Research Article

Application of Digital Media Technology for Teaching in Higher Vocational Colleges Using Big Data

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The utilization and accessibility of big data and digital media technology by common people have decreased technological prices. Professional education has been pushed to modernize curricula and boost talent development efficiency. The vocational education curriculum system must take into account the usage of new technologies in a comprehensive manner to ensure the availability of knowledge and ability structure. To accomplish the goal, the application techniques and approaches of teaching and practice utilizing big data and digital media technologies in vocational education are explored and researched. To improve the teaching quality of higher vocational education, with the help of big data, this paper aims to conduct an in-depth study on the application of digital media technology in higher vocational education. Firstly, the teaching management system of higher vocational education is constructed. Secondly, the structure, efficient units, architecture, and database of the teaching management system are pronounced. Thirdly, fuzziness mining and teaching data scheduling are used to optimize and regulate the storage structure. According to the multiparameter optimization method, the teaching feature screening and resource scheduling are completed improving the capability of parameter recognition and online identification related to teaching resources. The simulation results show that the method proposed in this paper can make the teaching methods of higher vocational education more diverse. It is anticipated that it can help the reform process and growth of vocational education, as well as the development of innovative and entrepreneurial skills. As the data receiving rate of teaching resources is high, therefore, the ability of teaching resource scheduling is also strong along with a high application value.

1. Introduction

Vocational education is essential for social business staff training since it directly trains high-tech and high-skilled employees. The problem of skills scarcity has become more serious as digital technologies and big data have advanced. Traditional courses and training techniques, on the other hand, are unable to keep up with the changing scenario. To remedy the problem, available policies and actions should be investigated, as well as research. This is the goal of the article, which includes several innovative ideas and paths.

Digital media mainly refers to information media such as digital text, images, animation, and video. Compared with multimedia, digital media mainly emphasizes communication characteristics and digital characteristics of information media networks. It mainly takes the modern network as the carrier of communication that includes digitization, networking, and multimedia features.

Digital media technology is the fundamental criterion for altering teaching techniques in modern education. In the context of big data, it has the potential to significantly increase teaching levels and diversify educational and instructional techniques. It can also systematically carry out the application of digital media technology in the teaching of higher vocational colleges, checking out all the prevailing problems and exploring the corresponding solutions to the development of teaching resources. Less learning outcome, less involvement of teacher and student, lack of skill-based education, emphasis on rote learning that practical utility, schedule stiffness, etc., are some of the most pressing problems that need serious attention. Only digital revolution can pave the way for the
solution of these problems. It will effectively actualize the
digital media resource content and to a larger extent
exploit the benefits of teaching resources and teaching
form innovation. Teaching materials, network technology,
scientificity, and speed may all be combined with digital
media technology. The research application of digital
media technology in the teaching process is encouraging
to the mining of diversified teaching resources and the
research of pioneering coaching approaches. Taking ed-
ucational and digital media technology as the supporting
technology of network teaching strongly depends on
digital media skill. It is of boundless significance to im-
proving teaching quality in higher vocational colleges.

The novelties of this paper are as follows:

(1) Construct the teaching management system of
higher vocational colleges, and elaborate the struc-
ture, functional modules, architecture, and database
of the teaching management system. Use fuzziness
mining and teaching data scheduling. In higher
vocational institutions, the storage structure of the
teaching resource database is optimized and man-
aged. According to the multiparameter optimization
method, the teaching feature screening and teaching
resource scheduling are completed. The ability of parameter detection and online identification of
teaching resources is improved.

(2) Simulation experiments show that the method
proposed in this paper can make higher vocational
colleges’ teaching methods more diverse than other
methods. It can also help to increase the quality of
instruction and the capacity to teach resource
scheduling.

The rest of the research paper is organized as follows;
Section 2 will explain all the related work linked to this
paper. Section 3 will elaborate the education organization
system. Similarly, Section 4 will go through all of the digital
media technology’s uses in vocational college education.
Section 5 explains the analysis and results. Finally, the
concluding remarks are described in Section 6.

