Research on Information-based Teaching and its Influence on Future Education under the Background of Epidemic Situation

Wanhong Peng
Audio Visual Education Center
Tibet Autonomous Region
Tibet Autonomous Region
pengwanhong@126.com

Xiaoniu Li
School of Computer and Information
Engineering
Henan Normal University
Xinxiang, China
1242177578@qq.com

Lilin Fan
School of Computer and Information
Engineering
Henan Normal University
Xinxiang , China
344375151@qq.com

Abstract—**Affected by the COVID-19 epidemic in 2020, the traditional teaching mode is going to be broken, while "Internet + Education" is becoming a hot topic again. Presently, the traditional teaching mode has some new challenges such as virtualization of teaching environment, mediatization of teaching content, fragmentation of teaching resources and diversification of teaching methods. Aiming at solving these challenges, this paper first analyzes the characteristics of information-based teaching under the epidemic situation in detail. Furthermore, this paper discusses the solution of integrating information techniques with teaching in combining the advantages of "Internet + Education" and traditional classroom teaching. This research is expected to provide good opportunities and new direction for future education development.**

Keywords—Information-based teaching, Teaching environment, Teaching methods, Teaching resources, Blended teaching

I. INTRODUCTION

In the spring of 2020, the sudden outbreak of COVID-19 pneumonia not only disrupted the peaceful pace of life, but also changed the normal teaching order on the campus. Most of schools across our country are actively responding to the call for "Do not stop teaching and learning during the suspension period". Artificial intelligence, big data, cloud computing and other information technology have been fully utilized to carry out online teaching in "Internet + Education" mode. At present, the environment, contents, resources and methods of teaching have all changed. Through actively exploring the current information-based teaching mode, the teaching quality as well as disease prevention and control can both guaranteed.

II. ANALYSIS OF THE CHARACTERISTICS OF INFORMATION-BASED TEACHING UNDER THE EPIDEMIC SITUATION

In the context of the COVID-19 epidemic, the characteristics of information-based teaching such as teaching environment, teaching content, teaching resources, and teaching methods need to be analyzed in detail, while will provide a solid foundation for the development of the future education.

A. Virtualization of teaching environment

Traditional teaching environment is school. As the epidemic spreads, the face-to-face teaching mode based on classroom is forced to change. The new teaching environment is no longer limited to a fixed time and space, but to create a kind of virtual learning space by breaking through the limitation of time and space.

1) Educational ecosystem in virtual environment

In the background of the epidemic, "Internet + Education " has become a normal state of teaching. This change is not only for teaching environment, but also the revolution of thinking that takes the Internet as the infrastructure and innovation elements to build a new educational ecosystem in the digital age. Therefore, the new teaching environment is not just a classroom or the Internet, but also includes all the factors of teaching platforms, network media, learning terminals, participants and other auxiliary teachings. To sum up, the new teaching environment becomes a complete ecosystem.

2) Platform: "Internet + Education" becomes the New Normal of Teaching

With the coming of the information age, modern information technologies which employ the Internet, cloud computing and big data as the core has realized instantaneous information communication and transfer between people, and between people and machines. "Internet + Education" realizes rich connections among teachers, parents, students and teaching staffs. Consequently, the teacher's precise teaching, students' personalized learning, and other smart education applications have been realized. The establishment of the new "Internet + Education" ecology and the resulting multi-directional interaction, as well as instantaneous communication and paradigm changes, provide a profound and rapid influence on the development of future education. Thereby, a set of new education business processes and new areas are then created, which is also the new normal of teaching.

3) Participants: Role change in the "Internet + Education" environment

Under the background of the epidemic, the participants in teaching activities mainly include students, teachers, managers and parents. These participants must quickly adapt to the new system, in which the most difficult is role change. In the virtual environment, teacher's control of the classroom has declined. Teachers become organizers, guides,

collaborators, and facilitators of learning. This change highlights the subjective status of students' autonomous learning.

B. Mediatization of teaching content

During the epidemic, our most common teaching content such as textbooks, blackboards, chalk are not available any more. Meanwhile, many new technologies and new media have been applied to teaching. As a result, more dimensional and vivid teaching content have been presented to attract students' attention and improve learning effect as well. At the same time, teachers are also spontaneously reforming their teaching methods and giving full play to the role of new technologies and new media. Besides, teachers' correct and active use of teaching media also guarantees to teach in special environments.

