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# A Study on Extending Metadata in the School Library DLS in South Korea

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**Abstract**

This study analyzes the structural limitations of DLS metadata used in South Korean school libraries and proposes an approach for its extension. The current DLS metadata structure, which primarily focuses on bibliographic and holding information, has limitations in supporting curriculum integration and data sharing with external resources. To address these issues, this study proposes curriculum-linked metadata elements, including school level, grade level, subject area, and subject topic, and reconstructs them using a BIBFRAME-based RDF triple structure. This approach extends DLS metadata into an entity-based semantic framework and enables linkages with external web resources. Furthermore, this study enhances the direct integration of school library metadata with the curriculum, improving the efficiency of resource discovery and use, and providing a foundation for the systematic utilization of school library collections.



## 1. Introduction

School libraries serve as essential educational infrastructures that support teaching and learning activities for students and teachers. To fulfill this role, they are required to systematically manage and provide access to a wide range of resources. For this purpose, systems that support the registration, management and retrieval of library materials are necessary, with the Digital School Library System (DLS) being widely utilized in South Korea.

However, the metadata in DLS is primarily designed for collection management within individual school libraries, resulting in limitations in data sharing and interoperability with external institutions. In addition, the current metadata elements mainly focus on bibliographic and holding information, which makes it difficult to fully reflect the role of school libraries in supporting the educational curriculum.

To replace traditional MARC, major national libraries, led by the US Library of Congress (LC) and those in Europe, are adopting BIBFRAME as a Linked Data-based bibliographic framework. Aligning with this international trend, the National Library of Korea is also implementing BIBFRAME to enable data to be connected, shared, and reused with external resources [1], establishing a clear rationale for extending the school library DLS into this next-generation structure. Furthermore, while existing studies on the DLS have primarily focused on user behavior analysis, bibliographic data structures, and system functional improvements, little to no research has explored its expansion into next-generation ontology models like BIBFRAME for external connection and scalability.

This study aims to analyze the limitations of DLS metadata and propose a framework for its extension. In particular, it develops curriculum-related metadata elements and reconstructs them using a BIBFRAME-based RDF structure to enable linkage with

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external web resources. Through this approach, the study seeks to enhance the interoperability and scalability of DLS metadata and to contribute to the development of a semantically enriched information environment for school libraries.

## 2. Theoretical background

### *2.1. School Libraries and the Digital Library System (DLS)*

School libraries play a key role in supporting teaching and learning activities by collecting, organizing, preserving, and providing access to various educational resources [2]. In particular, the systematic management and provision of materials aligned with the school curriculum can be considered a core function of school libraries [3].

To support these functions, the Digital School Library System (DLS) is widely used in South Korean school libraries. DLS is an integrated system designed to register and manage library collections while providing users with search and access functions. It aims to enhance the efficiency and automation of school library operations.

Moreover, DLS functions not only as a management tool for teacher-librarians and library staff but also as a primary access point for students to search and retrieve library materials, making it a key infrastructure for school library services [4].

However, the current DLS is primarily focused on collection management and has limitations in supporting curriculum integration and interoperability with external resources. Therefore, to strengthen the educational role of school libraries and extend resource utilization, it is necessary to improve the metadata structure of DLS and reconstruct it into a more extensible form.

### *2.2. Analysis of DLS Metadata*

The metadata structure of the Digital Library System (DLS) is designed to support the registration and management of school library resources. It is broadly divided into bibliographic information and holding information. Bibliographic information includes core descriptive elements such as title, author, publisher, publication year, and ISBN, while holding information consists of elements necessary for collection management, such as classification number, author number, and price.

DLS categorizes its resource types into four groups: monographs, non-book materials, instructional materials, and others. It also provides two input modes—basic mode and expert mode—which allow different levels of metadata description. This structure enables more detailed cataloging and reflects the principles of International Standard Bibliographic Description (ISBD), supporting standardized description and management of resources.

In particular, for monographs, DLS adopts ISBD areas as the basis for bibliographic description [5]. Accordingly, metadata elements are organized by ISBD areas and are divided into basic and expert modes, with required elements clearly defined (see Table 1). The required fields are consistent across both modes and include five bibliographic

**Table 1**. *Classification of DLS Metadata Required Elements*

| ISBD Area | Basic Mode/Expert Mode |
|---|---|
| Title and Statement of Responsibility Area | title |
| | author |
| Publication, Production, Distribution, etc., Area | publisher |
| | publication year |
| Standard Identifier and Terms of Availability Area | ISBN |
| | price |
| Additional/Supplementary Description Area | classification number (KDC) |
| | author number |

elements—title, author, publisher, publication year, and ISBN—and three holding elements—classification number (KDC), author number, and price—resulting in a total of eight mandatory elements.

However, the current DLS metadata is primarily focused on bibliographic and holding information, and therefore does not sufficiently reflect the distinctive role of school libraries in supporting the educational curriculum. In particular, elements related to curriculum linkage and target learners are only minimally included, which limits the extensibility and educational utility of the resources. Therefore, it is necessary to extend DLS metadata by incorporating elements that support curriculum integration. To this end, this study proposes the development and addition of curriculum-related metadata elements and the restructuring of DLS to enable linkage with external web resources.

