

Transforming Scientific Information into Educational Assignments: A Framework for Database Management and Content Conversion

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Abstract

Effectively storing, accessing, and adapting scientific information for educational purposes requires a flexible, multi-platform approach to data management. This paper introduces a framework supporting various data storage solutions—such as the Journal Article Tag Suite (JATS), Microsoft Excel, and conventional database systems—to organize scientific content in fields like mathematics, computer science, and engineering based on specific application needs. Each storage format offers unique advantages: JATS provides structured, standardized tagging, Excel allows user-friendly access to detailed content, and traditional databases deliver robust data management capabilities. Conversion tools enable seamless transformation across these formats, preparing scientific information for use in online assignments tailored to each discipline. Furthermore, assignments can be generated in multiple compatible formats, such as the Question and Test Interoperability (QTI) format for platforms like Blackboard, or ASP.NET and PHP formats to meet the needs of other learning management systems. This multi-format approach facilitates the direct integration of subject-specific scientific information into assignments, enabling educators to deliver interactive and discipline-relevant learning materials that enhance engagement and outcomes in mathematics, computer science, and engineering education.