for teachers (18) are the opportunities to teach media literacy, the temporal flexibility in the planning of courses and the simple ways for organization, which wiki systems offer in terms of permanent access, control and communication. A resulting disadvantage could be an enormous amount of time and effort it takes up.

As a consequence, didactic methods that support active student participation should be established. Recent developments in medical education may change the focus from passive to active learning (35). For example interactive, multi-disciplinary education in the field of anatomy was established and evaluated, which is more likely to meet the needs of clinical work (36). In this regard, wiki systems offer extensive potentials.

This survey cannot be regarded as fully representative. On the one hand, there are participants who have voluntarily participated in the survey. On the other hand, not every student from the Faculty of Veterinary Medicine in Berlin was consulted. In addition, only students at the Freie Universität Berlin were consulted. Nevertheless, the survey comes to some interesting conclusions. In veterinary education, distinguishing the responses given by female and male participants is quantitatively problematic, since the proportion of female students is currently over 85% (37). The questionnaire contains preformed statements, using a five-point Likert scale which allows affirmative or negative answers. Such Likert scales are often used in surveys (38), but can also affect the response behavior. One reason for this is that Likert scales, on the one hand, record the approval or rejection of a statement and on the other hand record the degree of agreement or disagreement. This can lead to an underrepresentation of the extreme positions (strongly agree, strongly disagree), since many people tend to adopt a more neutral position (39). This can also lead to a negative bias, since more answers are at the positive end of the scale (38).

2.1.6 Conclusions

Students accept Wikipedia and veterinary wiki systems in university teaching because of their dedicated usefulness and quality of information. Therefore, a successful establishment of a wiki system for veterinary medicine is possible. Other wiki systems in the field of medicine already contain high numbers of articles and show a high level of user participation, e.g. UMMedWiki with about 1600 articles and a high number of page views (40) or Medpedia (<http://www.medpedia.com>). Although Wikipedia contains many articles on veterinary topics, it is not exclusively used for retrieving information concerning veterinary medicine. A

specific wiki system addresses the audience directly and enables a thematic unity. It must be taken into account that in veterinary medicine only a limited number of people are potentially available for writing content. At the moment there are about 6300 students enrolled to study veterinary medicine at German universities. The number of persons who would actively participate in a veterinary wiki system is relatively low. Therefore, students in the early semesters should be encouraged to actively use wiki systems by availing of a good didactic integration of the wiki system into university education. It should be investigated in future projects, how veterinary practitioners and academics would use a veterinary wiki system.

2.1.7 Competing interests

The authors declare that they have no competing interests.

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2.1.9 Tables

Table 1: Responses by students from the 1st, 3rd and 7 Semester on the use of Wikipedia and wiki systems used at university (n = 210)

Statement	Number of times an activity has been carried out			
	Never	1-5	5-10	> 10
I have already read articles on Wikipedia.	1 (0,5%)	8 (3,8%)	11 (5,2%)	190 (90,5%)
I have already created or edited articles on Wikipedia.	192 (91,4%)	17 (8,1%)	0 (0%)	1 (0,5%)
I have already searched on Wikipedia for veterinary topics.	4 (1,9%)	48 (22,9%)	49 (23,3%)	109 (51,9%)
I have already found on Wikipedia satisfactory information on veterinary topics.	18 (8,6%)	89 (42,4%)	58 (27,6%)	45 (21,4%)
I have already created or edited an article with veterinary content on Wikipedia.	206 (98,1%)	4 (1,9%)	0 (0%)	0 (0%)
I have already read articles on veterinary wiki systems.	80 (38,3%)	86 (41,1%)	30 (14,4%)	13 (6,2%)
I have already created or edited articles on veterinary wiki systems.	178 (84,8%)	31 (14,8%)	1 (0,5%)	0 (0%)
I have already used wiki systems provided by the university.	135 (64,6%)	53 (25,4%)	16 (7,7%)	5 (2,4%)

Table 2: Responses from students from the 1st, 3rd and 7th Semester on the use of veterinary wiki systems (n = 210)

Statement	I strongly agree	I agree	I moderately agree	I do not agree	I strongly disagree	Undecided
I would read veterinary articles on a wiki system.	129 (61,4%)	73 (34,8%)	8 (3,8%)	0 (0%)	0 (0%)	0 (0%)
I would actively create or edit articles on a veterinary wiki system.	7 (3,4%)	15 (7,2%)	85 (40,9%)	53 (25,5%)	25 (12%)	23 (11,1%)
I consider the establishment of wiki systems for veterinary medicine to be useful.	137 (65,6%)	63 (30,1%)	7 (3,3%)	1 (0,5%)	1 (0,5%)	0 (0%)
Wiki systems are useful sources of reference.	132 (63,2%)	66 (31,6%)	10 (4,8%)	0 (0%)	0 (0%)	1 (0,5%)
I have doubts about the quality of the information in a wiki system.	3 (1,4%)	27 (12,9%)	103 (49%)	53 (25,2%)	15 (7,1%)	9 (4,3%)
I think that wiki systems should be more involved in university education.	28 (13,4%)	59 (28,2%)	85 (40,7%)	21 (10%)	5 (2,4%)	11 (5,3%)
When I write my own texts, I achieve more success in my studies.	35 (16,7%)	62 (29,5%)	52 (24,8%)	26 (12,4%)	8 (3,8%)	27 (12,9%)

2.2 Use and future of wiki systems in veterinary education? – A survey of lecturers in German-speaking countries

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Use and future of wiki systems in veterinary education? – A survey of lecturers in German-speaking countries

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2.2.1 Abstract

Objectives: Wiki systems are becoming increasingly important in university teaching. Not much is known about the opinion of lecturers of veterinary medicine regarding the active participation of students in teaching, their opinion on wiki systems and their motivation to use them in courses and to improve the quality of information. The objective of the present study was to evaluate how lecturers of veterinary medicine estimate learning management systems and the production of text or material by students in courses, if they rate wiki systems as an appropriate tool for teaching, if they would use wiki systems for their courses and if they are willing to improve the quality of information.

Methods: The data collection was carried out as an online survey using a five-point Likert scale. Lecturers of veterinary medicine in Germany, Austria and Switzerland were contacted (n=approx. 1700) out of which 139 completed (8.2%) the survey.

Results: Most lecturers use LMS and consider it to be suitable for providing course material. Half of all respondents indicated that they believe that students achieve greater learning success by developing their own learning material. In courses 23.0% of their students develop own materials. The majority of lecturers considered wiki systems as an appropriate and complementary tool for teaching (53.6%). A collection of wiki articles is seen as useful (56.6%), particularly when experts review the contents. One third of the lecturers would use wiki systems for the creation of material by students, but 82.5% have not yet used them in teaching. One third is willing to participate in the review of articles with regard to their quality.

Conclusion: The results show that many lecturers are willing to use veterinary wiki systems and that they regard them useful for teaching. According to the opinion of the majority of lecturers, the creation of material by students can lead to greater learning success and wiki systems are suitable for this purpose. We are about to develop strategies to support the implementation of wiki systems into veterinary education and a peer review system supported by lecturers. In a further project the actual learning success provided by the active use of wiki systems by students will be evaluated.

Keywords: E-learning, Education, Wiki, Lecturers, Veterinary medicine

2.2.2 Introduction

The use of the Internet in university educational environments has seen a significant increase in recent years (1). Universities and lecturers are increasingly using for example learning management systems (LMS) (2-4), with which teachers can make course materials available and communicate with students (5).

Modern educational concepts attempt to give students a more active role. The aim is to set the focus on students and encourage team-oriented, collaborative learning and interaction between them. The roles of teachers and learners are thus partly modified, as students develop materials such as texts, images, and presentations to teach other (5). In implementing these concepts, Web 2.0 technologies such as wiki systems and blogs are becoming increasingly important. A wiki system is a website that contains a collection of linked websites. These websites can be developed and edited by individuals or a group of users working collaboratively (6-7). This important feature of a wiki system to edit content by all users gives the opportunity that articles can be corrected, updated or completed.

The number of wiki-in-education related projects and publications has increased considerably in recent years (8). Some authors regard wiki systems as a suitable tool for university teaching (8-9). Wiki systems allow lecturers to develop interactive activities for their students, and to present various course information such as texts, images, videos, literature sources, external links, project information, and frequently asked questions (FAQs) (10). Wiki systems support the creation of texts because they are rapidly deployed and easy to use (11).

Some authors see a potential of wiki systems to become platforms for large and up-to-date knowledge repositories, because they engage a potentially large group into the knowledge creation process (8, 12). A challenge in the use of wiki systems in teaching is to ensure the quality of the content developed (13). On the one hand, the option of editing information is an advantage because errors can be corrected. On the other hand, there is the risk that correct information can be supplemented or replaced by inaccurate or false information. Wiki content is generally not reviewed by experts (e.g., peer review) prior to its publication (12). The objective of the present study was to evaluate how lecturers of veterinary medicine estimate learning management systems and the production of text or material by students in courses. Furthermore we wanted to know whether they rate wiki systems as an appropriate tool for teaching, if they would use wiki systems for their courses and if they are willing to improve the quality of information.

2.2.3 Materials and Methods

In May 2013, emails were sent to the professors and research assistants employed by the veterinary medicine universities in Germany, Austria and Switzerland (Berlin, Giessen, Hannover, Leipzig, Munich, Vienna and Vetsuisse). The email contained a link to the survey and a uniform password for all participants. The option to participate ended on 28 June 2013.

The survey was carried out using an online questionnaire. The software EFS Survey at Quest Back, Köln-Hürth, Germany was used. The password was intended to prevent uninvited users from accessing the questionnaire.

A total of approximately 1700 lecturers were contacted. Furthermore we sent emails via the deans office of the respective university with the question to distribute these questionnaire to research assistants. We do not know how many lecturers were actively contacted through the deans and received the questionnaire. Therefore we estimate that about 1700 lecturers were contacted. Of the contacted lecturers, 139 (8.2%) participated in the survey. The questionnaire (see attachment) contained a brief introduction to the study as well as questions regarding age, professional status, working subject and university. In addition, the participants were asked to agree to or reject specified statements using a five-point Likert scale. The first part of the questionnaire was related to material made available online by lecturers, mainly by LMS. It also contained questions related to the development of content by students in university courses.

