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*Article*

# Research on the Hybrid Teaching Path of AI Empowered Horse Veterinary Course

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**Simple Summary:** The introduction of AI in equine veterinary education has sparked new reform ideas. By modernizing teaching models and establishing a well-functioning system, AI-based blended learning can enhance teaching quality and learning outcomes. However, challenges arise in implementation, necessitating innovative teaching models, scientific evaluation, AI training for educators, and attention to student mental health. As AI evolves, its potential for application in this field will expand.

**Abstract:** This article aims to explore the application path and effectiveness of artificial intelligence (AI) technology in blended learning of horse veterinary courses. With the rapid development of AI technology, its application in the field of education is becoming increasingly widespread, bringing innovative opportunities for traditional teaching models. In response to the challenges of limited teaching resources and difficult practical operations in horse veterinary courses, this article proposes a hybrid teaching strategy empowered by AI. This strategy aims to enhance the teaching effectiveness and students' learning experience of the horse veterinary course by integrating and optimizing teaching resources, constructing a blended online and offline teaching mode, developing intelligent teaching assistance systems, implementing virtual simulation experimental teaching, and optimizing teaching evaluation and feedback mechanisms. Through the evaluation and analysis of the implementation effect, this paper verifies the feasibility and effectiveness of AI technology in the mixed learning of horse veterinary courses, and provides new ideas and methods for the future development of horse veterinary education.

**Keywords:** artificial intelligence technology; horse veterinary courses; hybrid teaching

## 1. Introduction

Artificial Intelligence (AI) is a comprehensive and burgeoning discipline dedicated to the research and development of theories, methods, technologies, and application systems aimed at mimicking, augmenting, and expanding human intelligence [1]. Since its formal inception by scientists like John McCarthy and Marvin Minsky in 1956, AI has undergone substantial advancements spanning over half a century, transforming into a vast interdisciplinary and cutting-edge science [2]. In the 21st century, AI technology has achieved remarkable breakthroughs and is increasingly permeating various facets of production and daily life [3], encompassing the realm of education as well. The consensus on AI's application in education is that it transcends being a mere strategic issue; rather, it is a strategic and overarching factor that influences or even dictates the high-quality evolution of education [4]. Presently, AI's applications in education primarily include personalized education ([5]-[10]), teaching evaluation and feedback ([11]-[16]), curriculum content design and optimization ([17]-[19]), educational management ([20]-[22]), as well as special and vocational education ([23]-[28]). These applications have not only bolstered teaching quality and learning efficacy but also furnished students with a more convenient and efficient learning experience. As AI technology continues to evolve and refine, its potential applications in education will undoubtedly broaden even further.

The blended teaching model, first introduced by Professor He Kekang of Beijing Normal University, integrates offline classroom instruction with online web-based teaching as a comprehensive educational approach [29]. By harnessing technologies like "Internet+" and "5G+," it seamlessly blends online and offline teaching, positioning students as the "center" and teachers as "facilitators." This model transforms the traditional classroom into a "dual platform" encompassing an online resource learning and interaction hub and an offline classroom teaching environment. It capitalizes on the abundance of online resources and the benefits of offline practice to offer students more adaptable and varied learning avenues. Specifically, there are seven primary types:

(1) Online Teaching Combined with Offline Courses: Teaching predominantly occurs on an online platform, augmented by periodic offline sessions. This method allows students to access learning materials anytime, anywhere, while offline courses facilitate face-to-face communication and mentorship ([30]-[35]).

(2) Offline-Dominant with Online Supplementation: Offline learning is the cornerstone, with online learning and webinars serving as supplementary tools. This approach suits disciplines demanding substantial hands-on practice, such as experimental sciences and arts ([36]-[42]).

(3) Dual-Teacher Model: Online teachers deliver live lessons from various locations, while offline teachers handle assistance and question-answering. This model leverages the expertise of online teachers while ensuring real-time engagement and personalized guidance for offline students ([43]-[47]).

(4) Flexible Learning: Students primarily learn online, with teachers offering personalized support, either offline or online, to those in need. This method is ideal for students with robust self-learning capabilities [48].

(5) Rotational Learning: Students cyclically alternate between offline learning and online tutoring modes. This model adapts teaching strategies based on students' learning progress and requirements ([49]-[50]).

(6) Self-Directed Learning: Students autonomously engage in online courses as a complement to traditional offline learning. This approach fosters students' interest in self-directed learning and enhances learning efficiency ([51]-[52]).