- **Integration of new technologies, new media and teaching courses**

In actual application processes, the integration of new media and new technologies into the teaching reform will present a variety of expressions such as "assistance, hybrid, embedded", and the effect is also very obvious. First, in the content production, teaching media resources are integrated and produced through a variety of multimedia tools to give full play to the function of teaching media and improve classroom teaching efficiency as well. Second, by integrating different hardware and software resources, the teaching media resources are reasonably applied to the teaching process in terms of content use, providing high-quality and efficient services for the teaching.

Based on the "assisted" fusion, "hybrid" fusion and "embedded" fusion with traditional multimedia, the "use" to "fusion" of educational information technology has been gradually realized. This is not just for the use of form, but gradually builds in-depth integration and complementary advantages of new media and new technologies with teaching courses.

C. Fragmentation of teaching resources

In the virtual environment, some knowledge transfer through teaching can only be completed through the organization and reasonable application of resources. With the continuous development of the Internet technology, resources have become more and more abundant. At the same time, they have become more fragmented and targeted, but the reasonable organization of resources has become more difficult.

- **Diversification of teaching resources**

Information-based teaching resources is specifically designed for teaching purposes or served for teaching purposes in the context of information technology. The resources can be run on a multimedia computer or in a network environment, and can directly become the content of course activities or support various types of teaching resources for course activities [1], including various pictures, courseware, animations, audio and video materials, micro-lessons, online courses, etc. During the epidemic, teaching resources partially replaced the role of teachers in the teaching process. At the same time, when solving a problem, teachers can use these information-based teaching resources

to make the knowledge more interesting and popular, which will help improve students' understanding of knowledge.

- **Reasonable organization of teaching resources**

The benefit of resource fragmentation is that resources are more targeted and shared value, but the rational organization of resources has become more difficult. The first challenge is the acquisition of resources. The continuous enrichment of resources has brought us more choices, but it has also brought higher choice costs. Therefore, the effective organization of discrete resources through the Knowledge Graph is more conducive to the sharing and application of resources. The second challenge is the application of resources. As resources become more targeted, how to properly organize these fragmented resources into our teaching content becomes more difficult.

- **Availability of teaching resources**

There have been some researches on the problem of information-based teaching resources in China. The effective use of information-based resources is the key to improve the teaching performance. Yuan et al. [2] evaluated the effectiveness of the use of information-based teaching resources by constructing classroom teaching effectiveness metrics. This work took experimental courses as an example to conduct experimental research on classroom teaching effectiveness based on the use of information-based teaching resources, and conducted statistical analysis of the test results. The experimental results show that the use of information-based teaching resources can improve the effectiveness of teaching [2].

- **Construction of teaching resources**

Aiming at solving the problem of information teaching resources construction, Tang et al. [3] began by reforming educational concepts, improving teaching quality, and promoting fair teaching. This work systematically analyzed the significant impact of information-based teaching resources on college education. Besides, this work thoroughly explored the specific ideas and countermeasures of the construction and reform of information-based teaching resources from multiple perspectives [3]. Wang et al. [4] divided the educational information-based software resources by referring to the classification standards of open education resources. These works also compared domestic and foreign policies and cases, and learned from the international construction ideas of "encouraging teaching application, promoting construction with the application". Therefore, these works are of great significance for strengthening application orientation in the construction of educational information-based resources [4].

Under the influence of the epidemic, some network learning platforms such as China University MOOC, NetEase Open Course, Koolearn, Rain Class, Learning Link have ushered in the best opportunity for development. These large learning platforms have acquired a large number of users. More and more information teaching resources are used, and the source range is also wider and wider. Therefore, the proper use of these teaching resources help to not only enrich the classroom teaching content, but also enhance the study fun, stimulate students' interest in learning, improve students' learning ability, and further improve the quality of school teaching.

D. Diversified teaching methods

Under the influence of the epidemic, traditional teaching methods were broken, while scaffolding teaching and research learning are becoming new teaching methods. The new teaching method attaches importance to cultivating students' autonomous learning ability. The learning methods such as flipped classroom and ubiquitous learning have replaced the traditional "taught" teaching mode, which is more autonomous and personalized and helps students to develop their personality and improve their practical ability. At the same time, it also cultivates students' sense of independence and innovation [5].

- **Scaffolding teaching**

The connotation of scaffolding teaching is to give play to students' subjective initiative through teachers' guidance. Scaffolding teaching emphasizes students' meaning construction of knowledge and pays more attention to students' subjective initiative. The scaffolding teaching has three characteristics: dependence, dynamic, interaction.