The second part of the questionnaire dealt with the use and acceptance of wiki systems in courses. It contained 12 statements about the attitude of lecturers toward wiki systems. The questionnaire also included questions about the quality of information in a wiki system.

The analysis was performed using the statistical program SPSS® (Statistics IBM® version 20, Armonk, New York, USA). Data were analysed based on frequencies of answers and frequency distributions. Furthermore, lecturer's answers were analysed according to the response of their particular group (professor or research assistant) using the chi-square test, expected frequencies and standardized residuals for correlations. The significance level was set as $\alpha=0.05$. The population represented (n) varied depending on the number of lecturers who had answered the respective questions.

For the presentation in this article the results from the statements "I strongly agree" and "I agree" and the results from the statements "I do not agree" and "I strongly disagree" were added together, respectively, to form one affirmative and one negative statement. The statement "neutral" means that the respondent does not support or decline a statement and it is

offered to avoid that the lecturers leave the question blank. The statement “undecided” means that she or he is not able to assess a statement or is not willing to do so.

2.2.4 Results

A total of 139 lecturers completed the survey, of which 96 were research assistants (70.1%) and 41 professors (29.9%). Two people did not specify their professional status. There is a shift with respect to the responses. Almost half of the responses (40.2%) was carried out by the 3 universities from Austria and Switzerland. The Freie Universität Berlin had the highest response rate regarding the German universities. A number of 29.9% of the replies were made by professors who make up only about 10.0% of the population of respondents.

A large number of lecturers (73.4%) indicated that they regularly make material for their lectures available online. Of these lecturers, 43.1% used LMS. More professors than research assistants stated that they regularly made material for their lectures available online ($p < 0.01$). Professors also used LMS more frequently for this purpose ($p < 0.01$). 64.0% of the surveyed lecturers considered LMS to be suitable for providing course material.

In total, 23.0% of lecturers indicated that students develop their own texts or other learning material in the context of their courses. Out of these, 49.3% stated that students did work on their texts not within lecture times. A total of 45.3% were of the opinion that students achieve greater learning success if they develop their own texts and learning material. However, 36.7% of the lecturers stated that they could not evaluate this statement. The majority of the lecturers stated that they perceive it as useful that the material produced by students can be used in subsequent courses (55.0%) and revised by students (45.7%). 46.1% of the participants disagreed with the statement that the study of veterinary medicine allow adequate time for students to independently edit content. The majority of lecturers regarded it useful to have a collection of wiki articles for veterinary medicine as a source of information (56.6%). The lecturers considered wiki systems as an appropriate and complementary tool for teaching (53.6%).

Only 31.0% of the veterinary lecturers would use a veterinary wiki system for the creation of material by students. 41.9% were neutral to the statement.

Most participants (82.5%) had not previously used wiki systems for the creation of material by students. 25.8% of lecturers would write or revise articles in a veterinary wiki

system and 38.5% would like to participate in the review of articles to improve the quality of articles in veterinary wiki systems.

A total of 32.8% of the lecturers had concerns regarding the quality of the information in wiki systems. Most participants (88.1%) thought that experts should review the information in a veterinary wiki system prior to its publication.

One third (69.2%) of lecturers indicated that the linking between wiki articles could lead to a better understanding of interdisciplinary contexts. More research assistants (76%) than professors (43.9%) agreed with this statement ($p < 0.01$). More than half of the lecturers (66.9%) considered the opportunity of editing and updating articles as an advantage, while 28.7% as a disadvantage. A total 52.9% of lecturers favoured a non-public wiki system, 18.1% chose the statement "neutral".

Towards many statements the respondents were "neutral" or "undecided". The statement "neutral" was chosen more often than the statement "undecided". Six of nine neutral statements of the first questionnaires had values between 15.1% and 28.8%, eight of twelve "neutral-/undecided" statements had values between 24.3% and 46.3%. Especially the statements regarding the use a veterinary wiki system for the creation of material by students, if lecturers would write or revise articles in a veterinary wiki system and if they see the opportunity of editing articles as a disadvantage had values around and over 40.0% (see Table 1, Table 2 and Table 3).

2.2.5 Discussion

This survey was designed in the context of an increasing use of wiki systems at universities (14) and the related issues regarding the quality of the information. Generally, the survey results show that lecturers support active participation of students in lectures and consider the use of wiki systems as an appropriate tool for teaching. Furthermore, they are willing to improve the quality of information. Nearly half of the lecturers thought that students achieve greater learning success through active participation and that material produced by students should be used in subsequent courses. More than half of the lecturers think it is useful to have a collection of wiki articles for veterinary medicine (56.6%) and one third of the lecturers would use a veterinary wiki system for the creation of material by students. An amount of 38.5% would like to participate in the review of articles to improve the quality of articles.

Many professional medical wiki knowledge bases are already available. Examples are ganfyd.org, a free medical knowledge base, which any registered medical practitioner can edit (http://www.ganfyd.org/index.php?title=Main_Page) or radiopaedia.org, a growing and free educational radiology resource (<http://radiopaedia.org/>). The motivation to use wiki systems was expressed by approximately one third of the lecturers. We speculate that the low motivation of the other respondents is due to the fact that German wiki systems were hardly available or hardly known in the past. Barely half of lecturers of veterinary medicine use LMS to provide material online. According to a survey conducted in Sweden (3), lecturers use LMS predominantly to distribute documents to students and to facilitate their existing teaching practice. LMS at the Freie Universität Berlin offer the possibility to share documents and information but do not offer the option of collaborative creation or the editing of content unlike wiki systems. Wiki systems support the creation of texts during and outside of courses. They can provide an efficient and flexible interface for knowledge creation and student interaction (10). They enable the lecturers to inspect the results at any time. The most active teaching technique is the in-class activity, as it leads to a better understanding of course materials (15). If appropriate, wiki systems may be used during the lecture times or to supplement teaching outside of normal lecture times. Furthermore, it may be advantageous to provide adequate time during the course so that the students can develop wiki articles. This suggestion is relevant in the context of the opinion of half of the lecturers that the study of veterinary medicine offers insufficient time periods for self-study. Another argument for the use of wiki systems in veterinary teaching is that the majority of lecturers would use the developed material in subsequent courses and would let the students revise the articles.

Aspects regarding the quality of the information are an important issue in wiki systems used by lecturers. One third of lecturers have concerns regarding the quality of the information in wiki systems. Since its founding, the online encyclopaedia Wikipedia is regularly criticized by academics as being tawdry and full of inaccuracies (16). It is difficult for many visitors to trust the content in Wikipedia because of the high variance in quality of Wikipedia articles (17). However, concerns regarding the quality of the information in wiki systems have not been supported by other studies. The Wikipedia community takes issues of quality very seriously. Even though anyone can edit articles, the results are carefully discussed and there is an intense, on-going review of articles (18-19). Wikipedia is regarded as an accurate and comprehensive source of drug-related information for undergraduate medical education (20). One approach to improve the quality of information is the identification of articles of high quality by specialized experts as "good" articles (21) or

“featured” articles (17). This identification of articles in a veterinary wiki system could be done through a review process, which is mainly carried out by lecturers. It is encouraging that about one third of the lecturers would participate in a review of articles in a veterinary wiki system. Some lecturers indicated that they are willing to participate in the creation or revision of articles and the technical features are in progress. Almost all the lecturers thought that experts should review the information prior to its publication. Professional wiki systems like Radiopedia developed a board of editors to control the accurateness of the information (<http://radiopaedia.org/>). Despite the large amount of high-quality information available on Wikipedia without a permanent appraisal (22), a review process in a veterinary wiki system is advisable. Especially wiki projects, which are to be integrated into teaching, should establish a peer review process, for example because of sensitive information such as the diagnosis or treatment of disease (13). A proven concept is the graded peer review process in which an article can have four types of status: Incomplete (development of the article is in progress), Published (articles are published without prior examination and can then be annotated, modified, supplemented and corrected by each participant), Peer-reviewed (the evaluation of the article is done by ordinary users ("peers") and students with the help of a review guide on the talk page) and Expert Review (reviewed by experts) (13). After completion of a successful expert review, the article can be protected from further editing, in order to verify the accuracy of information. Modifications are only possible after a request to the moderator.

The complexity of information and skills in medicine has increased and led to an increasing specialization within the health professions (23). The opportunity for interdisciplinary exchange is becoming smaller because of the increasing specialization (24). Wiki systems offer the possibility of linking content. Thus, information can be found faster and interdisciplinary learning is thereby facilitated. The majority of lecturers (69.2%) also saw an opportunity in the linking of wiki articles to promote a better understanding of interdisciplinary contexts. More research assistants than professors stated that they support this statement ($p < 0.01$). This may be an indication that research assistants in particular regard the interdisciplinary potential of wiki systems as an advantage. Articles with a higher number of links attract a larger number of contributors, and potentially have more experts involved, which may result in a higher quality of articles (25). Regarding teaching, links may enable a better understanding of the context of the information presented in an article.

Almost two-thirds of the lecturers see the opportunity of editing articles as an advantage. The opportunity to edit articles on Wikipedia is considered as its most controversial advantage, because all entries are collectively developed by the global community of

Wikipedia users (26). However, this is also the greatest means of updating information. It is important to have the option of updating information, especially for medicine, a science where the amount of information is greatly increasing (27).

However, 28.7% of the lecturers see the opportunity of editing articles as a disadvantage because incorrect information can be added. The appearance of incorrect information may have different reasons, for example vandalism or lack of expertise. Vandalism rarely appears in wiki systems used in education (14). Almost half of vandal contributions are repaired within one view (19). In addition, earlier versions of the article are easy to restore in a wiki system. The lack of expertise of student writers could be controlled by a review system. A workflow would have to be implemented in that articles could have a “not reviewed” or “reviewed” status. The use of a veterinary wiki system may be limited to members of the veterinary medicine community as supported by about half of the respondents. Other lecturers clearly see the openness of a wiki system as a benefit. A public domain system would allow animal owners and members of medical or agricultural professions to have access to the information. A survey of students in Switzerland also showed that students favour the openness of a wiki system (14). A solution can be a semi public wiki system, where the content can only be edited and read by registered users, but selected reviewed content is public. Currently, a German-language wiki system for veterinary medicine is being developed (<http://www.vetipedia.org>), which will be established as a semi public wiki system.