(7) Personalized Learning: Teachers provide offline tutoring opportunities at any time and place, addressing gaps in classroom and online learning as necessary. This model offers tailored teaching support that accommodates individual student differences ([53]-[54]).

The Equine Veterinary Medicine course, which functions as a cornerstone for the Equitation Sports and Management program at Wuhan Business University, is inherently practical and ideally positioned for the adoption of a blended teaching approach. Nevertheless, it encounters hurdles, including severely constrained teaching resources and the hazards and complexities involved in hands-on activities. In response to these challenges, this paper delves into the avenues for applying artificial intelligence technology within the blended learning context of the Equine Veterinary Medicine course, with the objective of augmenting teaching efficacy and enhancing students' learning journey.

## 2. Analysis of Current Teaching Situation of Horse Veterinary Course

Equine Veterinary Courses form a cornerstone of the talent development program for the Equitation Sports and Management major, encompassing a range of fundamental subjects such as "Fundamentals of Equine Anatomy and Physiology," "Equine Nutrition," "Prevention and Management of Common Equine Diseases," "Equine Care," and "Principles of Equine Diagnosis." These courses are characterized by their rich theoretical content and strong practical emphasis, playing a pivotal role in maintaining the health and enhancing the athletic performance of sport horses. However, the current teaching of Equine Veterinary Courses encounters several challenges, including outdated teaching methods, incomplete curriculum coverage, and limited student engagement.

## 2.1. *Single Teaching Method*

Currently, the most pressing issue in the instruction of the horse veterinary course is one that directly influences students' interest and learning effectiveness. Specifically, this issue manifests in the following ways:

### 2.1.1. Lecture-Based Teaching

The Traditional Lecture-Based Teaching method continues to be the primary approach in Equine Veterinary Courses [55]. In this method, the teacher is at the center, with students passively receiving knowledge, resulting in a lack of initiative and interactivity that significantly impacts students' learning interest.

### 2.1.2. Lack of Case-Based Teaching

Case-based teaching is an effective method that facilitates the integration of theoretical knowledge with practical application. However, due to the niche nature of equine veterinary medicine within the veterinary field and the scarcity of clinical cases, current Equine Veterinary Courses suffer from an inadequacy of case-based teaching. Consequently, students find it challenging to apply their acquired knowledge to real-life scenarios, which directly impacts their learning outcomes.

### 2.1.3. Insufficient Practical Teaching Resources

Practical teaching is a vital component of Equine Veterinary Courses, playing a pivotal role in students' mastery of skills. However, due to the underdevelopment of the horse industry in China and the highly uneven distribution of horses, practical teaching resources for horses in inland areas, such as Wuhan, are relatively scarce. The lack of resources, including experimental equipment, practical training bases, and horse disease models, hampers the cultivation of students' practical abilities and innovative capabilities in equine veterinary medicine in these regions.

## 2.2. *Imperfect Teaching Content*

### 2.2.1. Older Content in Equine Veterinary Courses

Equine Veterinary Courses suffer from a lack of dedicated textbooks and are only partially integrated within the broader veterinary curriculum. These sections have remained largely unchanged for an extended period, leading to a disconnection between the teaching content and the current practical needs of the equine veterinary industry. Consequently, some recent diagnostic methods, treatment technologies, and preventive strategies in equine veterinary medicine have not been promptly integrated into the teaching system.

### 2.2.2. Disconnection Between Theory and Practice in Equine Veterinary Courses

While the curriculum of Equine Veterinary Courses encompasses both theoretical knowledge and practical operations, the linkage between the two is insufficient. The theoretical content is frequently too abstract, devoid of concrete case support, and the practical exercises, due to factors such as the scarcity of equine cases, tend to be cursory, lacking opportunities for deep exploration and real-world application.

### 2.2.3. Lack of Interdisciplinary Content in Equine Veterinary Courses

The teaching content of Equine Veterinary Courses tends to be somewhat monotonous, lacking integration with interdisciplinary topics such as animal nutrition, feeding management, and genetics. This restricts students' ability to gain a comprehensive and profound understanding of equine health and diseases.

### *2.3. Student Participation Is Not High*

#### *2.3.1. Lack of Student Interest in Equine Veterinary Courses*

Factors such as incomplete teaching content and monotonous teaching methods contribute to a low level of interest in Equine Veterinary Courses among students. Consequently, some students even develop a dislike for the subject, which adversely impacts their learning outcomes.