When using pedestal teaching in practice, teacher should first build "false work" for the students' upcoming learning tasks. Then, under the guidance of the teacher, students should conduct group discussions to exercise their analytical and cooperative abilities. Finally, the teaching effect needs to be analyzed and evaluated. In the process of scaffolding teaching, the center of the classroom is transferred from the teacher to the student. The teachers need to pay attention to the analysis of the student's learning ability and task in the practical application, and fully mobilize the student's initiative and enthusiasm. Meanwhile, teachers need to maintain an equal and healthy teacher-student relationship in class. They need to focus on accumulating audio-visual resources after class, and avoid having no materials to use during teaching.

- **Research-based learning**

Starting from the problem, the core idea of research-based learning is taking the origin of exploration and development as a path, taking the formation process of analysis principles as a carrier, taking the process of analyzing and solving problems as a platform, and taking the guidance of teachers and peer assistance as a form. Combining learning with thinking, students can gain knowledge in the process of discovering, analyzing and thinking about problems. Therefore, it has the advantages of autonomy, passivity, openness and problematic [7]. It can give full play to students' subjective initiative and cultivate students' thinking level. Research-based learning can generally adopt the following four learning methods: (1) Autonomous learning methods. Students independently establish learning goals, independently choose learning methods, independently divide learning time and independently master learning progress; (2) Cooperative learning methods. Cooperative learning requires a clear division of labor and close cooperation among members, which can cultivate both the students' academic ability and social ability. At the same time, the group-to-group communication and learning will also help students learn better ideas and methods; (3) Teacher-student interaction methods. The teacher has changed from a traditional imparter to a student's learning inspiration and facilitator, and the teacher can also better grasp the student's learning status in the process of guidance and narrow the distance with the student.

Today, the knowledge base of students is multi-layered. Scaffolding teaching and research-based learning have filled the gaps in traditional teaching methods. They carry out "teaching according to their aptitude" according to the different student bases, which is more in line with the background of the information age, and they facilitate the exchange, collision and development of ideas between individual students. Meanwhile, the teacher has realized the change of role. As the guide, the teacher can better mobilize the students' enthusiasm for learning, stimulate the consciousness of innovation, cultivate cooperation ability, optimize the relationship between teachers and students, and cultivate excellent comprehensive talents for the country and society.

III. COMBINING THE ADVANTAGES OF "INTERNET + EDUCATION" AND TRADITIONAL CLASSROOM TEACHING

After the epidemic, "Internet + Education" will be more closely combined with traditional classroom teaching methods, forming a new teaching - blended teaching, which will be an inevitable trend in the development of future education. Traditional teaching and online teaching have their own advantages and disadvantages. Among them, traditional teaching methods require a fixed time and place, and the teaching style is old-fashioned. Communication with students is relatively simple. Students and teachers cannot teach face-to-face in online teaching, and there will be defects in the answering process after class. The key core of blended teaching is how to make up for the shortcomings of the two teaching methods and combine the advantages of the two teaching methods. Then the convenience of online teaching, the extensive knowledge content, and the comprehensiveness of after-school tutoring of traditional teaching methods are finally integrated to serve for teaching.

(1) First, we need to choose a suitable network platform to ensure the formality and superiority of the teaching environment;

(2) Second, we need to construct complete and standardized network resources to ensure that teachers' thinking is clearer when teaching. Consequently, students would have a clearer grasp of the content of knowledge in the classroom;

(3) Finally, we should design the teaching process, which is mainly divided into three parts: pre-teaching, teaching and post-teaching. Before teaching, teachers should carefully prepare the teaching content and teaching design to ensure the smooth progress of the classroom. In teaching, teachers need to allocate physical teaching content and online teaching content. The key and difficult courses are best taught in physical teaching, and the knowledge points that need to be sorted and memorized are reproduced on the screen to ensure that students grasp the knowledge more firmly. After teaching, teachers should use the evaluation system to test the learning status of students to ensure more targeted learning, and teachers should reflect on and adjust teaching methods in time.

The development of the Internet has provided good conditions for blended teaching and produced many

advantages which were not found in traditional teaching. Therefore, a reasonable and effective combination of the respective advantages of "Internet + Education" and traditional classroom teaching methods will point out the way for the development of future education.

IV. IMPACT OF INFORMATION-BASED TEACHING ON FUTURE EDUCATION

A. The Impact of teaching environment virtualization on future education

After the epidemic, classroom-based teaching will return back to normal state, but after this baptism, students, teachers, administrators and parents will recognize how to combine the advantages of "Internet + Education" and classroom teaching. They should know how to deeply integrate informatization and teaching, and understand the real environment and the virtual environment, which will provide development opportunities for future education.