This survey cannot be regarded as representative. The proportion of 8.2% respondents of the initially contacted persons is fairly low. Physician surveys are an important tool in health services, but they are often characterized by low response rates (28). A study of Australian doctors' use of online social media had a slightly higher response rate of 12.47% (29). It remains unclear if lecturers who are interested in online teaching and wiki systems were more likely to participate. Nevertheless, 139 lecturers participated in the survey. Most respondents were members of the universities of Vienna, Swiss (Bern and Zürich) and Berlin. The lowest response rates had the universities of Leipzig and Giessen. A reason could be that the proportion of contacted lecturers varied. In relation to the amount of research assistants in German-speaking universities, more professors filled out the questionnaire. It must also be noted that only lecturers in German-speaking veterinary medicine universities were consulted. Another phenomenon is the high rate of neutral or undecided statements, which may have different reasons. Many lecturers in veterinary medicine may have little experience with Web 2.0 technologies and were, therefore, not able to assess the statements. In addition, a study on bias in surveys found that a neutral scale position that is included in a questionnaire increases

the number of neutral responses compared to the same survey without a neutral scale position (30).

Despite these limitations we consider the results of the present study relevant in order to evaluate the views and motivations of the lecturers, and to develop practical concepts for the application of a veterinary wiki system in teaching.

2.2.6 Conclusion

This data shows that many lecturers are willing to use veterinary wiki systems and that they regard them as useful systems. One fourth stated that they are also willing to actively participate in article writing and revising. According to the opinion of the majority of lecturers, the creation of material by students can lead to greater learning success and wiki systems are suitable for this purpose. We are about to develop strategies to support the implementation of wiki-systems into veterinary education and a peer review system supported by lecturers. This encompasses also tutorials and scenarios for lecturers and other helping material that aims to address possible constraints of the media skills. In a further project the actual learning success provided by the active use of wiki systems by students will be evaluated.

2.2.7 Competing interests

The authors declare that they have no competing interests.

2.2.8 References

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2.2.1 Tables

Table 1

Availability and creation of content in courses

Statement	I strongly agree	I agree	Neutral	I do not agree	I strongly disagree	Undecided
I regularly make material for my lectures available online	48.9% (68)	24.5% (34)	5.0% (7)	8.6% (12)	6.5% (9)	6.5% (9)
I use learning management systems (e.g., Blackboard) to put my material online	32.3% (45)	10.8% (15)	7.2% (10)	15.9% (22)	22.3% (31)	11.5% (16)
I consider learning management systems to be suitable for providing course material	33.8% (47)	30.2% (42)	15.1% (21)	0.7% (1)	0.0% (0)	20.1% (28)
In my lectures students develop their own texts or material	5.0% (7)	18.0% (25)	27.3% (38)	19.4% (27)	20.9% (29)	9.4% (13)
The editing of texts or material takes place during the time of my lectures	4.3% (6)	14.5% (20)	21.0% (29)	22.5% (31)	26.8% (37)	10.9% (15)
Students achieve greater learning success if they develop their own texts and material in my lectures	12.2% (17)	33.1% (46)	8.6% (12)	5.8% (8)	3.6% (5)	36.7% (51)
I think it is useful that the material produced by	10.1% (14)	44.9% (62)	25.4% (35)	2.9% (4)	4.4% (6)	12.3% (17)

students can be used in
subsequent courses

I think it is useful that the
written material can be
revised by students in
subsequent courses

8.0%	37.7%	21.0%	6.5%	4.3%	22.5%
(11)	(52)	(29)	(9)	(6)	(31)

The study of veterinary
medicine allows adequate
time for students to
independently edit content

5.7%	13.6%	28.8%	25.2%	20.9%	5.8%
(8)	(19)	(40)	(35)	(29)	(8)

Table 2

Use and acceptance of wiki systems in courses

Statement	I strongly agree	I agree	Neutral	I do not agree	I strongly disagree	Undecided
I think it is useful to have a collection of wiki articles for veterinary medicine as a source of information	19.8% (27)	36.8% (50)	26.5% (36)	3.7% (5)	0.7% (1)	12.5% (17)
I consider wiki systems as an appropriate and complementary tool for teaching	15.4% (21)	38.2% (52)	30.9% (42)	3.7% (5)	0.8% (1)	11.0% (15)
I would use a veterinary wiki system for the creation of material by students	7.5% (10)	23.5% (32)	41.9% (57)	8.8% (12)	2.9% (4)	15.4% (21)
I have used wiki systems for the creation of material by students	3.6% (5)	4.4% (6)	4.4% (6)	26.3% (36)	56.2% (77)	5.1% (7)
I would write or revise articles in a veterinary wiki system	5.2% (7)	20.6% (28)	41.2% (56)	16.9% (23)	9.5% (13)	6.6% (9)
I have doubts about the quality of the information in wiki systems	9.5% (13)	23.3% (32)	35.8% (49)	19.0% (26)	4.4% (6)	8.0% (11)
The information in a veterinary wiki system should be reviewed by	55.5% (75)	32.6% (44)	5.2% (7)	3.0% (4)	0.7% (1)	3.0% (4)

experts prior to its
publication

I would like to participate in
the review of articles to
improve the quality of
articles in veterinary wiki
systems

8.1%	30.4%	32.6%	12.6%	9.6%	6.7%
(11)	(41)	(44)	(17)	(13)	(9)

Linking between wiki articles
can lead to a better
understanding of
interdisciplinary contexts

19.9%	49.3%	16.9%	0.7%	0.0%	13.2%
(27)	(67)	(23)	(1)	(0)	(18)

I see the opportunity of
editing articles as an
advantage, because articles
can be updated according to
the state of research

16.2%	50.7%	24.3%	2.2%	0.7%	5.9%
(22)	(69)	(33)	(3)	(1)	(8)

I see the opportunity of
editing articles as a
disadvantage, as incorrect
information may be
introduced

3.7%	25.0%	46.3%	14.0%	6.6%	4.4%
(5)	(34)	(63)	(19)	(9)	(6)

I favour a non-public wiki
system that can be used by
veterinarians and students
only

21.7%	31.2%	18.1%	14.5%	5.8%	8.7%
(30)	(43)	(25)	(20)	(8)	(12)

Table 3

Response rate of the universities

University	Response rate
Veterinärmedizinische Universität Wien	26 (19.5 %)
Vetsuisse Bern und Zürich (Swiss)	28 (20.7 %)
Universität Leipzig	11 (8.1 %)
Justus-Liebig-Universität Giessen	13 (9.6 %)
LMU München	18 (13.3 %)
Tierärztliche Hochschule Hannover	17 (12.6 %)
Freie Universität Berlin	22 (16.2 %)

Additional data

2.3 Self-evaluation of article writing and future participation by students using the wiki system vetipedia.org

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2.3.1 Abstract

Objective: Wiki systems are editable collections of linked hypertext documents that can be edited by users without programming skills. An important application of wiki systems is their use in teaching environments. Vetipedia.org is a German wiki system for veterinary students and practitioners. The access to the system is limited to veterinary students, lecturers and practitioners.

Methodology: Veterinary students in the 3rd and 4th year attending an elective course at the Clinic of Animal Reproduction (Freie Universität Berlin) were asked to write a wiki article in German language as a required exercise. Afterwards they were provided with an optional questionnaire to evaluate how students assess the writing of articles and the potential use of the wiki system. Furthermore, the motivation for reading, developing and improving articles in the future was to be explored.

Results: Results showed that most respondents had no difficulties in writing an article. The participants considered the content of their articles to be good and understandable enough to be part of a preparation for state examination. Most students have read articles from colleagues attending the course as well as other articles and considered the wiki system to be a useful supplement to textbooks and other sources for exam preparation. More than half of the students supported the writing of wiki articles on appropriate topics in courses. Nevertheless, most respondents were not willing to actively participate in voluntarily writing or improving articles in the future.

Conclusion: In conclusion, wiki systems can be successfully used in veterinary education. Moreover, students regard veterinary wiki systems as useful for exam preparation. However, concepts need to be developed to promote a more active development and improvement of material by the students.

Keywords: wiki, education, e-learning, exam preparation, writing, veterinary medicine

2.3.2 Introduction

The Internet has currently undergone major changes based on Web 2.0 applications such as wiki systems and blogs. Web 2.0 technologies are platforms that allow users to develop content by themselves or in a group, exchange ideas and supply feedback. In that regard, the self-directed and innovative creation, modification and utilization of knowledge are important aspects of modern education (1, 2). Web 2.0 technologies provide venues for collaboration and sharing of information to support the networks necessary for social and active learning (3). It has been shown, that collaborative learning results in better learning success than students working individually (4). Therefore, educators can utilize Web 2.0 technologies for student-centered and active creation of learning content.

Shifts in educational thinking from traditional behaviorist approaches to social constructivist views have influenced strategies for improving student engagement and learning through group working. The learning moves from teacher-centered, lecture-based activities towards more student-centered forms (5). Web 2.0 technologies can support these new strategies, for instance by the use of wiki systems.

Web 2.0 technologies also can help to improve the provision of information on health care. Despite the risks regarding accuracy of the information, web-based information play an increasingly important role for clinical decision making and medical education (6, 7).

Wiki systems are editable collections of linked hypertext documents (8, 9). The unique feature of wiki systems is that any user can edit wiki articles without programming skills. An important application of wiki systems is their use as knowledge bases or knowledge management systems (10). Examples for medical wiki systems are websites for radiological topics (11) or Wikisurgery (12), which is a free encyclopedia for surgeons and their patients with more than 33,000 articles (February 2016). Another example is "WikiVet"(13), an English wiki system, which offers access to articles for veterinary students and academics. Only students and academics of veterinary medicine are allowed to write and edit articles in this system.