## 3. Development of Curriculum-Linked Metadata Elements for DLS

In the current DLS, metadata elements that can represent curriculum-related unit topics are mainly limited to "subject headings" and "search keywords." However, these elements are not mandatory fields like title or author and are entered at the discretion of the cataloger. In the case of grade-level information, it may be included in the "intended audience note," but this information is not structured as a separate element and functions only as supplementary information rather than as a searchable or standardized field [6].

To address these limitations, it is necessary to develop curriculum-linked metadata elements that incorporate both target learner information and subject-specific content. In constructing such metadata elements, it is essential to refer to the national curriculum standards based on Paragraph 2 of Article 23 of the Elementary and Secondary Education Act, which provide the core content of each subject area.

Specifically, the curriculum's "content framework" and "achievement standards," which serve as the basis for teaching and learning, can be used to derive metadata elements for DLS, including target learner information (school level and grade level) and subject-related elements (content elements and learning elements).

**Table 2**. *Curriculum-Linked Metadata Elements for DLS*

| ISBD Areas | Type | DLS metadata elements |
|---|---|---|
| Curriculum-Linked Area | target learner information | school level, grade level |
| | learning elements | subject area, subject topic |

Accordingly, the curriculum-linked metadata elements proposed in this study, which were derived through a content analysis of the curriculum, can be categorized into four components: target learner information (school level and grade level) and learning elements (subject area and subject topic).

## 4. Linking DLS with BIBFRAME

The Digital Library System (DLS) is primarily designed for the registration and management of school library resources, resulting in a closed structure in which bibliographic data is used only within individual school libraries. This limitation makes it difficult to share and integrate data with external institutions and does not fully support the openness and extensibility required in digital environments.

To address these issues, this study proposes linking DLS metadata with a BIBFRAME-based structure. BIBFRAME is a model that represents data in terms of entities and relationships, and by utilizing the RDF triple structure, it enables bibliographic data to be transformed into an interconnectable format within web environments.

In particular, by mapping DLS metadata elements to BIBFRAME entities and properties and reconstructing them in a Subject-Predicate-Object structure, it is possible to extend traditional record-based data into an entity-based, semantic data model. This linkage enables DLS metadata to be transformed into a structure that can connect with external web resources, thereby facilitating the sharing and utilization of school library resources.

Accordingly, this study reconstructs DLS bibliographic data not as fixed records but as modular metadata elements. To enable web-based extension through BIBFRAME, DLS metadata elements are mapped to BIBFRAME entities based on ISBD areas and structured using RDF triple relationships.

In the case of the Korean Decimal Classification (KDC), it was modeled by utilizing BIBFRAME's generic classification class, *bf:Classification*, and specifying the KDC schema value in the *bf:source* property.

By linking DLS metadata with BIBFRAME, it becomes possible to connect school library collection data to external web resources. This approach overcomes the limitations of the closed, text-based structure of DLS and enables the extension of metadata into an open knowledge asset that can be shared with related institutions, such as other school libraries and public libraries.

**Table 3**. *Mapping between DLS Metadata and BIBFRAME*

| ISBD Area | DLS metadata | BIBFRAME entities | RDF triple relationships |
|---|---|---|---|
| Title and Statement of Responsibility Area | title | Work | `bf:title(bf:MainTitle)` |
| | author | Work | `bf:contribution(bf:Agent)` |
| Publication, Production, Distribution, etc., Area | publisher | Instance | `bf:provisionActivity(bf:Agent)` |
| | publication year | Instance | `bf:provisionActivity(bf:Date)` |
| Standard Identifier and Terms of Availability Area | ISBN | Instance | `bf:identifiedBy(bf:Isbn)` |
| | price | Instance | `bf:acquisitionTerms` |
| Additional/Supplementary Description Area | classification number (KDC) | Work | `bf:classification(bf:Classification)` |
| | author number | Item | `bf:shelfMark` |
| Curriculum-Linked Area | school level | Work | `bf:intendedAudience(bf:IntendedAudience)` |
| | grade level | Work | `bf:intendedAudience(bf:IntendedAudience)` |
| | subject area | Work | `bf:subject(bf:Topic)` |
| | subject topic | Work | `bf:subject(bf:Topic)` |

## 5. Conclusion

This study analyzed the structural limitations of DLS metadata used in school libraries and proposed a framework for its extension. Although DLS effectively supports the registration and management of school library resources, its metadata is primarily focused on bibliographic and holding information, resulting in limited integration with the educational curriculum and restricted data sharing with external resources.

To address these limitations, this study proposed curriculum-linked metadata elements, including school level, grade level, subject area, and subject topic, to strengthen the connection with the curriculum. In addition, it presented a method for restructuring DLS metadata into a BIBFRAME-based RDF triple structure to transform the traditional record-based model into an entity-based framework.

Through this extension and restructuring, DLS metadata can better reflect the educational functions of school libraries while enhancing openness and interoperability through linkage with external web resources. Furthermore, this approach provides a foundation for transforming school library data from simple management information into semantically rich knowledge resources.



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