B. The Influence of teaching content media on future education

In the epidemic situation, teachers present teaching content in various forms and increase the richness of teaching forms in various ways. Teachers use new media and new technologies to enhance the interaction between students and teachers, which has fully enhanced teachers' information literacy. Finally, it lays a solid foundation for the rapid development of future education.

C. The impact of fragmented teaching resources on future education

The teaching resources in the information age have the characteristics of short, succinct, clear purpose, etc. It is convenient for students to effectively use the fragmented time after class, such as waiting for the bus and going to bed for mobile learning. This process will break through the focus and difficulty of classroom learning. With the rapid development of the Internet, people will pay more attention to the concept of time and hope to make better use of their fragmented time. Therefore, the fragmented teaching resources are more suitable for the needs of future education.

D. The impact of diversified teaching methods on future education

Diversified teaching methods can turn the boring class into a lively and interesting class, and cultivate students' learning interest and creative thinking ability, thereby improving the teaching effect and cultivating high-quality talents. With the development of the information age, the society of the future will need more talents with innovative ability. Therefore, diversified teaching methods promote the development of future education.

V. CONCLUSIONS

The epidemic blocked teachers and students inside and outside the tangible fence. Information-based teaching in the new situation broke the tangible fence and brought teachers and students closer together. From distance education during SARS to online teaching of "new coronary pneumonia", information-based teaching has developed rapidly. By analyzing the characteristics of information-based teaching in the context of the epidemic, this paper analyzes the virtualization of teaching environment, mediatization of teaching content, fragmentation of teaching resources and diversification of teaching methods. In addition, in order to promote the development of future education, this paper also discusses how to combine "Internet + Education" with traditional classroom teaching methods, and how to apply blended teaching to practice.

From offline to online, teachers need to change their teaching concepts and fully understand their role positioning in the new era. Teachers need to improve their ability to identify information and build resources. They need to be oriented by the "strengthen moral education and cultivate people" to enrich their online teaching content, and they need to change their teaching way to guide students to learn individually and independently. There will be many changes brought by information-based teaching, and more content needs everyone to actively explore. After the epidemic, normal teaching will return, and the information-based teaching will play a greater role. The traditional teaching mode will be broken, and the spring of information-based is coming.

REFERENCES

[1] Ma Yan. A Brief Analysis of the Development and Application of Information-based Teaching Resources in the Network Environment [J]. Computer Products and Circulation, 2019 (03) : 188.

[2] Yuan Xiaohong. Research on the Effectiveness of the Utilization of Information-based Teaching Resources in Colleges and Universities [J]. China Electrochemical Education, 2011 (09) : 90-94.

[3] Tang Yan. Thoughts and Countermeasures for the Reform of Teaching Resources Construction of College Education Informatization [J]. Journal of Guangxi Institute of Education, 2019 (01) : 174-177.

[4] Wang Ying, Zheng Yanmin, Jia Yimin, Ren Changmei, Zhou Xiaoqing. Research on the Development Strategy of Educational Informatization Resources [J]. Journal of Distance Education, 2014,32 (06) : 3-14.

[5] Song Suyan. Research on the Application of Research-based Learning to the Cultivation of Students' Innovation Ability in High School Information Technology Teaching [D]. Hebei Normal University, 2014.

[6] Lin Jian. Cultivating the Ability to Solve Complex Engineering Problems Through Research-based Learning [J]. Research on Higher Engineering Education, 2017 (02) : 79-89.

[7] Xu Xiaojuan. Research on the Application of Research-based Learning in High School English Reading Classes [D]. Central China Normal University, 2013.

[8] Li Yushan. Research on Teaching Reform Ideas in Universities Under the New Media Environment [J]. Journal of Journalism and Research, 2019, 10 (23) : 223 + 225.

[9] Sun Bihua,Hu Xiaoju. Reasonable Integration of Classroom Teaching Media to Provide Efficient and High-Quality Services for Classroom Teaching [J]. China Medical Education Technology, 2005 (1) : 66-69.

[10] Bai Yunlu, Yin Zhihong, Bao Jianyang. Teaching Resource Self-media in Colleges and Universities: Status Quo and Thinking [J]. China Education Informatization, 2019 (17) : 24-27.

[11] Zhao Xiaojuan. An Analysis on the Way to Realize the Reform of Ideological and Political Teaching Mode in Universities under the New Media Environment [J]. Wisdom, 2018 (35) : 58.

[12] Hong Liu. Application of Scaffolding Teaching Mode in History Teaching in High Schools [D]. Yangzhou University, 2016.