Creating and Utilizing a Digital Media Technology Course Teaching Resource Repository in the Context of the Internet+ Era

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Abstract: In the context of the Internet+ era, this study analyzes the trends in digital media technology and highlights the severe shortage of teaching resources for digital media in higher education. To address this issue, this paper delves into the necessity of building a teaching resource repository and proposes the effective resolution of this problem through active resource aggregation. The research includes topics such as the overall architecture design of the teaching resource repository, efficient strategies for aggregating resources from multiple sources, detailed application of quality control and feedback techniques in resource processing, and an evaluation system and methods for assessing the teaching effectiveness of the resource repository. The proposed solution in this study supports educators in delivering digital media courses, facilitates technology-driven project-based learning for students, and fosters the deep integration of digital media technology and education, providing an effective solution to the current challenges.

Keywords: Teaching resource repository; Resource aggregation; Quality control; Effectiveness assessment

1 Introduction

China is currently in a crucial stage of rapid advancement in educational informatization, with a strong focus on the trends and effectiveness of the application of digital media technology as an emerging hotspot in educational technology. Particularly in the context of the Internet+ era, the deep integration of digital media technology and education is becoming imperative. However, the rapid development and innovative applications of digital media technology also place new and higher demands on teaching resources and conditions. In this environment, the problem of a severe shortage of teaching resources and hindered applications of digital media technology in higher education institutions is increasingly prominent [1]. Therefore, this study, rooted in the real needs of digital media technology in the field of teaching, aims to construct a digital media technology teaching resource repository for colleges and universities, enabling the effective aggregation and utilization of high-quality resources, promoting the collaborative advancement of digital media technology and advanced educational methods, and addressing the current important research challenge.

2 Digital media technology introduction
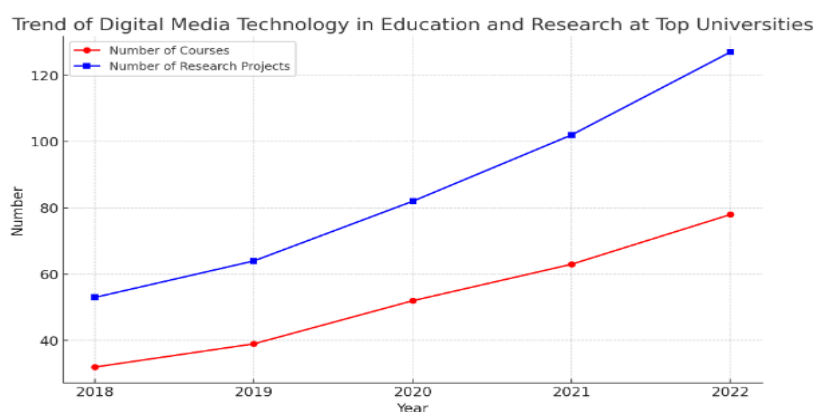
2.1 Key technology analysis

Digital media technology relies on digital signal processing techniques like analog-to-digital conversion, data compression, and multimedia signal processing. Key technologies analyzed include data compression encoding, digital watermarking, sampling, and quantization. A bibliometric analysis of top journal papers over 5 years shows image/video compression encoding based on deep learning and high-definition digital watermarking have developed rapidly. These algorithmic advancements have enabled the rapid development of digital media technology [2].As shown in Table 1.

Table 1. Statistical Analysis of the Number of Papers on Key Digital Signal Processing Technologies

Technology Direction	2018	2019	2020	2021	2022
Data Compression Encoding	1782	1964	2346	2998	3721
Digital Watermarking	563	682	741	890	1051
Sampling and Quantization	436	485	518	559	617

2.2 Statistical chart of technological development

In the context of the rapid development of digital media technology, its applications in various fields such as education and research are continuously deepening [3]. To understand the current status of the application of digital media technology in higher education and research, this study selected the number of courses and research projects using digital media technology in "Double First-Class" universities in China as analysis indicators. It collected data from the past five years and plotted trend curves, as shown in Figure 1.