#### *2.3.2. Lack of Active Learning Awareness in Equine Veterinary Courses*

The traditional lecture-based teaching method that dominates Equine Veterinary Courses often results in students lacking the initiative for active learning. They become accustomed to passively receiving knowledge rather than actively exploring and identifying problems.

#### *2.3.3. Weak Practical Operation Skills in Equine Veterinary Courses*

Due to inadequate practical teaching resources, such as a scarcity of equine cases, and a lack of hands-on opportunities, students develop relatively weak practical operation skills. They frequently struggle to apply their acquired knowledge in clinical equine veterinary situations, thereby affecting their employability and competitiveness in the field.

## **3. Hybrid Teaching Path of Horse Veterinary Course Based on Artificial Intelligence**

### *3.1. Selection and Application of Information Platform*

Considering the popularity and convenience among various information platforms, WeChat interaction groups, QQ groups, Rain Classroom, and the Chaoxing Network Teaching Platform have been chosen as the primary online platforms to support teaching. These platforms facilitate online teaching activities such as attendance tracking, in-class exercises, post-class quizzes, discussion and Q&A sessions, and group assignments. These activities are designed to capture students' interest, spark their learning motivation, and enhance their focus.

### *3.2. Transformation and Upgrading of Offline Teaching Mode*

With a focus on the characteristics and principles of the blended teaching model, it is crucial to harmonize online and offline educational resources and identify their synergies to achieve a combined effect of  $1+1\geq 2$ . Based on the online teaching dynamics, it is important to monitor and adapt offline teaching methods in order to promptly address the constraints that hinder the enhancement of teaching effectiveness. Attention should be given to the crucial assessment indicators of students' practical skills in Equine Veterinary Courses, with heightened guidance and support provided for their hands-on training. Improvements should be made to the practical training and experimental environment to effectively bolster students' operational abilities.

### *3.3. Establishment and operation of model system*

#### *3.3.1. Reconstruction and Planning of Course Content and Teaching Design According to the Characteristics of Mixed Teaching Mode*

Instructional design serves as the cornerstone of teaching quality. By integrating the hierarchical knowledge points of Equine Veterinary Courses, we should meticulously plan and organize both online and offline teaching arrangements, and harness artificial intelligence technology to develop premium online teaching resources. These resources encompass guided learning plans for chapter previews, videos and PPTs for key knowledge points, chapter quizzes, as well as supplementary materials for course learning and knowledge expansion, such as exercise banks, test banks, explanations of difficult and key concepts, resource packages, special lectures, experimental and



practical case studies, and curriculum-integrated ideological and political content. For instance, in the creation of knowledge point videos, AI tools like "ERNIE Bot" can be initially utilized to generate explanatory scripts, followed by the AI-powered "Dujia Creation Tool" to produce videos based on these scripts, with the entire process automated by AI [56].

### 3.3.2. Constructing Hybrid Teaching Process Based on Artificial Intelligence

#### 1. Sorting out knowledge points and determining network class hours

Integrate logically related knowledge points across the chapters of Equine Veterinary Courses, transcending their traditional boundaries. Clearly delineate between those knowledge points primarily instructed by the teacher and those intended for student self-study, and allocate online study hours accordingly, based on the difficulty level and volume of the self-learning content.

#### 2. Compiling teaching objectives and evaluation methods

Formulate teaching objectives for the knowledge points within the Equine Veterinary Courses, clarifying the categories of knowledge and the necessary requirements for the cognitive processes. Subsequently, devise assessment methods that align with these knowledge categories and cognitive process requirements to verify whether students have met the teaching objectives.

#### 3. Draw up teaching strategies and arrange teaching activities

Choose appropriate instructional media and teaching methods, and devise suitable teaching strategies accordingly. Organize the sequence of classroom teaching activities with a focus on integrating online and classroom instruction. The specific implementation steps are as follows: Firstly, students are tasked with independently completing online learning of knowledge videos. Secondly, in-class quizzes are conducted to evaluate the effectiveness of their online learning. Thirdly, through group collaboration, students prepare and present on the corresponding knowledge points in class, followed by peer evaluations, discussions, and scoring to further enhance their learning outcomes. Lastly, homework assignments related to the knowledge points are assigned to consolidate their learning achievements.