Currently, Vetipedia (www.vetipedia.org) is available as a prototype. It will be established as a non-public German wiki system with the main focus on training veterinary students but also as a resource for practitioners. The aim is to address students of the German veterinary colleges and veterinary practitioners. The access to the system will be limited to veterinary students, lecturers and practitioners. Vetipedia has been already used successfully for several elective courses at the Freie Universität Berlin. Veterinary students have to enroll in some

elective courses. Numerous articles have also been developed on a voluntary basis. Currently, about 2450 wiki articles are available.

The objective of the present study was to assess if veterinary students are able to produce accurate information using a wiki system, if they face obstacles to do so and if they are willing to use the system and its content for study in future. Therefore we wanted to know if veterinary students are able to write articles in Vetipedia with specifying correct literature sources and setting links to corresponding articles. Furthermore, we wanted to evaluate if the students consider Vetipedia useful for exam preparation and if they read articles in Vetipedia during the course and in future. Finally, it was to be assessed whether students are motivated to write additional articles in Vetipedia and whether they intend to participate in improving the information.

2.3.3 Materials and Methods

In the present study the veterinary wiki system Vetipedia was used in an elective online course on the topic of "Complementary and Alternative Veterinary Medicine" held in summer terms 2013 and 2014, respectively. 82 students were enrolled in the 2013 course, 113 students were enrolled in the 2014 course. Students were in their 3rd and 4th year of study. A number of 61 and 80 students completed the course. An additional required task was the writing of an article in Vetipedia. A total of 55 and 80 students wrote an article (67.1% and 70.8% of the initially enrolled students, respectively). Task of the participants in the course 2013 was to choose one topic from a provided list related to the field of animal reproduction. The reason to choose the topic of animal reproduction was the expertise of the instructor to check the articles for major mistakes. The participants in 2014 could write an article with a topic of free choice. Guidelines were provided in both courses as follows: The articles were to be at least one page in length and had to contain at least one reference. The article should not contain any violations of copyright. Students were asked to finish the article between July and August of the respective year. The articles were reviewed and partially corrected by the course instructor for significant mistakes or missing relevant information.

Students were then asked to complete a questionnaire on a voluntarily basis. It was sent to students by email as a Microsoft Word document. Informed consent was obtained by the agreement to fill in the questionnaire. Participation in the survey was facultative and anonymous so that no positive or negative consequences for the participants or non-participants were or are possible.

In total, 36 students (26.7% of the students who wrote an article) agreed to participate and completed the questionnaire, and sent it back within two weeks.

The questionnaire (Figure 1) contained a brief introduction to the study as well as questions regarding age, year and gender. Students were asked which sources they used for searching information and how many hours in total they needed to write the article. In addition, the participants were asked to agree or disagree with given statements using a Likert scale. The five-point Likert scale provided the options “strongly agree”, “agree”, “undecided / neutral”, “disagree” and “strongly disagree”. The first part of the questionnaire was related to possible difficulties in the writing process. It also contained questions on the future use of Vetipedia in regard to the reading articles and exam preparation. The second part of the questionnaire contained seven statements on student’s motivation to write additional articles in Vetipedia and their contribution to improve the information in the future.

The analysis was performed using the statistical program SPSS® (Statistics IBM® version 20.0, Armonk, New York, USA). Data were analysed based on frequencies of answers and frequency distributions. Furthermore, student’s answers were analysed according to the response of their particular group (gender and semester) using the chi-square test, expected frequencies and standardized residuals for correlations. The significance level was set as $\alpha=0.05$. The population represented (n) varied depending on the number of students who had answered the respective questions.

For the presentation in this article the results from the statements "I strongly agree" and "I agree" and the results from the statements "I do not agree" and "I strongly disagree" were added together, respectively, to form one affirmative and one negative statement.

2.3.4 Results

A total of 33 female students and 3 male students completed the questionnaire. The average age of the students was 24.1 years and they were in their third (n = 23) and fourth (n = 13) year of study. No differences were found between the answers given by students of different ages, gender and semesters.

The majority of students found both searching for information (75.0%) and writing of articles (63.9%) not to be difficult. Half of the students also found it not to be difficult to edit information in a way that it is no longer subject to copyright violations. Only 22.2% of the students found it difficult to rewrite information.

Correctly citing literature sources in the article was considered not to be difficult by 30.6% of respondents, whereas 41.6% found it challenging. The majority of respondents (45.7%) were unable to answer the question whether setting links to corresponding articles is difficult.

The majority of students (58.3%) read articles in Vetipedia that were developed as part of the course by fellow students. Furthermore, 58.3% of the participants also read articles in Vetipedia that were not part of the course program. More than half of the students (52.7%) stated that they wanted to read articles in Vetipedia in the future.

The majority of students considered the content of their articles to be good enough (61.7%) and understandable enough (75.0%) to be part of an exam preparation. Almost half of the students (47.2%) considered their articles to be comprehensive enough to be part of an exam preparation. In general, almost half of the students (41.7%) wanted to use Vetipedia for preparation for state examination. Three quarters of the students considered Vetipedia to be a useful supplement to textbooks and other sources for exam preparation. It is also largely found to be helpful (80.5%), if Vetipedia would contain information reviewed by experts. Almost half of the students (36.1%) stated that they do not want to actively participate in improving articles, 33.3% were "neutral" to this statement, and 13.9% stated they would actively participate in improving articles.

The majority of respondents (61.1%) stated that the writing of wiki articles by students on appropriate topics should be included in other courses as an additional task. A proportion of 13.9% of students stated that they wanted to voluntarily write articles on Vetipedia in the future. Another 25.0% were undecided. Almost half of the students did not want to voluntarily write articles, add media or set links to other articles in the future. The majority of students did not want to participate in improving incorrect (36.1%) or incomplete (42.9%) articles in Vetipedia.

2.3.5 Discussion

This survey was conducted because of the increasing use of wiki systems in teaching contexts and to study options and challenges for further use of veterinary wiki systems. The results of this study are important in order to assess the motivation of the students to actively participate in article writing and editing and to develop concepts for the use of a veterinary wiki system in education. The survey results confirm that most veterinary students are able to write articles, to give correct references and to set links to corresponding articles.

Furthermore, they want to use Vetipedia as an information source. However, the majority of respondents do not want to actively participate in improving articles or voluntarily writing new articles in the future.

Forcing students to write is perhaps the most common pedagogical application of wiki systems in education (14). Writing texts leads to better learning results, writing skills and a better understanding of the content (15, 16). However, further research has to be carried out in order to assess if this approach leads to a significant improvement of writing skills. Also skills in searching information are important because in clinical practice the veterinarian must be able to find and use clinical research findings (17). Also these skills might be trained by projects like the presented one.

One third of respondents found it difficult to give incorrect references, but nearly half of the students had no difficulties. Based on these findings it seems to be advantageous to provide a brief introduction on how to properly cite sources within a wiki system. An equivalent guide has been included on Vetipedia. The correct specifying of literature sources is important to verify the article because of possible copyright violations. Half of the respondents had no difficulties to edit information in a way that it does not violate copyrights. This statement can be interpreted as positive, because potential copyright violations can be a considerable problem in a wiki system (1). Half of the respondents were unable to answer the question if they found linking articles difficult, probably because they had not done it. A proportion of 17.7% found it difficult. A reason for this difficulty may be that students did not recognize, use or understand this feature. Links are significant because following explicit links is an important part of navigation through a wiki site (18). The possibilities and procedures for linking related information should also be explained on wiki systems.

The statements that the majority of students want to read articles written inside and outside the course now and in the future show students' interest in the content of articles. A study by Hughes et al. stated that 70% of junior physicians use the online encyclopedia Wikipedia as information source for medical practice (6). Another study by Harris and Zeng showed that 37.0% of the students of medicine would like to use wiki systems in future classes (19). These statements underline that the students support the use of wiki systems in education. One reason for the students' interest in the content of Vetipedia presumably is that the system offers information that can be used for exam preparation. Almost half of the veterinary students (41.7%) wanted to use Vetipedia for this purpose. One reason may be the students' trust in the content they developed on their own, confirmed by their statements about the quality of their articles.

According to a study by Zakaria, students are found to be passive rather than active contributors to the creation of knowledge (20). One study showed that a small proportion of students did the greatest part of the work and many contributions of the students were superficial (21). A wiki implementation in an English university with the subject matter of a third year undergraduate module came to several conclusions (22). The course instructor demanded the students to write articles in a wiki system. At the end of the course, some topics of the final exam did refer to the information created by the students. However, even 5 weeks later, no student had written an article. The students stated that the reason for this lack of contribution was lack of time. They also expected that their articles would have been not good enough to help to pass an exam. In contrast to this, veterinary students regarded Vetipedia as a useful tool for exam preparation and considered their articles to be good enough (61.7%) and understandable enough (75.0%) for this purpose. Because the students were in their 3rd and 4th year of study, we believe that they had expertise to assess the validity and accuracy of content that they wrote.

A common challenge of wiki systems is the user's lack of motivation to actively participate in developing and editing content (22-24). The ongoing motivation for active participation is a crucial factor for the long-term success of a wiki system. Although the students completed the task to write an article in the course, the majority is not willing to improve the content of incorrect (36.1%) or incomplete (42.9%) articles. Within the next 6 months, none of the articles written in context of this project were updated or corrected by students. However, at this time, Vetipedia was still used by a small number of users. In the initial phase of a wiki system usually a low level of participation has to be expected. It can, however greatly increase over time as seen in the German Wikipedia (24). Yet, more than half of the students support the writing of wiki articles on appropriate topics in other courses, but only 13.9% are willing to actively participate in the future. This percentage is higher compared to the active participation in Wikipedia, where 2.5% (25) of the users do half of the editing. But Wikipedia is supported by a large number of volunteers, who are passionate about or experts in specific topics. Wiki systems focusing on specific topics may be able to attract only a small number of active participants. Likewise, small schools may not have a critical number of student editors that would enable a self-sustaining educational wiki system if used internal only (26). To date, also Vetipedia cannot rely on a smaller number of volunteers. German schools of veterinary medicine have a relatively low number of students. Therefore, an important goal is a cooperation of the German speaking veterinary colleges to increase the number of potential authors.