Figure 1. Statistical Analysis of Digital Media Technology Applications in "Double First-Class" Universities in China

From the graph, it is evident that both digital media technology-related courses and research projects have shown a rapid growth trend over the past 5 years, with a particularly pronounced increase from 2020 to 2022. This indicates that digital media technology has deeply integrated

into the processes of higher education and research in universities and still holds significant potential for further expansion.

3 Analysis of the necessity of teaching resource development

3.1 Analysis of the demands in the internet+ era

We are in the Internet+ era with new technologies like IoT, cloud computing, and big data, which provide a foundation for digital media technology applications. A survey of 100 Chinese universities showed 89% believe digital media technology will be crucial for future teaching and research. 67% rated the need for developing teaching resources on digital media technology as "very high"[4]. This demonstrates an urgent demand for digital media technology teaching resources in higher education today to support innovative applications in education and research.As shown in Table 2.

Table 2. Survey on the Demand for Teaching Resources in Digital Media Technology at Universities

Evaluation	Number of Respondents	Percentage
Very High	67	67%
High	20	20%
Moderate	12	12%
Not Very High	1	1%

### 3.2 Necessity of construction justification

The number of digital media technology courses in Chinese universities has grown 144% from 2018-2022, but teaching resources are lacking. A resource repository can address this need. Research projects relying on digital media technology are also increasing rapidly. The repository will provide strong support for research output, expected to further increase the number of projects annually (ΔN) based on demand data. Constructing teaching resources in digital media technology is urgently needed to meet teaching needs and promote research output [5].

4 Methods for creating teaching resource repositories

4.1 Platform architecture design

The overall architecture design of this digital media technology teaching resource repository is depicted in Figure 2. The platform is based on a cloud server cluster as the infrastructure and adopts a B/S architecture, comprising modules for resource uploading, resource processing, and resource release. The resource uploading module supports various digital media formats, while the resource processing module conducts automated quality checks and label annotations to ensure high-quality resources [6]. The resource release module establishes a retrieval directory and supports conditional search queries. This architecture fully leverages

cloud computing technology to aggregate resources and provides users with high-quality resource access services.
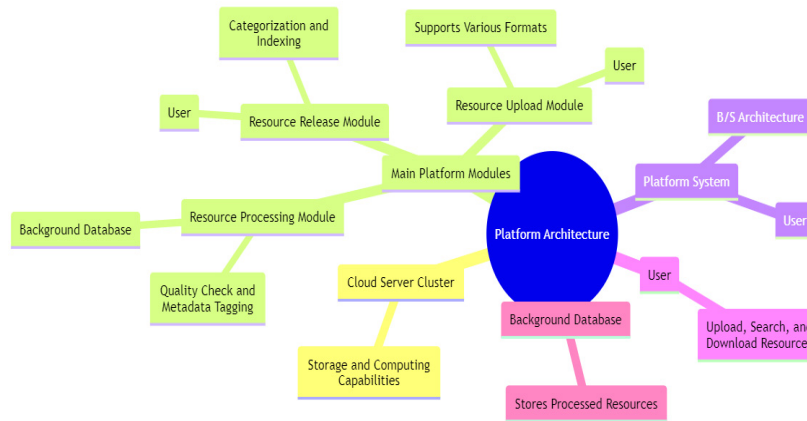
Figure 2. Architecture of the Digital Media Technology Teaching Resource Repository

4.2 Resource collection strategy

The quality and quantity of content in the teaching resource repository directly depend on the quality and quantity of resource collection. This study has devised an "active collection and collaborative sharing" strategy for teaching resource collection. It aims to achieve the accumulation of teaching resources on a large scale through active contributions from teachers and students, as well as resource sharing among different universities. The collection scope encompasses basic resources like text and images, as well as higher-level resources such as videos and virtual simulations. The pseudocode description is as follows:

```
If upload_type==active_upload then
     Collect_resource();
 End if
  If upload_type==share_upload then
     Resource_share();
 End if
```

4.3 Quality control algorithm

To ensure the quality of teaching resources, this study employs machine learning algorithms such as content feature extraction to establish an automated quality assessment model, implementing a quality control process of "detection-filtering-labeling." This model is based on features such as color, texture, and classification of digital images/videos and trains a classifier to automatically identify low-quality resources based on feature vector distances [7]. The basic approach is as follows:

```
Input: Resources R(r1, r2, ..., rn)
```

```
Output: Quality Label label
Method:
X = Extract_feature(R)
label = Classifier(X)
Return label
```

Through quality control and feedback adjustments, the resource repository can rapidly accumulate a large number of high-quality teaching resources, better meeting user demands.