#### 4. Implement teaching and feedback adjustment

During the implementation of Equine Veterinary Courses, fully utilize the advantages of intelligent teaching platforms like Chaoxing and Rain Classroom to facilitate students' online self-directed learning and offline practical operations. By gathering and analyzing students' learning data, promptly adjust teaching strategies and activities to cater to their individual needs.

### 3.3.3. Establish Intelligent Evaluation and Feedback Mechanism

The hybrid teaching mode of Equine Veterinary Courses encompasses a diverse range of teaching activities that span before, during, and after class. Consequently, the intelligent assessment and feedback mechanism for these courses should emphasize students' knowledge accumulation and practical application abilities throughout their continuous learning journey. In this hybrid mode, it is imperative not only to conduct objective assessments and provide feedback but also to prioritize process assessments and feedback, ensuring student engagement throughout the entire learning process. To foster student enthusiasm and emphasize process evaluations, specific reforms have been implemented in the assessment score ratio of Equine Veterinary Courses. The proportion of final exam scores has been reduced to 50%, while the proportion of regular achievement scores has been increased to 50%. The regular achievement scores comprise the following components:

1. Class Participation (15%): This category encompasses classroom speeches, group discussions, and presentations, aimed at encouraging active class interactions and enhancing students' thinking and expression skills.
2. Regular Assignments (10%): Through a variety of assignments, we evaluate students' understanding and mastery of key concepts, fostering their practical and innovative abilities.

3. Interim Tests (10%): Throughout the semester, several interim tests are scheduled to promptly assess students' learning progress and identify any issues, allowing for targeted tutoring and adjustments to the teaching plan.
4. Online Video Learning (10%): Prior to class, students are required to watch specified online videos that cover course material and related background information.
5. Attendance (5%): Attendance is tracked using the Chaoxing Learning Platform to ensure timely class participation. It is included as part of the process assessment and contributes to the final grade.

By leveraging artificial intelligence technology, we analyze and evaluate students' learning data, encompassing homework completion status, exam scores, online learning duration, and other pertinent information. Based on these evaluations, teachers can offer tailored learning suggestions and resources to students, assisting them in refining their learning techniques and enhancing their academic achievements. Moreover, through an effective feedback mechanism, students are motivated to actively engage in the learning process, thereby boosting their motivation and level of involvement.

## **4. Application challenges and Countermeasures of Artificial Intelligence in Hybrid Teaching of Horse Veterinary Course**

### *4.1. Application Challenges*

#### **4.1.1. Challenges of Teaching Mode Transformation**

For a considerable period, Equine Veterinary Courses have adhered to a relatively established traditional teaching mode. Upon introducing AI technology, it becomes necessary to overcome this inertia and embark on exploring novel teaching modes and methodologies, a process that may necessitate time and effort. Additionally, in a blended learning setting, effectively merging AI technology with traditional teaching modes to forge a teaching approach that not only resonates with the unique attributes of Equine Veterinary Courses but also ignites students' enthusiasm presents a formidable challenge.

#### **4.1.2. Challenges of Teaching Evaluation and Feedback**

After integrating AI technology, it is imperative to establish new teaching evaluation criteria that holistically and objectively assess students' learning outcomes and teachers' instructional quality. This endeavor necessitates crafting scientific and reasonable evaluation standards that take into account the unique attributes of AI technology and the specialized nature of Equine Veterinary Courses. In a blended learning environment, where students often leverage online platforms for learning, teachers must establish an efficient feedback mechanism to promptly comprehend students' learning progress and any challenges they face. Simultaneously, students should provide feedback on teachers' teaching content and methods, enabling teachers to swiftly adjust their instructional strategies accordingly.

#### **4.1.3. Challenges of Teacher Training and Development**

After introducing AI technology, teachers must possess the requisite technical literacy and application skills. To achieve this, systematic training is necessary to bolster their proficiency and ability in utilizing AI technology. Furthermore, given the continuous evolution of AI technology, teachers must keep their knowledge and skills up-to-date to adapt to emerging teaching environments and requirements. This necessitates teachers to possess the capacity for continuous learning and self-improvement, enabling them to effectively address the challenges associated with professional growth.

#### 4.1.4. Challenges of Students' Psychological and Emotional

Following the introduction of AI technology, students encounter a greater volume of learning content and tasks, subsequently experiencing heightened academic pressure. It is imperative to monitor students' mental health status and offer necessary psychological support and counseling. Additionally, in a blended learning environment, students miss out on face-to-face interactions with teachers and peers, leading to a scarcity of emotional exchanges. Therefore, it is essential to establish effective emotional communication channels through online platforms or alternative means, fostering a stronger sense of belonging and collective pride among students.