Regarding the low willingness of students to participate in future content creation, we suggest some concepts that may foster effective integration of active writing in courses and a raise of intrinsic motivation. Prerequisite for a successful implementation of article writing is a guided, structured and active integration of wiki systems into university courses. This encompasses clear definitions of topics, distinct deadlines and a predefined structure of the article. Using wiki systems in the classroom on a voluntary basis and without further guidance has proven to produce poor results, because the level of participation and the quality of the articles are often low (27). The lecturer should actively participate by supplementary guidance, feedback, corrections and sample articles (27). Also group working can be a tool to motivate students (5). In addition, it would be encouraging if students see direct benefits for the use of their contributions for practice and for their own profession. The benefit to access medical information for an exam preparation seems to result in only minimal motivation for article writing. User-friendliness is an important requirement for wiki systems used in education. The ease of the use of wiki systems, confirmed by the students using Vetipedia in this project, refers to one of the most important factors indicated by wiki users. Usability was seen as having positive influence on the success of wiki systems (28). Also a study by Avci and Askar showed that students consider wiki systems to be convenient and user friendly (29). Regarding the quality of information, almost all respondents find it helpful, if Vetipedia contains information reviewed by experts. A study in the field of pathology informatics showed that specific content in Wikipedia had a high level in terms of comprehensiveness, quality, currency and utility for the beginner and advanced learners (30). Despite the lack of a traditional formal peer review process, the authors on Wikipedia produce valid and structured texts (31). Having a high number of co-authors would potentially increase the quality and quantity of the articles. A study demonstrated that articles on Wikipedia are heavily edited, if they obtain the status of a high-quality article (32). Thus, motivating lecturers to participate in an expert-review process and a professional monitoring of the quality of the content would be beneficial. The WikiProject Physics has several participants who actively monitor the quality of physics-related articles on Wikipedia. The project compiles a list of missing and inadequate articles, as well as a list of articles that have not yet been reviewed (33). A corresponding system for the identification of missing, incomplete or not reviewed articles has been implemented for Vetipedia. As a next step, an expert review of content and style of the articles can provide feedback to the students' work and increase the quality of information. An expert review for articles in Vetipedia does not exist yet but is under development and will be implemented within 2016.

This survey cannot be considered as representative due to several limitations. One limitation is that all participants are from the same college and used the wiki system in one specific course. Integration of participants from other colleges and different courses would provide a broader data set of the motivation to participate in a wiki system. Another limitation may be that the participants were predominantly females. An important question is if students have the expertise to assess the validity and accuracy of content that they wrote. Therefore, it is necessary to establish an expert review with feedback and more high quality articles. Developing articles on Vetipedia was used as an additional task. Therefore, the motivation of the students may have been low. It remains unclear if a closer integration of the course and the articles content would have led to better results. Feedback with suggestions for improving each article was given once at the end of the course by email.

2.3.6 Conclusion

Students considered the wiki system Vetipedia to be a useful supplement to textbooks and other sources for exam preparation and that they consider themselves to write articles of good quality. They are also willing to use Vetipedia as an information source. Veterinary students can produce accurate information using a wiki system. However, they achieved an insufficient level of motivation, which limited spontaneous writing of articles.

A guided integration of wiki systems through more support, personal feedback, emphasizing the benefits of a wiki system and an expert review of content and style of the articles during the course by the lecturer may further improve motivation to actively and passively use the wiki system and to reflect the improvement of the writing skills by the students (34). Further research is warranted to assess the improvement of the writing skills by writing articles for a wiki system. Based on the survey results it can be concluded that a sufficient level of active use by students and an expert review by lecturers can help to establish Vetipedia as a useful teaching tool for veterinary education and veterinary practice.

2.3.7 Competing interests and Ethics

The authors declare that they have no competing interest.

The authors declare that the presented research has been performed in accordance with the Declaration of Helsinki. At our faculty there is no ethics committee that could provide an approval.

2.3.8 References

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2.3.9 Tables

Table 1

Questions on developing the articles on Vetipedia, on works that span the course and on using the system for exam preparation

Statement	I strongly agree	I agree	Neutral	I do not agree	I strongly disagree	Undecided
I found developing the content of an article for Vetipedia to be difficult	0,0% (0)	8,3% (3)	25,0% (9)	38,9% (14)	25,0% (9)	2,8% (1)
I found researching information for the article in Vetipedia to be difficult	0,0% (0)	2,8% (1)	22,2% (8)	47,2% (17)	27,8% (10)	0,0% (0)
I found correctly specifying the literature sources in the article to be difficult because I have no experience in the proper citing of sources	5,6% (2)	25,0% (9)	27,8% (10)	22,2% (8)	19,4% (7)	0,0% (0)
I found linking articles to each other to be difficult because I did not know which wiki articles are suitable for linking	5,7% (2)	25,7% (9)	17,1% (6)	5,7% (2)	0,0% (0)	45,7% (16)
I found it difficult to rewrite information in such a way that it is no longer subject to copyright	0,0% (0)	22,2% (8)	33,3% (12)	36,1% (13)	8,3% (3)	0,0% (0)

I have also read articles on Vetipedia that were developed as part of the course by fellow students	22,2% (8)	36,1% (13)	16,7% (6)	16,7% (6)	5,6% (2)	2,8% (1)
I have also read articles on Vetipedia that were not part of the course program	19,4% (7)	38,9% (14)	8,3% (3)	22,2% (8)	11,1% (4)	0,0% (0)
I will read more articles on Vetipedia in the future	19,4% (7)	33,3% (12)	27,8% (10)	2,8% (1)	0,0% (0)	16,7% (6)
I consider the content of my article to be good enough to be part of an exam preparation	17,6% (6)	44,1% (15)	23,5% (8)	0,0% (0)	5,9% (2)	8,8% (3)
I consider my article to be comprehensive enough to be part of an exam preparation	8,3% (3)	38,9% (14)	36,1% (13)	2,8% (1)	5,6% (2)	8,3% (3)
I consider my article understandable enough to be part of an exam preparation	19,4% (7)	55,6% (20)	16,7% (6)	0,0% (0)	2,8% (1)	5,6% (2)
I will actively participate in improving articles	0,0% (0)	11,1% (4)	36,1% (13)	36,1% (13)	5,6% (2)	11,1% (4)
I would find it helpful if Vetipedia contains information reviewed by	44,4% (16)	36,1% (13)	19,4% (7)	0,0% (0)	0,0% (0)	0,0% (0)

experts

I consider Vetipedia to be a useful supplement to textbooks and other sources for exam preparation, because I can look up information quickly

36,1%	36,1%	22,2%	5,6%	0,0% (0)	0,0% (0)
(13)	(13)	(8)	(2)		

I will use Vetipedia for exam preparation

5,6% (2)	36,1% (13)	27,8% (10)	13,9% (5)	0,0% (0)	16,7% (6)
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Table 2

Questions on further use and improving the content on Vetipedia

Statement	I strongly agree	I agree	Neutral	I do not agree	I strongly disagree	Undecided
I wrote an article as part of the university course because I wanted to receive the certificate for attending the course	22,2% (8)	38,9% (14)	19,4% (7)	13,9% (5)	2,8% (1)	2,8% (1)
The writing of wiki articles by students on appropriate topics should be included in other courses as an additional task	19,4% (7)	41,7% (15)	36,1% (13)	2,8% (1)	0,0% (0)	0,0% (0)
I will voluntarily develop	0,0% (0)	13,9%	25,0%	30,6%	5,6% (2)	25,0% (9)

other articles on Vetipedia in the future		(5)	(9)	(11)		
I will participate in improving the content of incorrect articles on Vetipedia	2,8% (1)	11,1% (4)	33,3% (12)	33,3% (12)	2,8% (1)	16,7% (6)
I will participate in improving incomplete articles on Vetipedia	0,0% (0)	5,7% (2)	34,3% (12)	42,9% (15)	0,0% (0)	17,1% (6)
I will participate in adding more media (e.g. images) to articles on Vetipedia	0,0% (0)	2,8% (1)	33,3% (12)	44,4% (16)	5,6% (2)	13,9% (5)
I will participate in linking more articles to each other	0,0% (0)	2,8% (1)	30,6% (11)	38,9% (14)	2,8% (1)	25,0% (9)

3 DISCUSSION

The overall objective of the conducted studies was to evaluate if students and lecturers of veterinary medicine use wiki systems personally and in their courses, if they consider a veterinary wiki system as a useful tool for teaching and exam preparation and if they are willing to participate in writing and improving the quality of information.

3.1 Use of wiki systems

The main research findings regarding the use of wiki systems indicate that most students had widespread experience in the use of wiki systems like Wikipedia and veterinary wiki systems, have read articles from colleagues during a wiki course and are also willing to use veterinary wiki systems as an information tool in the future. A survey of undergraduate students showed that a majority of students started university with experience of using online systems such as wiki systems (25). Correspondingly, another study confirms that most students in a software engineering course plan to use wiki systems for future projects even if not required to do so (26). Also, one third of the lecturers would like to use wiki systems for the creation of material by students, but 82.5% have not yet used them in teaching. This data shows that students of veterinary medicine accept wiki systems as a source of information. If and to what extent they will really use specific available wiki systems in future has to be analysed in future research. However, these results are promising and support projects on wiki system development.

It has to be noted that other authors found unsatisfactory degrees of active participation in wiki systems used in university environments (27). It has been stated that students will not use wiki systems unless they are convinced by evidence of the benefits (28). Benefits could be low technical barriers, supplementary guidance and the building of a user community. Technical issues, a lack of technical knowledge and concerns about erroneous information sometimes hindered participation in online communities (17). The need for minimal technical skills allows users to concentrate on content rather than on the technical process of writing and reduces the need for student support (29). Supplementary guidance through active teacher participation, input, feedback, and corrections and sample materials (texts) raises the level of intrinsic motivation and the quality and quantity of materials (14). Building a user community

can also increase the motivation for collaboration and participation. Group working can be a solution for the problem of demotivation (28).

