



# Research on Teaching Reform of Intelligent Transportation Systems Based on Internet Learning

**Wei Dan<sup>1</sup>, Wang Xiaolan<sup>2</sup>, Ren Hongjuan<sup>3</sup>**

<sup>1,2,3</sup>Shanghai University of Engineering Science, Shanghai, China

**Abstract:** *The network learning education teaching method is widely used in the new era. It is a new method of teacher teaching, new technology, and a new idea of school teaching management, and it is an important teaching tool for schools to organize online learning. Network learning has the characteristics of high technology value, high integration, high sharing, and high personalization. Network teaching has unique advantages and promotes the new development direction of education. At the same time, because of its shortcomings, network teaching can not fully replace traditional teaching. This paper aims at the problems existing in intelligent transportation courses, combined with the advantages of network learning, to explore the reform of teaching methods and means to improve the efficiency and quality of education and teaching and enhance students' interest in learning.*

**Keywords:** *network learning; teaching methods; intelligent transportation system.*

## I. Introduction

With the rapid development of Intelligent Transportation Systems (ITS) in recent years, it has become increasingly essential to reform the teaching methods of ITS to keep up with the latest development trends. The integration of the internet and learning approach into the teaching reform of ITS can provide an effective way to improve student's learning outcomes and promote the development of ITS. In this research, we explore the existing issues in the teaching of ITS and propose Internet-based teaching methods to reform the education of ITS.

### 1.1 Characteristics of Online Learning

The so-called network learning refers to a kind of learning activity carried out through the computer network, which mainly adopts the way of autonomous learning and negotiates learning. Compared with traditional learning activities, network learning has three characteristics: First, it shares rich network learning resources. Second, individual independent learning and collaborative learning are the primary forms. Third, it breaks through the limitation of time and space of traditional learning. In the 10-year Development Plan for Education Informatization of the Ministry of Education of China from 2011 to 2020, the construction of "broadband network communication between school and school, high-quality resource communication between class and class, and network learning space for everyone" is regarded as the development focus of education informatization in China in the next ten years. It can be seen that network learning occupies an essential position in information education and teaching (Cai Y. F., Wang H., &Chen X. B., 2015, Wei D., 2019)

E-learning refers to learning or teaching through online platforms or tools. Here are some features of e-learning:

1. Flexibility: Online learning is flexible. Learners can learn according to their learning progress, time and place, which makes learning more free.
2. Convenience: Online learning is free from regional restrictions and can be carried out anytime and anywhere. At home, coffee shops public libraries, etc., it eliminates the time

and space restrictions in traditional education and improves the efficiency and convenience of learning.

3. Interactive: Online learning can set up online discussions, tasks and other interactive activities to help learners better understand the course content, interact with teachers and classmates, and enhance students' learning enthusiasm.
4. Synchronicity: Learners can receive the latest course and resource information synchronously through the network learning platform so that students can instantly grasp the newest knowledge and skills.
5. Self-adaptability: Online learning can provide personalized learning plans and feedback according to students and adjust and improve according to students' learning effects.
6. Diversity: Online learning can adopt various teaching forms, textbooks and methods, so students can learn more diversified and choose their courses.
7. Innovation: Online learning can provide the latest technological support, including virtual experiments, simulations, games, etc., to enhance learners' innovative thinking and practical operation ability.

Online learning can realize the characteristics of flexibility, interactivity and self-adaptability by using modern technological means, advocate students' independent development, and make learning more efficient and personalized.

## **1.2 The Advantages of Online Learning**

The independent and inquiry-oriented learning of students under the network background makes their knowledge incomparable advantages over traditional knowledge. First, when the student is faced with the computer, the first feeling he has is: I am going to use it to study, I must do it by myself. This is actually to encourage students to establish their own main position in the learning process. Second, students can avoid the limitation of time and space in traditional teaching mode. Third, the network environment is the liberation of time and space for students. The loose learning atmosphere can enable students to give full play to their intelligence and wisdom. They can inspire each other, cooperate and communicate in learning activities, and learn to speak and cooperate. Fourthly, learning under the background of a network is a multi-directional information exchange activity. Students can compare different learning resources, pool their wisdom, learn from each other, deeply understand and digest what they have learned, and contribute to the meaning construction of new knowledge. E-learning has many applications, such as in this paper (Rina E., &Risnovita S., 2022, Rabiah A., &Evi E., 2022).

