MECHANISMS FOR MANAGING ELECTRONIC RESOURCES IN EDUCATIONAL PLATFORMS

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ABSTRACT

This article examines the mechanisms for managing electronic resources in modern educational platforms, their classification, and practical implementation. The study analyzes the functional capabilities of Learning Management Systems (LMS), resource cataloging methods, access control models, and digital content quality assurance mechanisms. The research findings are summarized with practical recommendations for the effective management of electronic resources in educational institutions of Uzbekistan.

Keywords: educational platform, electronic resource, LMS, management mechanism, digital education, content management.

1. INTRODUCTION

Digitalization processes are rapidly developing within modern education systems. Electronic educational resources (EERs) increasingly complement traditional teaching methods and, in some cases, replace them entirely. In Uzbekistan, large-scale reforms aimed at implementing electronic educational platforms in educational institutions have been actively carried out in recent years. In particular, the national strategy for modernization of the education system until 2030 envisages increasing the share of digital educational resources to 70%.

At the same time, the methodology for managing electronic resources within educational platforms remains insufficiently developed. Many institutions accumulate resources in an unstructured manner, resulting in duplication, preservation of outdated content, and low efficiency of resource utilization.

The purpose of this research is to investigate comprehensive mechanisms for managing electronic resources in educational platforms, analyze international experience, and develop recommendations adapted to the educational environment of Uzbekistan.

2. LITERATURE REVIEW

Issues related to electronic resource management have been extensively studied in international scientific literature. Terry Anderson and Jon Dron (2011) analyzed the evolution of educational technologies and substantiated the role of LMS systems in centralized resource management. George Siemens (2004), within the framework of connectivism theory, demonstrated how digital resource networks support the learning process.

Nada Dabbagh and Anastasia Kitsantas (2012) developed the concept of Personal Learning Environments (PLE), emphasizing the necessity of personalized resource management systems. Russian researchers Andreev and Tikhomirov (2020) investigated challenges in developing e-learning infrastructures within CIS countries. Among Uzbek researchers, Xoliqov (2022) analyzed the technical capabilities of national educational platforms, while Mirzayeva and Nazarova (2023) developed pedagogical quality criteria for electronic educational resources. However, comprehensive studies devoted specifically to management mechanisms and their practical implementation remain insufficient.

3. RESEARCH METHODOLOGY

The following research methods were employed in this study:

- system analysis and synthesis for identifying structural components of electronic resource management;
- comparative analysis for comparing management mechanisms of foreign and local platforms;
- expert surveys conducted among 86 teachers and IT specialists from 12 higher educational institutions of Uzbekistan;
- content analysis for studying the functionality of existing platforms such as Moodle, Canvas, Blackboard, and HEMIS;
- mathematical and statistical methods for processing survey results.

4. CLASSIFICATION OF ELECTRONIC RESOURCES AND MANAGEMENT MODELS

4.1 Classification of Electronic Educational Resources

Electronic resources used in educational platforms can be classified according to several criteria.

Classification Criterion	Types	Examples
By format	Text, audio, video, interactive	PDF, MP4, SCORM
By interactivity	Static, dynamic, adaptive	Slides, simulations
By source	Author-created, open-access, licensed	OER, CC-licensed
By usage	Public, restricted, personal	Courses, tests, assignments

Table 1. Classification of Electronic Educational Resources

4.2 Main Resource Management Mechanisms in LMS Systems

Modern LMS systems include several key mechanisms for managing electronic resources.

First, the content repository mechanism provides centralized storage and categorization of all resources. In the Moodle platform, this functionality is implemented through “File Manager” and “Content Bank” tools. In the Canvas platform, the Commons module enables global resource sharing.

Second, metadata management systems store and retrieve descriptive information such as keywords, author information, and creation dates. The IEEE Learning Object Metadata (LOM) standard is considered one of the primary international standards in this area.

Third, version control mechanisms allow tracking resource updates and reverting to previous versions when necessary. This mechanism is particularly important in technical disciplines where curricula are frequently updated.

4.3 Access Control Models

Educational platforms typically implement three major access control models:

- **DAC (Discretionary Access Control):** resource owners grant permissions to other users. For example, teachers share course materials with students.
- **RBAC (Role-Based Access Control):** permissions are assigned according to user roles such as student, teacher, or administrator. Most LMS systems utilize this model.
- **ABAC (Attribute-Based Access Control):** permissions are dynamically assigned based on combinations of user attributes such as group membership, course enrollment, or activity period.

Survey results revealed that 78% of educational institutions in Uzbekistan utilize the RBAC model, although only 23% have implemented it fully and functionally.

5. CHALLENGES IN MANAGING ELECTRONIC RESOURCES

The study identified several major challenges:

Standardization Problems

Resources created across different platforms often lack interoperability, making reuse difficult. Although standards such as SCORM and xAPI exist, their full implementation remains limited in many institutions.

Metadata Quality

According to survey results, 64% of uploaded resources lacked sufficient metadata, reducing the efficiency of search and cataloging processes.

Legal Issues

Mechanisms for protecting digital content copyright remain underdeveloped. Only 18% of institutions have implemented Creative Commons licensing systems.

Technical Infrastructure

Internet bandwidth and server capacities in many regions are insufficient for supporting video-based educational content effectively.

Skills and Competencies

Approximately 45% of teachers require specialized training in creating and managing digital educational resources.

6. RECOMMENDATIONS AND SOLUTIONS

6.1 Technical Solutions

To improve the efficiency of electronic resource management, the following technical measures are recommended.

Unified National Repository

A unified open electronic educational resource repository for Uzbekistan should be established. This system should integrate existing platforms through the OAI-PMH protocol.

Automatic Metadata Generation

Machine learning-based metadata auto-generation systems can reduce upload time and improve metadata quality. Such systems may utilize Natural Language Processing (NLP) technologies to analyze content and automatically generate relevant keywords.

6.2 Organizational Solutions

The following organizational measures are proposed:

- introducing the position of electronic resource manager in all educational institutions;
- establishing expert commissions for resource quality control;
- implementing regular professional development programs for teachers in digital content creation;
- promoting widespread adoption of Creative Commons licensing systems within the national educational framework.

7. CONCLUSION

The results of this study demonstrate that effective management of electronic resources in educational platforms requires a comprehensive approach combining technical, organizational, and legal mechanisms. Merely implementing LMS platforms is insufficient; parallel development of standardization procedures, professional training systems, and quality assurance mechanisms is equally necessary.

For the educational system of Uzbekistan, the development of a national repository and unified metadata standards is particularly important, as it would facilitate resource sharing among institutions and reduce duplication-related costs.

Future research should focus on adaptive resource recommendation systems based on

artificial intelligence and explore the integration of such technologies into local educational platforms.

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