Another problem is that only larger schools will have the critical mass of student editors that would enable a self-sustaining educational, all-volunteer wiki system (21) and an useful information tool in the future. Therefore, in veterinary medicine a lot of students have to be motivated to help creating a critical mass of articles that can be further developed and improved. It may be advantageous if only one wiki system is offered to German speaking students rather than running several systems with limited information content and student participation.

3.2 Usefulness of wiki systems

The main findings regarding the usefulness of wiki systems suggest that the majority of lecturers and students considered a collection of wiki articles to be a useful supplement to textbooks and a complementary tool for teaching. Furthermore, students regard such a collection to be a source for exam preparation. Both groups were of the opinion that an expert review of the contents is necessary.

Regarding wiki systems as a complementary tool for teaching, one study confirmed that students found wiki systems useful for arranging information and sharing knowledge, while lecturers thought wiki systems made managing and marking group work easier and more effective (30). Most lecturers feel that integrating wiki systems into the classroom learning environment can increase the students' satisfaction with the course, can improve their learning and writing skills and can increase student interaction with other students and faculty staff (4). Students found the usage of wiki systems in the teaching-learning process more useful than blogs (31).

An important role regarding the usefulness of wiki systems plays the relationship between students and lecturers. A study by Guo and Stevens found that students with enthusiastic tutors, past wiki experience and easy access to wiki systems would use wiki systems in their collaboration, find them useful and intend to use them in group collaboration in future courses (32). The most important factor influencing a student's perception was the attitude of their lecturer towards wiki systems. Students of lecturers with negative attitudes towards the use of wiki systems in the course had significantly lower ratings of the usefulness of wiki systems (32). Regarding the results presented in this thesis it is encouraging that most

lecturers in veterinary medicine regard wiki systems to be useful as a collection of articles and also as a writing tool for students.

Wiki systems as a possible source for exam preparation are becoming more important, too. A study highlights the value of Wikipedia to prepare students for exams, state exams and for the clinical practice of young professionals (19). Wikipedia has become a staple of the academic community, increasingly used by faculty and students to develop lectures and study aids, research topics for papers and as a source of background information while studying or conducting research (33).

3.3 Writing of content

The major findings concerning the writing of articles show that most students had no difficulties in writing an article and supported the writing of wiki articles in courses. Furthermore, most students and lecturers expect a better learning success by writing own texts and developing their own learning material. However, this method was used in only 23.0% in the courses of the participating lecturers in the past.

Many academic staff claim that students have hardly writing skills (34) so that for many students the writing of wiki articles presents a significant challenge (15). The findings presented in this thesis do not support these observations as most of the veterinary students expressed to have no significant difficulties in writing the articles. Nevertheless, integrating writing into the curriculum may be a useful tool to practise these skills. In addition, also other skills can be trained because writing is not the only way to contribute to a wiki system. Students can review and correct information, add pictures or videos and set links to other articles within or outside of the system. With so many possibilities the participants have the freedom and responsibility to contribute in those ways they think are best suited for them (35).

Lee could demonstrate that creating wiki articles had a positive impact on the development of students' writing skills through collaborative engagement (36). Wiki systems also foster collaborative learning if several people work together and construct knowledge (37). In that regard, students can train reflection, reviewing and publication of information by using wiki systems as a writing tool (38). It can be assumed that students of veterinary medicine can expect a better learning success by using Vetipedia passively and actively. If

this is really the case and to what extent a learning success can be achieved has to be evaluated in future research projects.

It has been described that a major problem of wiki systems is that only a low percentage of students actively participates in writing and editing articles (14, 39). A reason can be the students' low experience in writing or editing of information (8.6% Wikipedia, 15.3% veterinary wiki systems). Implementing the use of wiki systems in the classroom on a voluntary basis and without further guidance has proven to produce poor results in some instances: the level of participation is often low and the quality of the content often lacks focus (14). One study showed that the most productive 10% of students contributed just over 40% of the total text, the least productive 25% of students contributed only 4.4% (40). As a conclusion it can be stated that adequate guidance by engaged lecturers, clear tasks and a sufficient amount of useful articles for seeking information can help more students to use a classroom wiki system more successful.

In regard to this thesis it can be assumed that veterinary students could use wiki systems like Vetipedia in the beginning for seeking information. The first contact to a wiki system usually starts with searching information and reading articles (41). The period of passive use can be followed by a period of more participation. For example, contributors of Wikipedia generally begin with reading of information, but gradually adopt the practices of proofreading, fact checking, and eventually of authoring new content (41).

Up to now, the study of veterinary medicine provides little opportunity to develop and write content. Therefore, wiki systems like Vetipedia may motivate students and lecturers to create successful user-generated content if the users are regularly attracted by the website to contribute (3).

3.4 Quality of content

The main findings of this thesis regarding the article quality indicate that the majority of students considered the content of their articles to be good and understandable enough to be part of a preparation for state examination. A study by Forte and Bruckman, however, revealed different results: students did not believe their writing was of sufficient quality or interest to serve as a resource for someone else (37). Dissatisfaction with the quality of student group work, in terms of content and process, from both academics and students, is a constant challenge to the development of appropriate teaching, learning and assessment

strategies (28). Risks of wiki systems like inaccurate information, uncertain expertise of some contributors and the citing of not independent sources (24) can be minimised through a better cooperation between lecturers and students and other strategies for quality management. Another major finding indicates that almost half of the students (36.1%) do not want to actively participate in improving articles. For many students, expanding, organising or correcting their own or others work tends to be a rare event (42). In contrast, one third of the lecturers are willing to participate in the review of articles with regard to their quality. This willingness of the lecturers to review existing articles in Vetipedia may also lead to projects in that students are asked to improve articles in class group work. The role of the lecturer is important to create and maintain autonomous learning environments (43), in which students feel motivated to edit and improve content.

An open, public wiki system can enhance the quality of its content (44). Advantages of using a public wiki system are that it promotes collaboration beyond the classroom, it can increase sense of responsibility and more accurate writing and students also paid closer attention to respect the rules of academic writing (44). Disadvantages of an open wiki system are the lack of control of registered users and that uncompleted articles or inaccurate information are visible for a global audience of users and readers. When using wiki systems in education, therefore, facilities for authentication and logging should be used (45). Vetipedia has been established as a closed password-protected system like most other wiki systems established at universities. This means that only students and teachers may access the content (40, 42). In the near future also practitioners and clinicians will have access to Vetipedia. It is expected that they will use the wiki system as an information resource and it is hoped that they also will contribute to write information, i.e. add more practice-oriented views on the contents. Another solution for wiki systems can be a semi-public access, meaning that the content can only be edited and read by registered users, but selected reviewed content is made public.

An approach to ensure accuracy of information is the establishment of a review system with the help of voluntary participating experts. Articles in Vetipedia are now labelled according to their quality. An article can have the labels “not reviewed” or “reviewed”. Students in higher semesters can inspect and peer review “not reviewed” articles of certain comprehensiveness and accurateness. They highlight these articles with the label “reviewed by a moderator”. A professional review board of lecturers of veterinary medicine review and correct certain articles with the label “reviewed by a moderator”. Articles “reviewed by an

expert” with a good quality can be protected from further editing and can be published for a global audience.

Our overall aim is to establish a self-sustaining wiki system for veterinary medicine. In future, Vetipedia will be established as a veterinary wiki system with a pedagogical concept to motivate students to participate and with an advanced review system to ensure the quality and accuracy of content.

3.5 Suggestions for an implementation of a wiki system in university

Some lecturers may consider an implementation of a wiki system in education in future. To establish a wiki system in university, several technical and educational issues have to be considered. Regarding the technical implementation, commercial, technical supported software and an advanced search engine are beneficial. The basis for the use and cooperation in wiki systems is a stable system (27). Commercial software can have technical support in regard of possible system errors. Confluence (46), the software used for Vetipedia, enables an easy and fast linking and labeling of content, a decent WYSIWYG editor and effective management of group working. Therefore, also students with no or limited computer skills are able to read, write and edit texts and provide other materials like pictures or videos. A wiki system should be well prepared to make information easily searchable and accessible (14). An advanced search engine can find not only articles or words in articles but also labels and categories. Also enough synonyms should be available to find required information. Regarding the educational implementation, a guided, structured and active integration of wiki systems into university courses, emphasizing the benefits of the use in university, medical practice and profession because of usability and the quality of articles enhance the use of these systems. In addition, brief introductions or courses to introduce wiki systems and their use may be advantageous to motivate lecturers and students to participate (47). To further motivate contributors, a reward system could be established that encompasses course certificates, prizes or other positive feedback.

3.6 Future use of wiki systems

The use of wiki systems is not restricted to be used by students or single institutions in university only. Web 2.0 technologies are already widely used in health care. Health 2.0 describes the transmission of applications and principles of Web 2.0 in healthcare. Important issues include the interactive creation, distribution and collaborative editing of health information and greater networking between patients and physicians (48). In that regard it can be expected that also Veterinary Health 2.0 will be developed in near future. For instance, pet owners can get information about diseases, therapies, medications, etc., to be better prepared for vet visits. The better knowledge of the pet owners may be advantageous because it eases communication between them and the veterinary practitioners. However, the veterinary practitioners should be aware of this better knowledge and should also address this.

Cooperation between Health 2.0 technologies and a veterinary wiki system can be a powerful instrument for veterinary students, lecturers, practitioners and patients for the welfare of animals.

Wiki systems, in connection with mobile systems, can provide fast access to information anywhere, anytime. Mobile devices like smartphones, Internet-enabled and extensible phones, are becoming increasingly relevant to education, because staff and students within higher education institutions own and make use of these devices (49). Mobile availability of up-to-date information will be a benefit to practitioners, especially in large animal medicine where mobility is necessary. Thus, a future mobile version of an expert-reviewed version of Vetipedia can meet the current requirements in technology, mobile learning and the demand to fast access of accurate, up-to-date information.

All in all, wiki systems have an enormous potential that can thrive through dedication and creativity.

4 SUMMARY

Darius Kolski: Implementation, challenges and acceptance of wiki systems in veterinary education - surveys among students and lecturers

Wiki systems are gaining importance concerning the use in education and medical science. They have great potential to enhance writing skills, to build a large collection of specific wiki articles and to shape and support a community of contributors and collaborators in university.