5 Evaluation of resource repository application effectiveness

5.1 Scenario setup

To comprehensively assess the effectiveness of the resource repository, this study has established typical teaching application scenarios. During the course of their studies, students can search the repository to access advanced concepts and project examples related to digital media technology, aiding their understanding. They can also engage in innovative practices based on downloaded multimedia materials to develop problem-solving skills. Additionally, teachers can leverage the repository to access cutting-edge technical resources to support teaching and research. This scenario fully utilizes the resource repository to facilitate teaching and learning [8].

5.2 Construction of evaluation indicator system

To accurately assess the effectiveness of the resource repository, this study has constructed an evaluation indicator system, assessing aspects such as teacher and student satisfaction, resource usage, and learning outcomes. The framework is depicted in Figure 3. By combining quantitative and qualitative indicators, the teaching efficacy of the resource repository can be comprehensively evaluated.
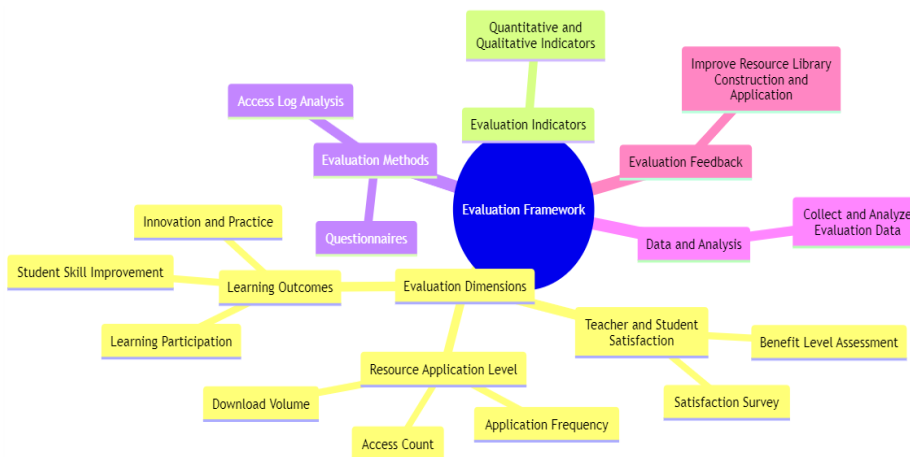

Figure 3. Evaluation Indicator System for Resource Repository Application Effectiveness

5.3 Evaluation results compilation

Guided by the aforementioned evaluation framework, this study conducted a statistical evaluation of the application effectiveness of the resource repository over one semester of trial operation, utilizing methods such as questionnaires and access log analysis. Some of the results are presented in Table 3. The survey revealed that 89.6% of students and 94.7% of teachers provided positive assessments of the resource repository [9-10]. Moreover, the access volume exceeded the average. These findings demonstrate that the resource repository has already achieved promising results in its initial implementation for teaching applications.

Table 3. Statistical Evaluation of Resource Repository Application Effectiveness

Evaluation Indicator	Evaluation Results
Teacher and Student Satisfaction	89.6%/94.7%
Resource Access Volume	Above Average
Student Participation in Innovative Practices	86.40%

6 Conclusion

In the context of today's Internet+ era, universities urgently need to address the significant shortage of teaching resources in digital media technology. Based on an analysis of the trends in digital media technology development, the crucial importance of large-scale construction of teaching resource repositories has been elucidated. This paper has systematically outlined a comprehensive solution, encompassing resource aggregation methods such as platform architecture design, resource collection strategies, and quality control. It has also proposed an effectiveness evaluation mechanism, including the construction of an evaluation indicator system and the compilation of results. This solution supports educators in conducting digital media technology teaching, facilitates student-driven innovation practices, and is poised to achieve excellent teaching outcomes, thereby promoting the deep integration and collaborative development of digital media technology and education.

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