2. Related Work

The degree of attention to education has risen as society
has progressed and as people have become more aware of
contemporary schooling. Relevant improvement mea-
sures have been taken to improve the teaching quality of
higher vocational colleges. The unilateral feedback of
students often judges the improvement and evaluation of
teaching quality in higher vocational colleges, which often
depicts that the results are one-sided, and the accuracy of
teaching quality evaluation is low. The web design is
applied to evaluating teaching quality in higher vocational
institutes. As the teaching quality evaluation system of
higher vocational colleges is designed based on the sorting
algorithm of community search, the data acquisition
module is used to obtain the web page theme, web page
content, and web page technology-related data. The ob-
tained teaching resource data are transmitted to the
community search module. It divides the relevant
teaching evaluation data into teacher community evalu-
data, student community evaluation data, and ad-
ministrator community evaluation data. It also analyzes
the teaching quality of higher vocational institutes from
many angles. The multifactor sorting algorithm is used to
evaluate the teaching quality of higher vocational colleges
in web design. The results of the experiments suggest that
the method can accurately assess the quality of web design
instruction in higher vocational institutions [1]. To im-
prove the teaching quality and stimulate the enthusiasm
and motivation among college students, Shu establishes
corresponding evaluation indexes of teaching quality in
higher vocational colleges from five aspects: teaching
methods and attitude, teaching ability and effect, and
essential quality of students. It uses expert scores to obtain
different evaluation index scores and final scores. Then,
different evaluation index scores are used as cs-elm input.

The final score is used by cs-elm to create the cs-elm
teaching quality evaluation model in higher vocational
colleges. The teaching quality of higher vocational colleges
has not been effectively improved compared to the other
higher vocational colleges [2]. Cai analyzes the current
form. With the rapid development of computer tech-
nology, the application field is becoming more extensive.
In the development process, many industries will com-
plete the relevant work in the field with the help of
computer technology. In the educational work of higher
vocational colleges, computer technology will also be used
for auxiliary teaching. However, the current computer-
aided teaching system continues to innovate and optimize.
Combined with the advantages of computer-aided
teaching, this paper makes an in-depth discussion on the
corresponding measures of computer-aided teaching but
does not put forward specific methods, so that the
teaching quality of higher vocational colleges has not been
improved [3]. In addition, big data information tech-
nology is rapidly developing, and Gao makes it possible to
apply the corresponding analysis skill of data mining to
analyze the teaching evaluation data of higher vocational
colleges, promote the diversification of teaching methods
in higher vocational colleges, and improve the teaching
quality. Combined with the advantages of the traditional
Apriori algorithm, this paper adopts the data partition
mode to solve the related performance problems of
teaching resource scanning and puts forward an improved
o-Apriori algorithm. The algorithm’s core is to reduce the
number of scanning teaching resource databases and
generate candidate sets. The original algorithm of the
correlation value is introduced and applied to the problem
of low accuracy of association rules for obtaining teaching
resource data to find the correlation between the KPI
factors of teaching quality evaluation and teaching con-
tent method. The critical points of improving the teaching
quality of higher vocational colleges can be positioned.
The teachers can also adjust the teaching content and
provide data support for improved teaching. However,
this method has the problem that the improvement in
teaching quality is not apparent [4].
3. Teaching Management System of Higher Vocational Colleges

In this section, the overall structure design, functional design, architecture, and database design of teaching management systems will be discussed. This will help us clarify the prevailing problems in the teaching management system of higher vocational colleges and their related solutions. The explanation is as follows.

3.1. Overall Structure Design of Teaching Management System in Higher Vocational Colleges. Figure 1 shows the overall structure of teaching management in higher vocational colleges. Here, the system is divided into module structures such as teaching resource management, teaching quality and evaluation management, and operation management [5, 6]. This will help divide the burdens from the teacher shoulders to the digital technology. It will automatically help the teachers as well as the students to operate and manage their respective work. In this way, the system will work efficiently as the load on the server is distributed accordingly.

3.2. Functional Design of Teaching Management System in Higher Vocational Colleges. For the teaching management system, the main functions must retain the functions of management, query, and statistics. Figure 2 shows the main functions of the teaching management system. It explains the following:

(1) Management Function: Related managers can publish teaching-related news, notices, and schedule of classes for teachers and students. They can also make their teaching plans accordingly.

(2) Query Function: For the relevant managers, one can query the information related to their rights in the teaching management system [7, 8].

(3) Statistics and Teaching Department Resource Data Function: The relevant management personnel in the teaching management system can use the teaching management system to make statistics on the number of students in higher vocational schools and make statistics on the relevant situation of teachers’ scheduling. Teachers and students utilize the teaching management system to compile data based on their own requirements, such as teachers’ statistics on students’ information and teaching information and students’ statistics on their credit information.