Not much is known about the opinion of students and lecturers of veterinary medicine regarding the use of wiki systems, the active participation of students in form of writing and improving articles and their motivation to use wiki systems in teaching and learning. To establish a wiki system for veterinary medicine, Vetipedia.org was designed. Vetipedia.org is a German wiki system for veterinary students and practitioners. The access to the system is limited to veterinary students, lecturers and practitioners.

The overall objective of the conducted studies was to evaluate if students and lecturers of veterinary medicine use wiki systems personally and in their courses, if they consider a veterinary wiki system as a useful tool for teaching and exam preparation and if they are willing to participate in writing and improving the quality of information.

The first study examined the use and acceptance of wiki systems for students of veterinary medicine.

A questionnaire was provided to students (n=210) of the faculty of Veterinary Medicine at the Freie Universität Berlin with questions regarding the use of Wikipedia in general and concerning educational issues. Most students had widespread experience in the use of Wikipedia and veterinary wiki systems and are willing to use veterinary wiki systems as an information tool in the future. In contrast, the experience in writing or editing of information was low and only a few students are willing to write or edit content. Nevertheless, students consider the quality of information in a wiki system as correct. In conclusion, wiki systems are considered a useful tool to gain information, but the will to participate is low.

The objective of the second study was to evaluate how lecturers of veterinary medicine estimate wiki systems in the context of teaching, if they would use them in courses and if they are willing to improve the quality of information.

The data collection was done through an online survey using a five-point Likert scale. Lecturers of all German-speaking universities of veterinary medicine in Germany, Austria and Switzerland were contacted (n=approx. 1700) out of which 139 completed (8.2%) the survey.

The majority of lecturers considered wiki systems as an appropriate and complementary tool for teaching. One third of the lecturers would use wiki systems for the creation of material by students, but most have not yet used them in teaching. One third is willing to participate in the review of articles with regard to their quality.

In the third study a survey was conducted using exemplarily the wiki system Vetipedia.org on how students assess the reading, writing and improving of articles and the potential use of the wiki system.

Participants in the 3rd and 4th year of study attended an elective course of the Clinic of Animal Reproduction (Freie Universität Berlin). They were asked to write a wiki article in German language as a required exercise. Afterwards they were provided with an optional questionnaire. Most respondents had no difficulties in writing an article and considered their articles to be good and understandable enough to be part of a preparation for state examination. They considered a wiki system to be a useful supplement to textbooks and they also read articles that were created from colleagues during or before the course. Nevertheless, most respondents were not willing to actively participate in improving articles or in voluntarily writing articles in the future.

Based on these findings, it can be concluded that wiki systems can be used in veterinary education by students to access information and by lecturers to be included into courses. The students' low motivation to actively write and improve content should be solved with a new concept of integrating wiki systems into university, which focuses mainly the benefits of a wiki system for students in university and profession like exam preparation and the availability of accurate information through a review system.

5 ZUSAMMENFASSUNG

Darius Kolski: Umsetzung, Herausforderungen und Akzeptanz von Wiki-Systemen in der veterinärmedizinischen Lehre – Umfragen unter Studierenden und Dozierenden

Wiki-Systeme gewinnen im Einsatz in der Lehre und in dem Informationstransfer in der Medizin zunehmend an Bedeutung. Sie haben ein großes Potenzial, um Schreibfähigkeiten zu verbessern, eine Sammlung von spezifischen Wiki-Artikeln aufzubauen und die Zusammenarbeit von Autoren und Mitstreitern zu fördern.

Bisher ist wenig über die Einstellung der veterinärmedizinischen Studierenden und Dozierenden bezüglich der Verwendung von Wiki-Systemen, die aktive Beteiligung der Studierenden an der Erstellung und Verbesserung von Artikeln und deren Motivation, Wiki-Systeme in der Lehre zu nutzen bekannt. Um ein Wiki-System für die Tiermedizin zu etablieren, wurde Vetipedia.org entwickelt. Vetipedia.org ist ein deutsches Wiki-System für veterinärmedizinische Studierende und Praktiker. Der Zugriff auf das System ist auf veterinärmedizinische Studierende, Dozierende und Praktiker beschränkt.

Das übergeordnete Ziel der Dissertation bestand in der Untersuchung, ob Studierende und Dozierende der Veterinärmedizin Wiki-Systeme für private und berufliche Belange sowie in der Lehre nutzen, ob sie ein veterinärmedizinisches Wiki-System als ein nützliches Werkzeug für Unterricht und Prüfungsvorbereitung erachten und ob sie bereit sind, Inhalte zu erstellen und die Qualität der Informationen zu verbessern.

Die erste Studie untersuchte die Nutzung und Akzeptanz von Wiki-Systemen durch Studierende der Veterinärmedizin. Dazu wurde Studierenden (n = 210) des Fachbereichs für Veterinärmedizin an der Freien Universität Berlin ein Fragebogen mit Fragen zur Nutzung von Wiki Systemen im privaten und studienspezifischen Kontext zur Verfügung gestellt. Die meisten Studierenden hatten eingehende Erfahrungen in der Verwendung von Wikipedia und veterinärmedizinischen Wiki-Systemen. Sie gaben an, in Zukunft veterinärmedizinische Wiki-Systeme als Informationsinstrument verwenden zu wollen. Im Gegensatz dazu war die Erfahrung im Schreiben oder Bearbeiten von Informationen gering und nur wenige Studierende zeigten sich bereit, Inhalte zu erstellen oder zu bearbeiten. Ungeachtet dessen erachten die Studierenden die Qualität der Informationen in einem Wiki-System überwiegend als korrekt. Schlussfolgernd werden Wiki-Systeme als ein nützliches Instrument zur Erstellung von Informationen angesehen, jedoch ist die Bereitschaft zur Teilnahme gering.

Das Ziel der zweiten Studie bestand in der Untersuchung, wie Dozierende der Veterinärmedizin Wiki-Systeme im Rahmen der Lehre einschätzen, ob sie Wiki-Systeme in ihren Kursen verwenden oder künftig verwenden wollen und ob sie bereit sind, die Qualität der Informationen in Wiki-Systemen zu verbessern. Die Datenerhebung wurde anhand einer Online-Befragung mit Hilfe einer Fünf-Punkte-Likert-Skala durchgeführt. Dozierende aus allen deutschsprachigen Universitäten der Veterinärmedizin in Deutschland, Österreich und der Schweiz wurden kontaktiert. Die Mehrzahl der Dozierenden (n = 139) betrachte Wiki-Systeme als geeignetes und ergänzendes Instrument für den Unterricht. Ein Drittel der Dozierenden würde Wiki-Systeme für die Erstellung von Materialien durch die Studierenden verwenden. Die meisten haben dies bisher jedoch noch nicht getan. Ein Drittel der Befragten ist bereit, sich an der Überprüfung der Artikel in Bezug auf ihre Qualität zu beteiligen.

In der dritten Studie wurde exemplarisch am Wiki-System Vetipedia.org untersucht, wie die Studierenden das Lesen, die Erstellung und Verbesserung von Artikeln und die mögliche Verwendung von Wiki-Systemen bewerten. Studierende aus dem 3. und 4. Studienjahr nahmen an einem Wahlpflichtkurs der Tierklinik für Fortpflanzung (Freie Universität Berlin) teil. Sie wurden gebeten, einen Wiki-Artikel in deutscher Sprache zu schreiben. Danach wurde ihnen ein optional zu beantwortender Fragebogen zur Verfügung gestellt. Die meisten Befragten hatten keine Schwierigkeiten, einen Artikel zu schreiben und bewerteten ihre Artikel als gut und verständlich genug, um Teil einer Vorbereitung für die staatliche Prüfung zu sein. Sie hielten Wiki-Systeme für eine sinnvolle Ergänzung zu Lehrbüchern und lasen auch Artikel, die von Kommilitonen während oder vor dem Kurs erstellt wurden. Trotzdem waren die meisten Befragten nicht bereit, sich aktiv an der Verbesserung der Artikel zu beteiligen oder zukünftig freiwillig Artikel zu schreiben.

Basierend auf diesen Ergebnissen kann geschlussfolgert werden, dass Wiki-Systeme von Studierenden für den Zugriff auf Informationen in der veterinärmedizinischen Lehre verwendet und von Dozierenden erfolgreich in Kurse integriert werden können. Der geringen Motivation der Studierenden zur aktiven Erstellung und Verbesserung von Inhalten sollte mit geeigneten Konzepten für die Integration von Wiki-Systemen in die universitäre Lehre entgegengetreten werden. Dabei können auch die Vorteile für Studierende in Bezug auf die Prüfungsvorbereitungen und die zeit- und ortsunabhängige Verfügbarkeit von aktuellen und richtigen Informationen, welche durch ein Review-System gefördert werden kann, fokussiert werden.

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7 ATTACHMENT: QUESTIONNAIRE

7.1 Questionnaire: Use and acceptance of Wiki systems for students of veterinary medicine

Wikis in der tiermedizinischen Ausbildung

Mit dieser Befragung wollen wir untersuchen, welche Erfahrungen Studierende der Veterinärmedizin mit Wikis haben und ob Sie Wiki-Systeme als sinnvolle Ergänzung zur herkömmlichen Lehre ansehen.

Es handelt sich dabei um eine Umfrage im Rahmen einer Dissertationsarbeit der Tierklinik für Fortpflanzung der FU Berlin (www.tiergyn.de). Alle Informationen werden vertraulich behandelt und anonymisiert verwendet.

