Research and Countermeasure of Network Education Teaching Based on Online Learning Behavior Data Analysis

Shi Yang
Vocational Education Center Naval University of Engineering, PLA Wuhan,430033 China
Email:76983758@qq.com

Abstract: Compared with traditional teaching mode, network teaching has advantages, but its defects are obvious. This paper selected some samples and analyzed them according to certain standards, pointed out the shortcomings of modern network education teaching, and finally put forward some suggestions and measures from the aspects of education mode, resource integration, system norms and so on.

1. Introduction
Big data analysis is an extremely important tool for social science analysis. It can be said that big data has changed people's lives. Online education is one of the early learning phenomena that use the Internet as a tool. Its main learning situation is also presented through online statistics. The foundation of online education is the learning data behind students' online behavior and online behavior. With the further development of Internet technology, the function of big data is more perfect, and learning behavior data is also of great significance and representativeness. Therefore, how to deeply analyze the big data, grasp the law, and apply it to improve the teaching of network education is of great significance.

Learning behavior is the basis of carrying learning data, what kind of learning behavior will lead to what kind of learning consequences. With the rapid development of education data, learning behavior analysis has gradually become an important direction for educators. Through the analysis of large data of education, we can deeply study the learning process and situation of learners and discover the learning rules. But network learning is uncertain, and how to present its data is a key problem. Generally, network education is represented by students' online learning traces, but this statistical method is easily inconsistent with the actual situation, which involves presenting data as far as possible under the limitation of statistical conditions.

2. Online Learning Behavior and Related Concepts
In recent years, big data technology has developed rapidly on the Internet, and rapidly penetrated into all walks of life. The era of big data has come, and the emergence of big data will have a profound impact on all areas of society. On September 5, 2015, the State Council officially promulgated the Platform for Action to Promote the Development of Big Data, and planned 10 big data projects. In the "Big Data Project for Public Services", the State Council explicitly proposed the construction of big data for education and culture. The focus of big data in education is not on the large capacity of data, but on the comprehensiveness and potential value of data.
2.1. Online Learning Behavior

Network learning behavior refers to all kinds of learning behavior occurring in e-learning environment. The main body of online learning behavior is still learners, while the object of behavior is mainly digital learning resources. The environment in which learning behavior occurs is mainly network learning environment, while the explicit behavior mode is mainly reflected as a network operation. The factors affecting online learning behavior include learners' personality and environmental factors. Network learning behavior consists of two logical domains: psychology and behavioral science, learning theory and information technology. Psychology and behavioral science explore the causes of behavior and the interaction of various related factors. Learning theory explores the significance of individual behavior in learning and the behavioral characteristics of promoting learning. Information technology studies the formal representation, identification and evaluation of individual learning behavior under the information technology environment.

![Figure 1 Network Learning Logic Diagram](image)

Learning analysis technology is the interpretation and analysis of large educational data generated by learners to assess learners' learning progress. Through the research on learners' online learning behavior based on data mining analysis, the management of universities is more accurate and efficient, and the precise governance based on data analysis rules is realized, and the personalization of resource service and teaching management is realized.

2.2. Main Application Forms of Network Education

Network education is a new form of education emerged after the full development of information technology represented by network technology. This form of education takes the network as an interactive medium and resource carrier to realize various teaching activities, including knowledge transfer, learning activities organization and other learning support services. The application of network education mainly includes the following aspects. First, higher education based on network education, which is the most common and standardized form of learning, is mainly carried out on the basis of existing colleges and universities, and most colleges of network education in Colleges and universities are the manifestations. Secondly, the assistant teaching means of regular school education. All along, China has been actively promoting the construction and sharing of high-quality network education resources, so as to achieve the double improvement of the scale and quality of resources. This form is mainly set for those who can not receive formal education. This kind of learning is amateur, mainly in order to improve their knowledge. Thirdly, enterprise training, not only in enterprises, including the current party and government organs, institutions and so on, will have network learning platform, and stipulate how much network learning the corresponding groups must complete in a certain time to achieve the corresponding learning, and finally achieve the purpose of assessment. Fourthly, it is an individual's amateur informal learning. Both formal learning and
informal learning are important forms of learning. Informal learning has the flexibility of occasion, time and form.

Table 1 Comparison of Traditional Classroom and Online Education Models

| Behavior pattern                        | Self-learning | Traditional classroom |
|-----------------------------------------|---------------|-----------------------|
| Rate of learning                        | E-learning    | Teacher Mastery       |
| Knowledge learning                      | Self Mastery  | Teachers'Guidance     |
| Communication between teachers and students | Less          | More                  |
| Exercises                               | Not face to face | Face to face          |
| Learning assessment                     | Electronic Platform | Teacher led         |
| Activity development                    | Less          | Teacher organization  |

3. Data collation and analysis of e-learning Education

With the continuous development of computer technology, multimedia technology and mobile Internet technology, how to timely and accurately grasp the learners' online learning behavior characteristics and find the key factors affecting these behaviors, provide efficient, dynamic, personalized and scalable learning support services for network learners, and provide effective teaching reform and supervision information for network education institutions has become a problem. Through data collection, analysis, management and application, building intelligent and dynamic management strategy will become the main theme of the era of network education.