3.3. The Overall Architecture of Teaching Management System. In the teaching management system of higher vocational colleges, a three-tier structure is established. They are the performance layer, function layer, and application layer to ensure that the users in the teaching management system can practice and apply the system. Also, ensure that users can rely on the campus network where students can use the user keys to anti-counterfeit the teaching management interface in actual time with the help of Internet. Resultantly, this will increase the teaching management system’s application value [9, 10]. The complete planning is shown in Figure 3.

In Figure 3, it is guaranteed that the users in higher vocational schools can click on different functions in the teaching management system through a web browser and then based on ASP.NET and application server responds by assigning system user needs to different modules. It ensures that the teaching management system can provide response needed to users.

3.4. Database Design. In the teaching management system of higher vocational colleges, the system database mainly consists of data access and software of SQL server. In practice, data access groups can perform database access operations to ADO.NET. It makes processing data objects. The data interface applies to access to the control database SQL server [11, 12]. In the teaching management system, the specific database tables are as follows:

(1) Administrator Table in Teaching Management System: If there are many different administrators in master simultaneously, access permissions for different operations must be set in the teaching management system for different administrators’ specific information. Table 1 sets statistics on behalf of master administrators. Thus, it will distinguish the management elements in the system.

(2) Overview of Teaching Management System of Higher Vocational Colleges: There is also a table of teaching resources. It is indicated in Table 2 specifically used to store different teaching resources, pictures, videos and documents, and specific teaching resources uploaded by teachers. However, the storage data depend on the range and availability of physical devices or access to the cloud server. In the teaching management system, this instructional content can also be captured automatically to satisfy the demands of students for download, querying, and browsing according to different learning needs.

(3) Internal Structure of Teaching Management System of Higher Vocational Colleges: There are user tables for teachers. They are represented in Table 3. The corresponding user name of the teacher number can be applied, the uniqueness of the data in the table can be ensured, and the information security of teaching in the teaching management system can be improved. The necessary information must be retained from it.

(4) In the Teaching Management System of Higher Vocational Colleges: There is a student user table. It is represented by Table 4 and is used to store the students’ information in teaching. The permission of this table is not for students to modify. Only the administrators and teachers have the authority to modify it.
4. Application of Digital Media Technology in Vocational College Teaching

This section will explain the storage and mining of multi-terminal interoperable teaching resources and the fusion scheduling of teaching resources. It will help describe the application of digital media technology in vocational college teaching. The explanation is as follows.

4.1. Storage and Mining of Multiterminal Interoperable Teaching Resources. The distribution function of the statistical probability of integrating teaching resources with multiple terminals is expressed as

$$W_{i}^{(k)}(n) = W_{i}^{(k)}(n-1) + g_{i}^{(k)}(n)\epsilon_{i}^{(k)}(n). \tag{1}$$

In formula (1), $W_{i}^{(k)}(n-1)$ represents the original data of teaching resources in multiterminal interconnected...
higher vocational schools, \( g_i^{(k)}(n) \) represents frequently used teaching resources, \( y_i(t) \) represents the total number of online students based on the difference among education resource data storage media and fitting function, and the data distribution of multiterminal interoperability teaching resources is established:

\[
z(t) = x(t) + y_i(t) \times W_i^{(k)}(n).
\]

In formula (2), \( x(t) \) represents the fuzzy correlation of data points in the distribution of multiterminal interoperability teaching resources, and \( y_i(t) \) represents the distance of network between phases. Using the scheduling of fuzzy mean, the density function of sampling statistics of multiterminal interoperability teaching resources data is expressed as

\[
J = \frac{1}{2} E[z(t)^2 - R].
\]

In formula (3), \( E \) represents the center of fuzzy clustering of teaching resource data in higher vocational schools, \( z(t) \) represents the probability density of prior teaching data of resources, and \( R \) represents the amount of teaching resource data used. Construct the conversion model of multiterminal interoperability teaching, optimize and control the data storage structure of teaching resources by using information dispatching, and improve the teaching management capacity of multiterminal interoperability [13, 14].

The data mining and feature extraction model for multiterminal interoperability teaching resources is established. Using fuzzy degree detection and data mining method, the identification model of parameters for multiterminal interoperability teaching resources is obtained as follows:

\[
\hat{g}(t) = \frac{[F|x(t)| + [G|x(t)| + [H]|x(t)|]}{J}
\]

In formula (4), \([F]\) represents the matrix of the quality of the parameter identification model, \([G]\) represents the identification model damping matrix, \([H]\) represents the identification model stiffness matrix, and \( |x(t)| \) represents the displacement vector between the samples of the teaching identification model [15, 16].