## **1.3 Disadvantages of Network Learning**

Network learning has some disadvantages, which need to be noticed and solved. The following are some significant aspects: 1. Lack of face-to-face communication and feedback: the interaction of e-learning is mainly based on virtual Settings, which makes it challenging to achieve face-to-face communication and feedback. Students may feel isolated and unsupported. 2. Raise the threshold: Independent learning methods such as online learning require learners to have relatively high autonomous ability, which often requires learners to have sufficient self-learning ability and self-management ability for the subject field they are learning. For beginners or those who lack the self-learning ability of students, the learning threshold will be relatively high. 3. High-quality streaming media technology and equipment are required: network learning requires relatively high requirements on network bandwidth, hardware equipment, software platform and teaching resources, and needs to ensure stable computer hardware performance, easy software operation, and stable network. 4. Lack of practice and hands-on experience: Online learning focuses on theoretical learning, while some

subject areas require practice and hands-on experience. Such as experiments, field trips, exercises, etc., online learning may need more opportunities. 5. Unclear course objectives: the teaching objectives of online courses need to be unified, the teaching materials need to be completed, the teaching resources need to be more sufficient, and the management needs to be humanized. In network learning, students tend to ignore the logical sequence of subjects due to their increased autonomy. 6. Low motivation of students: In learning by themselves, learners need to be self-motivated. However, many learners lack motivation and motivation, and it is difficult to maintain continuous interest in learning. Some online courses often have no teacher guidance and rely 100 percent on students to learn independently. With proper teacher guidance, students are more likely to succeed or learn. It should be pointed out that network learning, as a new way of learning, needs to be constantly perfected and improved to solve some difficulties and problems to give full play to the advantage effect and better serve students' learning.

## **II. Review of Literature**

### **2.1 Current Situation of Intelligent Transportation System Courses**

Intelligent Transportation System is an interdisciplinary course involving sensors, communication, computer, control and other disciplines. To engage in the work of intelligent transportation system needs to have multiple professional knowledge, for the compound professional talents. Many domestic colleges and universities in transportation, vehicle engineering, and other majors have opened the course of intelligent transportation systems. Some colleges and universities even set up majors to learn knowledge and technology related to intelligent transportation to play an active role in cultivating urgently needed composite senior talents related to intelligent transportation systems (Li Y., & Zhang S. Y., 2018). The teaching methods of domestic colleges and universities offering intelligent transportation system courses are the same. At present, the teaching content and teaching methods of intelligent transportation system courses mainly have the following two problems (Wang X. Y., Ge W. Q., Liu L. P., Yu C. C., & Zhao J. B., 2016).

### **2.2 The Teaching Content of the Textbook Is Broad and Cannot Cover the Latest Knowledge Related To Intelligent Transportation**

The main content of the intelligent transportation system course includes the concept, origin, development course, system framework, basic theory, critical technology, structural framework, working principle, and primary function of the representative service subsystem. It involves many subjects, a wide range of content concerning all aspects of the field of transportation, intelligent transportation system-related introduction technology update fast, and the need for network learning as an auxiliary teaching means (E W. J., Xiao W. Z., Wu G., Wang Z. Q., 2017).

### **2.3 The Teaching Method Is Simple and Old-Fashioned**

The teaching is based on systematic teaching by teachers, that is, teachers prepare lessons in advance, make courseware, and prioritize PPT presentations in class to transfer rich knowledge of intelligent transportation systems to students in a relatively short time. The main problem is that the teaching methods need to be revised, which cannot arouse students' learning enthusiasm. Therefore, teachers should pay attention to interactive teaching and add the latest cases that can attract students' interest in classroom teaching. Classroom teaching and extracurricular learning should be combined to strengthen interactive practical teaching to arouse students' learning enthusiasm.

### III. Research Method

The application of e-learning to the teaching of intelligent transportation systems is a necessary research. We mainly put forward the following suggestions.

#### **3.1 Classroom Teaching Combined With Network Teaching, Based On Theoretical Teaching, Network Teaching Ability**

Classroom teaching is the most direct, traditional, and effective way of teaching. Students can understand and digest this theoretical knowledge through the teacher's explanation in class and transform it into their reserved knowledge. However, traditional classroom teaching has many drawbacks. For example, the teacher is the faithful implementor of the textbook. What is written in the textbook is what the teacher says. Many teachers regard teaching materials as the golden rule and dare not cross the line. They regard teaching materials without omission and without offside as the purpose of classroom teaching so that teaching materials become shackles of students' free creation and bold innovation. With a single teaching method, the teaching process is like a cup of tasteless water. The view is not to make people clap the case and cheer for it but to let people feel dull and bland. For a long time, our education only emphasized the training and cultivating memory and thinking. Still, we do not realize that the learning process is not only a cognitive process but also emotional. "Emphasis on result rather than process" is a very prominent problem in traditional classroom teaching, but also a very obvious teaching malpractice. The intelligent transportation system is the course of realizing smart traffic, which is an interdisciplinary subject. Classroom teaching alone can not achieve an ideal effect.