#### 4.2. Countermeasure

##### 4.2.1. Innovative Teaching Mode

Taking into account the unique characteristics of equine veterinary courses, we should delve into the integration of blended learning and AI technology to explore innovative teaching models tailored for these courses. This involves researching and constructing new teaching models, such as the O2O (Online to Offline) blended learning model for equine veterinary courses, which is grounded in the Outcome-Based Education (OBE) philosophy. When implementing these new teaching models, a phased approach should be adopted to gradually integrate AI technology into equine veterinary courses, thereby avoiding a disruptive shift from traditional teaching models. Throughout this transition process, it is crucial to closely monitor students' learning feedback and teaching effectiveness, making prompt adjustments to teaching strategies as necessary.

##### 4.2.2. Making Scientific and Reasonable Teaching Evaluation and Feedback Mechanism

By integrating the unique characteristics of equine veterinary courses with the advantages of AI technology, comprehensive and objective evaluation standards should be established. The emphasis should be on enhancing the process evaluation of students' learning. By increasing the weight of process evaluation scores within the overall assessment framework, students can be encouraged to appreciate the value of the learning process, actively engage in classroom interactions and presentations, and cultivate habits of autonomous and lifelong learning. Meanwhile, leveraging technological tools such as online learning platforms, real-time and convenient feedback channels should be established. Students are encouraged to actively share their learning progress and challenges, while teachers should promptly provide guidance and support. Utilizing big data and AI technology, in-depth mining and analysis of students' learning data should be conducted. Through data visualization and other techniques, students' learning progress and achievements can be displayed intuitively, providing teachers with targeted teaching recommendations.

##### 4.2.3. Strengthen AI Training for Teachers

Arrange for teachers to participate in training programs focused on AI technology and blended learning to boost their AI literacy and application skills. Engage industry experts and educational scholars to offer guidance and support to teachers on AI skills, assisting them in resolving practical AI-related teaching challenges. Provide teachers with essential AI learning resources and support to help them continually enhance their AI literacy and teaching proficiency. Establish an AI exchange platform for teachers to facilitate the sharing of AI experiences and collaboration. By organizing events such as AI teaching competitions and seminars, ignite teachers' passion for AI teaching and foster their innovative capabilities in this field.

##### 4.2.4. Pay attention to Students' Mental Health and Emotional Communication

Regularly conduct mental health surveys and assessments among students to promptly identify and address their psychological concerns. Utilize technological tools, such as online learning platforms, to establish emotional communication channels between teachers and students. Leverage



AI technologies, including natural language processing and emotional analysis, to monitor in real-time the communication content of students on these platforms and identify their emotional states. By analyzing students' language patterns, word choices, and other indicators, AI can ascertain whether their emotions are positive, negative, or neutral, thereby providing timely emotional support to help alleviate learning pressure and adjust their mindset.

## 5. Conclusions

Due to the swift advancements in network and big data technologies, online teaching platforms have undergone continuous functional enhancements, creating an ideal moment to introduce blended online and offline teaching in equine veterinary courses[57]. The introduction of artificial intelligence (AI) technology in education has sparked fresh ideas and approaches for reforming the teaching of equine veterinary courses. By selecting appropriate information platforms, modernizing offline teaching models, and establishing a well-functioning system of models, the creation of an AI-based blended learning pathway for equine veterinary courses can significantly enhance the quality of teaching and improve learning outcomes. However, during the implementation process, challenges emerge in various areas, such as transitioning teaching models, developing teaching evaluation and feedback systems, advancing teacher training and professional growth, and addressing student psychology and emotions. To ensure the successful integration of AI technology in blended learning for equine veterinary courses, it is necessary to adopt innovative teaching models, create scientific and reasonable evaluation and feedback mechanisms, intensify AI training for educators, and prioritize student mental health and emotional well-being. As AI technology continues to evolve and advance, its potential for application in blended learning for equine veterinary courses will undoubtedly expand in the future. Certainly, the challenge of effectively implementing a hybrid teaching approach that seamlessly integrates online and offline methodologies, and achieving an organic blend of both classroom environments, necessitates ongoing exploration and resolution within future educational endeavors[58].

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