Using fuzzy PID control, the expression of fuzzy degree mining for teaching resources is obtained as follows:

\[
[H(\omega)] = \frac{[F] - \omega[G] + j\omega[H]}{J}.
\]

In formula (5), \( \omega \) represents the fuzziness coefficient of digital media technology teaching and \( j \) represents the vector of fuzziness of digital media technology teaching.

4.2. Fusion Scheduling of Teaching Resources. The fused dispatch of teaching resources is carried out by replica fusion. The fuzziness detection function of fused dispatch of resources is \( G_m(s) \), and the distribution state function of fused features of multiterminal interoperable teaching resources is expressed as \( G_m(s) \):

\[
[X(t)] = [G(t)] \times [H(\omega)]
\]

In formula (6), the \([X(t)]\) represents the \(|x(t)|\) Fourier transform and \([G(t)]\) represents the \(f(t)\) Fourier transform. Combining with fuzzy detect and optimal fusion algorithms, a model of multiterminal interoperability teaching resources fusion is obtained:

\[
R = \frac{E[x(n)^4]}{E[x(n)^2]}
\]

The sample set of multiterminal interoperability teaching statistics satisfies \( A \subset V, B \subset V \), and \( A \cap B = \phi \). By clustering the differences in the fusion of teaching resources, the optimal iteration formula for dispatching teaching resources for multiterminal interoperability is obtained:

\[
\begin{bmatrix}
v_{11} & v_{12} & \cdots & v_{1n} \\
v_{21} & v_{22} & \cdots & v_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
v_{n1} & v_{n2} & \cdots & v_{nn}
\end{bmatrix}
\]

Based on the R-sorting table of duplicates, the status variable of multiterminal interchange teaching resources dispatched in higher vocational colleges is expressed as

\[
\begin{bmatrix}
v_{11} & v_{12} & \cdots & v_{1n} \\
v_{21} & v_{22} & \cdots & v_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
v_{n1} & v_{n2} & \cdots & v_{nn}
\end{bmatrix}
\]
Table 2: Table of teaching resources.

<table>
<thead>
<tr>
<th>Describe</th>
<th>The column name</th>
<th>Data description</th>
<th>The length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Remark</td>
<td>Varchar</td>
<td>100</td>
</tr>
<tr>
<td>The name of the resource</td>
<td>ResName</td>
<td>Varchar</td>
<td>30</td>
</tr>
<tr>
<td>Store address</td>
<td>ResAdd</td>
<td>Char</td>
<td>150</td>
</tr>
<tr>
<td>Resources</td>
<td>ResID</td>
<td>Varchar</td>
<td>30</td>
</tr>
<tr>
<td>Type</td>
<td>ResType</td>
<td>Varchar</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3: Table for teachers.

<table>
<thead>
<tr>
<th>Describe</th>
<th>The column name</th>
<th>Data description</th>
<th>The length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>Teacher</td>
<td>Varchar</td>
<td>20</td>
</tr>
<tr>
<td>Password</td>
<td>TPwd</td>
<td>Varchar</td>
<td>30</td>
</tr>
<tr>
<td>The name</td>
<td>TName</td>
<td>Varchar</td>
<td>50</td>
</tr>
<tr>
<td>The phone</td>
<td>TPhone</td>
<td>Varchar</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 4: Student user table.

<table>
<thead>
<tr>
<th>Describe</th>
<th>The column name</th>
<th>Data description</th>
<th>The length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>SPwd</td>
<td>Varchar</td>
<td>20</td>
</tr>
<tr>
<td>Class number</td>
<td>SClassID</td>
<td>Varchar</td>
<td>30</td>
</tr>
<tr>
<td>The dormitory no.</td>
<td>SHouseID</td>
<td>Varchar</td>
<td>30</td>
</tr>
<tr>
<td>The name</td>
<td>SName</td>
<td>Varchar</td>
<td>50</td>
</tr>
<tr>
<td>Student ID</td>
<td>StudentID</td>
<td>Varchar</td>
<td>20</td>
</tr>
</tbody>
</table>

\[
g(x_i, y_j | \mu_k, \sigma^2_k) = \frac{a_k}{\sqrt{2\pi} \sigma_k} e^{-\frac{(x_i - \mu_k)^2}{2\sigma_k^2}}
\]

In formula (11), \(a_k\) signifies the circulation threshold of multiterminal interworking teaching resources in higher vocational colleges, \(\mu_k\) represents the distribution function of fuzziness, and \(\sigma_k\) represents the mark position distribution of teaching resource capacity and adjustment. The above process completes the application of digital media technology under the background of big data [18–20].