At present, it is the era of rapid development of the Internet. The "Internet plus" model has become the business model of many industries and the development direction of the future economic model. In the cause of education, the Internet is gradually coming to every student, such as New Oriental Education and various online training courses. Students can learn what they want to know without stepping into a classroom. As the post-00s begin to enter the university campus, their interest in and understanding of the Internet is beyond the imagination of teachers. To better improve students' learning interest and efficiency, it is necessary and inevitable to combine online teaching with classroom teaching to form "Internet + teaching". Before learning the theoretical knowledge, questions are introduced by watching the network video, and the questions are presented as a visual display. While watching the video, students can ask questions in real-time. The places in question are sent to the video broadcast in bullet screen, which not only enables students to think about the reasons for the questions but also improves their interest. Then, the teacher explained the theoretical knowledge, combined with the real-time questions raised by the students for in-depth analysis of the knowledge points, so that the teacher can also understand the students who do not know where the point is to achieve better results. Network teaching, combined with classroom teaching, has its primary purpose of activating classroom teaching, and learning a mutual combination, mutual penetration, teachers and students mutual inspiration, mutual promotion, and finally achieving the purpose of students independent learning. The key to implementing this teaching method is that teachers need to prepare a subject and an interesting video before class. Classroom teaching accurately grasps the opportunity and duration of bullet screen mutual learning (Xie, K. 2011).

### **3.2 The Combination of Network Teaching and Extracurricular Learning Can Strengthen the Classroom Learning Effect**

As the ancients said, "Although scholars have learned, their behavior is nothing." The knowledge learned in class is limited. The knowledge learned in practice is infinite. Students' interest in learning is crucial for teaching (Daliati, G. L.2019).To make students not satisfied with the book knowledge, to study further and grasp the books do not have things. Therefore, extracurricular study is significant. After class, the teacher assigned some tasks to the students. Instead of asking the students to complete the assignments after class, the teacher divided two people into task groups and asked them to learn relevant knowledge on the Internet. In addition, each group member is required to put forward one or two questions for each group member to answer based on the knowledge taught in class. This approach has two main advantages: 1) In the process of raising questions, each student will think about what kind of questions, and once students have considered, they will review the classroom content and watch some online teaching videos. To achieve the purpose of teaching. 2) To complete the question, the student must complete the same work as the person who created the question. In this way, the effect of four learning. At the same time, we have established friendly cooperative relations with outstanding enterprises in the intelligent transportation industry, so that we can learn about the application of cases in the actual work of enterprises. Moreover, for the juniors and seniors studying this course, we can establish industry-university cooperative relations with enterprises so that students can acquire practical knowledge in the internship or cooperation with intelligent transportation enterprises.

### **3.3 In View of the Shortcomings of Network Teaching, Strengthen Communication, Optimize Courses, Strengthen Equipment Support, and Strengthen Management Efficiency and Student Participation**

Strengthen interactive communication: online discussion groups, groups and other means to promote students' interactive communication. At the same time, teachers can provide in-depth feedback about the course, understand students' learning progress and mastery, and timely provide targeted guidance and incentives (Hake, R. R., 2020). 2) Optimize course design: rationally plan the teaching process of online learning, increase the value of courses and students by introducing more interactive methods and practical links, and improve the teaching content and methods. 3) Strengthen equipment and technical support: Provide students with more stable and reliable network equipment and related software, ensure the stable operation of network teaching, and provide professional technical support. 4) Strengthen management efficiency: increase the use of courses, manage and allocate energy, innovate teaching methods in a planned way, and improve user experience and course effect. At the same time, to better solve the problem of low motivation of students, the scientific application of teaching and education big data, mining user learning information, development of evaluation of data evaluation mechanism, improve students' learning enthusiasm. 5) Strengthen student participation: Students see that their interactive learning behaviors contribute to teaching quality, which can strengthen students' participation and learning interest, better adjust students' attention, resolutely complete learning tasks, and play a positive role in promoting their personal development. The key to optimizing online teaching is to continuously enhance the awareness of teachers and students, enrich the network environment and communication methods, expand practical opportunities and design customized courses.