3.1. Data Acquisition

The essence of network education is simply the separation of time and space between teaching and learning. The teaching research of network education should focus on time and space. Only by understanding the problems of time and space can we have a better grasp of learners' learning performance. This paper takes the learning data of 120 first-year students of Guangdong University of Technology as a sample, and through the analysis of various learning behavior data of the learners on the network teaching platform, finds out or finds out the characteristics of learners' online learning behavior and the actual implementation, and puts forward learning support service strategies and suggestions, which can provide the evaluation, monitoring and implementation of teaching reform for the teaching quality. Data support and useful reference.

3.1.1. Data preparation

The basic research object of this paper is 120 freshmen enrolled in the Department of Administration in the College of Network Education of Guangdong University of Technology in 2017, including 40 specialist students, 40 undergraduate students and 40 graduate students. The reason for choosing different levels of groups as analysis samples is that students at different levels also have different ages, and their learning behavior is often quite different. At the same time, network education is a part-time teaching method, this classification can also reflect the learning attitude of students at different levels, which has more reference significance for network education and teaching.

In the specific analysis process, we will analyze the factors one by one according to the educational level, age level, gender composition, length of study, online learning habits, academic performance, online interaction and so on. Then we will make a comprehensive evaluation of different types of analysis, in order to achieve the purpose of improving and upgrading online education. The data of this study are mainly based on the school's network education learning platform, and the data are collected in a complete school year from 2017 to 2018. The main idea is to take the traces of online learning behavior on the network learning platform as the research object. But such research will inevitably lead to data distortion and other phenomena. Mainly because online learning is uncontrollable, many people will open the learning platform, but in fact it is not in real learning. In order to avoid such problems as far as possible, in data setting, the analysis factors mainly adopt the following sections:
answer questions, interaction, message and so on. Although data distortion can not be completely avoided, the reliability of such analysis will be greater.

### 3.1.2. Data Acquisition and Analysis

The basic composition of 120 samples is as follows. Generally speaking, the sex ratio of the subjects is relatively average, and the age is concentrated between 18 and 35 years old. The basic conclusion is that the learning effect of the younger and older samples is not as good as that of the middle-aged students.

#### Table 2 Sample Basic Composition Analysis Table

| Educational level       | Sex | Age    |
|-------------------------|-----|--------|
| Graduate student        | Male 22 | 20-30 28 |
|                         | Female 18 | 30-35 12 |
| Undergraduate           | Male 12 | 18-25 32 |
|                         | Female 28 | 25-30 8  |
| Junior college student  | Male 17 | 16-23 29 |
|                         | Female 23 | 23-28 11 |

The main reason is that smaller students haven't changed their learning status yet. Their motivation for online learning is generally vague, and there are coping phenomena in learning. The older groups generally have to take into account work, life and family, in this case, there will be insufficient learning time and other issues. Because of their lower level, they also feel the pressure of society, and their learning needs are more urgent, so their learning data will be better.

#### Table 3 Statistics of learners' independent learning ability

| Learners' Independent Learning Ability | Time  |
|---------------------------------------|-------|
|                                       | 10~20 | 20~30 | 30~50 | 50~60 |
| View Learning Objectives              | 70%   | 0     | 0     | 0     |
| Text learning                         | 20%   | 15%   | 20%   | 8%    |
| Using animated video                  | 55%   | 20%   | 0     | 0     |
| Practice                              | 34%   | 10%   | 0     | 0     |
| Search for extracurricular resources  | 49%   | 0%    | 0     | 0     |
| Make notes                            | 30%   | 0%    | 0     | 0     |
| Case study                            | 45%   | 12%   | 0     | 0     |
| Reflect                               | 12%   | 12%   | 0     | 0     |
| Rest halfway                          | 8%    | 10%   | 0     | 0     |