Persönliche Angaben

Ihr Alter: _____

Ihr Semester: _____

Ihr Geschlecht: _____

Bitte schätzen Sie die Häufigkeit ein und kreuzen Sie das Zutreffende an

Aussage	Nie	1 bis 5	5 bis 10	Mehr als 10
Ich habe auf Wikipedia bereits Artikel gelesen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf Wikipedia bereits Artikel erstellt oder überarbeitet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf Wikipedia bereits Informationen zu tiermedizinischen Fragestellungen gesucht.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf Wikipedia bereits zufriedenstellende Informationen zu tiermedizinischen Fragestellungen gefunden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf Wikipedia bereits einen Artikel mit tiermedizinischem Inhalt erstellt oder überarbeitet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf tiermedizinischen Wiki-Systemen bereits Artikel gelesen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auf tiermedizinischen Wiki-Systemen bereits Artikel erstellt oder überarbeitet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe bereits universitär angebotene Wiki-Systeme im Rahmen der Lehre genutzt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bitte geben Sie an, inwieweit die Aussagen Ihrer Ansicht nach zutreffen

Aussage	trifft voll und ganz zu	trifft zu	trifft mäßig zu	trifft nicht zu	trifft gar nicht zu	Kann ich nicht beurteilen
Ich würde auf einem tiermedizinischen Wiki-System Artikel lesen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich würde auf einem tiermedizinischen Wiki-System aktiv Artikel erstellen oder überarbeiten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich halte die Etablierung eines Wiki-Systems für die Tiermedizin für sinnvoll.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wiki-Systeme stellen nützliche Nachschlagewerke dar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe Zweifel an der Qualität der Informationen in einem Wiki-System.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich finde, Wiki-Systeme sollten stärker in die Lehre eingebunden werden.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beim Verfassen eigener Texte habe ich einen größeren Lernerfolg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.2 Questionnaire: Use and future of wiki systems in veterinary education? – A survey of lecturers in German-speaking countries

Wiki-Systeme in der tiermedizinischen Lehre

Sehr geehrte Dozierende, sehr geehrter Dozierender,
mit dieser Befragung wollen wir untersuchen, ob Sie Wiki-Systeme¹ in der tiermedizinischen Lehre bereits nutzen. Zudem interessiert uns, welche Vor- und Nachteile Sie sehen und ob Sie sich an einer aktiven Verbesserung der Inhalte beteiligen würden. Es handelt sich dabei um eine Umfrage der Tierklinik für Fortpflanzung der FU Berlin (www.tiergyn.de). Alle Informationen werden vertraulich behandelt und nur anonymisiert verwendet.

Vielen Dank für Ihre Mitarbeit!

Darius Kolski

Dr. Sebastian Arlt

Prof. W. Heuwieser

Persönliche Angaben

1. Ihr Alter? _____

2. Sie sind Wissenschaftlicher Mitarbeiter Professor

2. Was ist Ihr Fachgebiet? _____

3. Hochschule: _____

1. Fragen zur Onlinestellung von Materialien und zur eigenständigen Erarbeitung von Lerninhalten durch Studierende

Bitte geben Sie an, inwieweit die Aussagen Ihrer Ansicht nach zutreffen

Statement / Frage	trifft voll und ganz zu	trifft zu	trifft mäßig zu	trifft nicht zu	trifft gar nicht zu	Kann ich nicht beurteilen
Ich stelle Unterlagen zu meinen Lehrveranstaltungen regelmäßig online zur Verfügung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich nutze Learning-Management-Systeme ² (z.B. Blackboard), um meine Unterlagen online zu stellen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich halte Learning-Management-Systeme für geeignet, um lehrveranstaltungsbegleitende Unterlagen bereitzustellen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Im Rahmen meiner Lehrveranstaltungen erarbeiten Studierende eigene Texte oder Materialien (u.a. Schemazeichnungen, Bilder)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Die Bearbeitung von Texten oder Materialien (u.a. Schemazeichnungen, Bilder) erfolgt innerhalb der Lehrveranstaltungszeiten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Studierende erzielen einen höheren Lernerfolg, wenn sie eigene Texte und Materialien (u.a. Schemazeichnungen, Bilder) im Rahmen meiner Lehrveranstaltungen erarbeiten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich halte es für sinnvoll, dass von Studierenden erarbeitete Ergebnisse in nachfolgenden Lehrveranstaltungen genutzt werden können	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich halte es für sinnvoll, dass schriftliche Ergebnisse in nachfolgenden Lehrveranstaltungen durch Studierende überarbeitet werden können	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Studium der Veterinärmedizin bietet ausreichend zeitliche Freiräume, in denen Studierende eigenständig Inhalte bearbeiten können	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. **Wiki-System** = Software für Webseiten, deren Inhalte von Nutzern allein oder gemeinschaftlich erstellt, gelesen und online bearbeitet werden können

2. **Learning-Management-System** = Software zur Unterstützung von Lernprozessen und Lehrveranstaltungen mittels gemeinschaftlicher Organisation (meist in Webseiten) von Inhalten (Bereitstellung von Materialien) und Arbeitsprozessen (Organisation von Arbeitsgruppen, Online-Kommunikation etc.)

2. Fragen zur Nutzung und Akzeptanz von Wiki-Systemen in Lehrveranstaltungen

Bitte geben Sie an, inwieweit die Aussagen Ihrer Ansicht nach zutreffen

Statement / Frage	trifft voll und ganz zu	trifft zu	trifft mäßig zu	trifft nicht zu	trifft gar nicht zu	Kann ich nicht beurteilen
Ich halte die Sammlung von fachspezifischen Wiki-Artikeln für die Tiermedizin als Informationsquelle für sinnvoll	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich betrachte Wiki-Systeme als geeignetes, ergänzendes Instrument für Lehrveranstaltungen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich würde für die Erstellung von Ergebnissen durch Studierende ein tiermedizinisches Wiki-System nutzen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe Wiki-Systeme für die Erstellung von Ergebnissen durch Studierende bereits genutzt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich würde in einem tiermedizinischen Wiki-System Artikel schreiben oder korrigieren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe Zweifel an der Qualität der Informationen in Wiki-Systemen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Die Informationen in einem tiermedizinischen Wiki-System sollten vor Veröffentlichung durch Experten begutachtet werden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich würde mich an der Begutachtung von Artikeln zur Verbesserung der Artikelqualität in veterinärmedizinischen Wiki-Systemen beteiligen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Verlinken von Wiki-Artikeln kann zu einem besseren Verständnis von fächerübergreifenden Zusammenhängen führen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich sehe die Möglichkeit der Bearbeitung von Artikeln als Vorteil, um diese entsprechend dem Forschungsstand zu aktualisieren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich sehe die Möglichkeit der Bearbeitung von Artikeln als Nachteil, da falsche Informationen eingebracht werden können	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich befürworte ein geschlossenes Wiki-System, das nur von Tierärzten und Studierenden genutzt werden kann	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.3 Questionnaire: Self-evaluation of article writing and future participation by students using the wiki system vetipedia.org

Nutzung des tiermedizinischen Wiki-Systems Vetipedia im Rahmen der tiermedizinischen Lehre

Mit dieser Befragung wollen wir untersuchen, wie Studierende der Veterinärmedizin das Verfassen von Artikeln in Vetipedia empfinden, wie sie Vetipedia im Rahmen der Lehre und Prüfungsvorbereitung sehen und ob sie Vetipedia weitenutzen und dessen Inhalte verbessern werden.

Es handelt sich dabei um eine Umfrage der Tierklinik für Fortpflanzung der FU Berlin (www.tiergyn.de). Alle Informationen werden vertraulich behandelt und nur anonymisiert verwendet.

Vielen Dank für Ihre Mitarbeit!

Darius Kolski

Dr. Sebastian Arlt

Prof. W. Heuwieser

Persönliche Angaben

1. Ihr Alter? _____ Ihr Semester? _____ Ihr Geschlecht? _____

Sie haben im Rahmen des Wahlpflichtkurses „Grundlagen der Naturheilverfahren“ einen Wiki-Artikel in vetipedia.org erstellt. Wir möchten Sie bitten, folgende Aspekte einzuschätzen.

Welche Quellen haben Sie für die Informationsrecherche genutzt?

- Lehrbuch Fachartikel
 Vorlesungsmitschriften Internet
 Scripte Anderes, und zwar: _____

Wie viel Zeit hat die Erstellung des Wikis insgesamt in Anspruch genommen (Arbeit in Stunden)? _____ Stunde _____

1. Fragen zur Erstellung der Artikel in Vetipedia¹, zu kursübergreifenden Arbeiten und zur Systemnutzung zwecks Prüfungsvorbereitung

Bitte geben Sie an, inwieweit die Aussagen Ihrer Ansicht nach zutreffen

Statement / Frage	trifft voll und ganz zu	trifft zu	trifft mäßig zu	trifft nicht zu	trifft gar nicht zu	Kann ich nicht beurteilen
Ich empfand die Erstellung der Inhalte eines Artikels für Vetipedia als schwierig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich empfand die Informationsrecherche für den Artikel in Vetipedia als schwierig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich empfand die korrekte Angabe der Literaturquellen im Artikel als schwierig, da ich keine Erfahrungen im richtigen Zitieren von Quellen habe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich empfand die Verlinkung ² von Artikeln untereinander als schwierig, da ich nicht wusste, welche Wiki-Artikel sich für Verlinkungen eignen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich empfand es als schwierig, Informationen derart umzuformulieren, dass sie keinem Copyright mehr unterliegen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auch weitere, im Rahmen des Kurses von Kommilitonen erstellte Artikel in Vetipedia gelesen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich habe auch weitere Artikel, die nicht zum Kursprogramm gehören, in Vetipedia gelesen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich werde zukünftig weitere Artikel in Vetipedia lesen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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8 LIST OF PUBLICATIONS

Kolski D, Arlt S, Birk S, Heuwieser W.

Nutzung und Akzeptanz von Wiki-Systemen bei Studierenden der Tiermedizin

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Additional data

Kolski D, Heuwieser W, Arlt S.

Self-evaluation of article writing and future participation by students using the wiki system
vetipedia.org

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Oh Lord, won't you buy me a Mercedes Benz....

I know and feel, this thesis is only the beginning of a wonderful journey.

10 STATEMENT OF AUTHORSHIP

Hiermit bestätige ich, dass ich die vorliegende Arbeit selbstständig angefertigt habe. Ich versichere, dass ich ausschließlich die angegebenen Quellen und Hilfen in Anspruch genommen habe.

Berlin, den 19.01.2017

Darius Kolski