### **3.4 Some Ways to Apply E-Learning to the Course Teaching of ITS**

Develop an online course platform: Develop an online platform to host the online ITS course, creating a space for students to access the course materials and assignments, as well as

participate in group discussions and interactive online activities. The platform should be easy to navigate, user-friendly, and incorporate multimedia elements.

Use multimedia instructional materials: Incorporate multimedia elements, including videos, animations, and audio to enhance the students' learning experience. Multimedia elements make the learning process experiential, interactive, and promotes the retention of learned material.

Online webinars: Host live webinars or online meetings where students can interact with the instructor and classmates. These webinars aim to clarify misunderstandings, answer questions, and provide additional guidance related to the course content.

Provide immediate feedback: E-learning allows for the provision of immediate feedback, which is essential to keep students engaged and motivated. It allows for quick assessment of student understanding and provides personalized learning plans to guide students' studies. Self-paced learning is ideal for students who have tight schedules or who are busy with work or other personal commitments. In conclusion, applying e-learning to the course teaching of ITS will enhance the learning experience for students, providing a flexible learning environment that encourages students to develop practical skills and promotes academic achievement.

We conducted a survey to evaluate the effectiveness of our proposed internet-based teaching methods. Our results show that, compared with the traditional teaching methods, the internet-based teaching approach improves student engagement and learning outcomes in ITS courses. The surveyed students generally agreed that the Internet-based teaching method enhanced their interest and understanding of ITS, was interactive and lively, and promoted their practical ability in ITS.

#### **IV. Conclusion**

The course on intelligent transportation systems is multidisciplinary. There are some problems in teaching, such as broad teaching content, outdated teaching methods and stereotypes. This paper discusses the reform methods of teaching methods of this course. In teaching methods, it puts forward the combination of classroom teaching with network teaching, based on theoretical teaching, network teaching improves ability, and "Internet + teaching" mode enters the classroom, which makes the teaching more interesting, more diversified and more efficient. The combination of network teaching and extracurricular learning can strengthen the classroom learning effect, let students actively participate in the course, and cultivate students' interest in the study. Students should make reasonable use of the Internet, let the Internet really help students learn, improve their practical ability, achieve the course assessment process, and cultivate students' ability to analyze and solve problems independently in academic research. Only students can truly understand intelligent transportation and achieve the expected teaching effect.

## References

- Cai Y. F., Wang H., &Chen X. B.(2015), Reform and Thinking on the Teaching of "Intelligent Transportation System" Course. *The Science Education Article Cultures*, 17, 58-59.
- Wei D.(2019). Research on Intelligent transportation system course reform about vehicles related major. *International Journal of Innovation Education and Research*,7(2).
- Li Y., &Zhang S. Y.(2018). Research on Teaching Methods of Intelligent Transportation under the environment of "Internet+Transportation". *Education and Teaching Forum*, (39): 187-188.
- Wang X. Y., Ge W. Q., Liu L. P., Yu C. C., &Zhao J. B.(2016). Research on Teaching Reform of the Intelligent Transportation Systems Course. *Education Modernization*, (09), 14-16.
- E W. J., Xiao W. Z., Wu G., &Wang Z. Q.(2017). Discussion on the Teaching Reform of Intelligent Transportation System. *The Guide of Science & Education*, 2017, 03, 123-124.
- Xie, K. (2011). On the concept of information technology based on course reform”, *International Conference on Electrical and Control Engineering*. 6675-6677.
- Daliati, G. L.(2019). The Increase of Student Learning Interest through the Application of Recitation Methods Assisted by Cyber Counseling Media. *Budapest International Research and Critics in Linguistics and Education*. 2(3), 448-453.
- Rina E., &Risnovita S.(2022). Development of Moodle-Based E-Learning on the Website for German Reading Skills A2. *Britain International of Linguistics, Arts and Education Sciences Journal*. 4(3), 311-317.
- Hake, R. R. (2020). Interactive-Engagement Vs Traditional Methods: A Six-Thousand Student Survey Of Mechanics Test Data For Introductory Physics Courses. [online].Tersedia: <http://www.physics.indiana.edu/~sdi/ajpv3i.pdf>. [25October2022]
- Rabiah A., Evi E.(2022). Development of Articulate Storyline Learning Media to Improve the Writing Ability of French Students. *Britain International of Linguistics, Arts and Education Sciences Journal*. 4(3), 251-257.