According to the situation of learners' independent learning ability in the table above, this table is classified according to the learning links. From the learning objectives, text learning, video learning, case learning, feedback, after-school interaction and so on, the decline in turn. In terms of the duration of learning, it is almost proportional to the degree of learning, and in many deep learning links, the learning time is almost zero. This is because, on the one hand, the lack of supervision in online learning, on the other hand, it is due to the rules of curriculum settings. Many times, after shallow learning, the basic requirements of learning have been met, and students have no motivation to conduct in-depth learning.
Table 4 Statistics of learners' interactive learning

| Learner Interaction | Time | Frequency |
|---------------------|------|-----------|
|                     | 10–20| 20–30 | 30–50 | 50–60 | 0–5 | 5–10 | More than 10 times |
| Writing learning    | 40%  | 23%   | 0     | 0     | 0    | 0    | 0 |
| Online questions    | 9%   | 45%   | 50%   | 45%   | 10%  | 0    | 0 |
| Forum exchange      | 25%  | 28%   | 0     | 0     | 20%  | 0    | 0 |
| Mutual evaluation   | 14%  | 10%   | 0     | 0     | 20%  | 0    | 0 |
| Online Participation| 69%  | 30%   | 0     | 0     | 0%   | 0    | 0 |

The above table is the statistics of the interactive links of learning, including the length of learning and the frequency of interaction. In terms of interaction duration, the statistics are lower than those of basic learning requirements, almost all of which are 0. The reasons are similar to those listed above. The most important thing is that with the development of the Internet, students can be satisfied most of the time through other forms of learning. The so-called learning interaction itself is not necessary, and the quality of these interaction settings is not high enough to attract students.

Figure 2 Statistics of Students' Use of Multimedia Resources

The picture above is a supplement to interactive learning and learning behavior. It should be noted that the activity of the forum is the lowest, which is consistent with the previous analysis. But the learning of text is the highest, and the learning of learning materials is the second. To sum up, as far as online learning is concerned, first, compared with the traditional classroom teaching, the learning effect is much lower, but online learning is an indispensable part of the whole learning structure because of its convenience. Secondly, the above analysis not only exposes the problems of e-learning, but also provides some thoughts for the further improvement of e-learning education. Thirdly, online learning education can not follow the old-fashioned pattern. It must adapt to the development trend of the Internet. For example, we can make full use of such tools as artificial intelligence, coursework, mobile new media terminals and so on, so as to achieve better educational effect.
4. The Enlightenment and Significance of Online Learning Data to Online Education and Teaching

4.1. Construct professional and systematic teaching staff. In order to make the curriculum vivid and accurate, the teaching method of space-time separation must strengthen the training of teachers' professional skills, network education technology and theory, teacher ethics education and service consciousness, and improve their teaching ability in the information technology environment through various ways. Full-time teachers, part-time teachers and teaching assistants should work in accordance with the division of service, perform their duties, communicate and coordinate with each other, form a joint force, share the responsibility of learning support services, and effectively improve the quality of service. The construction of the teaching staff of network education follows not only the teaching law of higher education, but also the characteristics of modern network education.

4.2. Create the internal and external environment of learners' learning process. Advanced and high-quality hardware facilities are the most important conditions for the development of network education. Every link of course learning, course making and interactive question answering is closely related to them. Therefore, we should optimize the server architecture, increase capacity, build a cloud platform, and improve the ability of the server to carry concurrent data. At the same time, we should advocate interactive learning through the network platform, in order to strengthen the exchange of experience and emotion between teachers and students, improve learning enthusiasm, in order to achieve emotional satisfaction and learning goals in the learning process.

4.3. Equipped with diverse and diversified curriculum resources. In the era of "Internet +", online education must develop more short and precise network resources that can attract interest in learning. At the same time, we should also absorb other high-quality resources, such as the system of curriculum resources that can include online courses. First, it can avoid the rapid updating of some professional knowledge and the duplicate recording of the courseware as a whole, resulting in the timely updating of knowledge and the old and backward learning materials. Secondly, efforts should be made on the diversity of courses, which can integrate academic education, vocational needs, industry development and case teaching in the design of curriculum content, so as to provide conditions for learners to complete a specific learning purpose. We should advocate the co-construction and sharing of high-quality courseware resources for network education in Colleges and universities, and increase the number of elective courses to meet the individual needs of students.

4.4. Building a one-stop teaching management service platform. With learners' learning needs as the center, we should renew the teaching management model, establish a one-stop learning platform, provide a friendly human-machine interface, flexible mode of human learning, course selection and registration. Managers should renew their concepts, change service modes and change passive management into active guiding service. Make full use of the learning platform data, carry out data statistics and data mining, objectively analyze students' learning behavior, learning habits and teachers' working conditions, and provide the basis for management improvement and resource construction.

5. Conclusion
Network education is an important supplement to modern learning education system, but its shortcomings and drawbacks are obvious. For example, learning enthusiasm is not high, learning effectiveness is not good and other issues are also obvious. It is necessary to improve the network curriculum, the application of technical means, the standardization of assessment methods and the renewal of ideas. The analysis in this paper also has some shortcomings. Firstly, there are fewer samples. Although some analysis indicators have avoided uncertainties as far as possible, the amount of data is not large enough. Secondly, the selected data are not authoritative, some are not representative, and there may be deviations in conclusions. However, it can still provide some
Reference and thinking for online learning education.

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