5. Analysis of Experimental Results

The simulation experiment is carried out to verify the application performance of the method proposed in this paper. The system hardware configuration is shown in Figure 4. In Figure 4, the human-computer interaction mode is used to carry out the data output and interface control of multiterminal interworking teaching resources to realize the integration of teaching resources in the teaching management system of higher vocational colleges. The hardware of the teaching management system of higher vocational colleges is realized at the output terminal of the computer. The experimental test data are shown in Table 5.

Figure 5 shows the proposed method, in this paper, reception rate comparison between the multiterminal interworking teaching resource fusion and the traditional method of teaching resource transmission in higher vocational colleges.

Through the analysis of Figure 5, it can be seen that the reception rate of teaching resource data of the method proposed in this paper is 100 per cent when the data throughput is small. The gradual increase of teaching resource data throughput decreases the data reception rate. However, it is not less than 40 per cent. In the traditional methods, the initial data reception rate is also 100% when receiving teaching resource data. With the increase in data throughput, the data receiving rate gradually decreases. It is significantly lower than the method proposed in this paper. It shows that the teaching data scheduling ability of the proposed method is strong. It can also effectively improve the teaching quality of higher vocational colleges.

Table 6 compares the data mining time between the proposed method and the traditional method.

It can be noticed in Table 6 that the time of data mining of teaching resources in higher vocational colleges by the method proposed in this paper is 23 seconds. In comparison, the time of data mining by the traditional method is 56 seconds. Figure 6 shows the error comparison between the
proposed method and the traditional method for data mining of teaching resources in higher vocational colleges. It shows that the method proposed can quickly mine the teaching resource data and improve the efficiency of teaching resource data fusion and the quality of teaching.

By analyzing Figure 6, at the beginning of the experiment, we can see that the traditional methods’ error of data mining of teaching resources is about 56%. With the gradual increase of experimental data, when the experimental data are 600, the minimum error of data mining of teaching resources is about 38%. Then it gradually increases. The proposed method is contrary to the traditional method. When the experimental data are 600, the maximum error of teaching resource mining is 24%, and the error of other data is relatively small. In this paper, the maximum error of the teaching resource mining of the method proposed is also far lower than the traditional method. It shows that the method proposed in this paper can effectively mine the teaching resource data of higher vocational colleges. The mining accuracy is also high. This will effectively integrate the teaching resource data and improve the teaching quality of higher vocational colleges. Figure 7 shows the comparison between the application of digital media technology in higher vocational college teaching and the application of the method proposed in document [1] to improve teaching quality in higher vocational college teaching.
In this paper, methods can improve teaching methods and make teaching methods more diversified. To improve the quality of teaching in higher vocational colleges, we need to control the storage structure database of higher vocational colleges and make teaching data scheduling to optimize and control the storage structure database of higher vocational colleges. This method uses fuzzy control to improve the teaching quality even better when applied to teaching higher vocational colleges. The use of digital media and big data in education sector is a hot topic. We investigated the existing condition and examined the various methods and the used strategies. Digital media and big data provide the means and proposals for vocational education reform. We investigated and demonstrated how to overcome these challenges in the main IT specialty of software technology. The focus of digital media is on the communication and digital features of information media networks. It primarily uses the current network as a communication carrier, incorporating digitization, networked, and multimedia capabilities.

Similarly, big data provides a broad platform for the application of digital media. The form of higher vocational colleges can be transformed from quantitative to qualitative change. It can transform from breakthrough to technical application. The two are inseparable and complementary. The need for education and teaching in higher vocational colleges and the joint driving force of technological reform and innovation generate solutions for different subjects to promoting the quality of education and teaching and talent training in higher vocational colleges. It can also promote the overall development and application of digital media technology. In the future, through the proposed method, the teaching methods can become more diverse that can effectively improve the teaching quality of higher vocational colleges.

### Data Availability

The experimental data used to support the findings of this study can be obtained from the author upon request.

### Conflicts of Interest

The author declares that there are no conflicts of interest regarding this work.

### References


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**Figure 7:** Comparison of teaching quality improvement in higher vocational colleges with different methods.


