



DIGITIZING EDUCATIONAL RESOURCES: DEVELOPMENT OF LEARNING MATERIALS REPOSITORY HUB

**Joseline M. Santos, Raquel C. Adriano, Marian Minneli S. Cruz,
Mayleen Dorcas B. Castro, Eunice B. Custodio, Gerriper T. Bernardo**

Bulacan State University, Philippines

E-mail: joseline.santos@bulsu.edu.ph, raquel.adriano@bulsu.edu.ph,
marian.cruz@bulsu.edu.ph, mayleen.castro@bulsu.edu.ph,
eunice.custodio@bulsu.edu.ph, gerriper.bernardo@bulsu.edu.ph

Abstract

This study developed a Learning Materials Repository Hub (LMRH) to digitize educational resources for the K-12 education system, addressing the need for centralized, high-quality, and accessible learning materials. Using a developmental research approach, Graduate School students created Digitized Learning Materials (DLMs) aligned with the Most Essential Learning Competencies (MELCs) and the Alternative Delivery Mode Learning Resource (ADMLR) standards of the Department of Education (DepEd). These materials were reviewed by subject-matter experts and integrated into the LMRH, which was designed as a centralized platform for organizing and sharing digital learning content. The study employed expert evaluations and teacher assessments to determine the content quality, educational effectiveness, technical usability, and overall acceptability of the LMRH. The Technology Acceptance Model (TAM) was used to measure perceived usefulness, ease of use, attitude toward using, and intention to use, while the System Usability Scale (SUS) evaluated its usability. Findings revealed that the DLMs received high ratings for quality, and the LMRH was deemed effective in supporting both synchronous and asynchronous learning. Teachers strongly agreed on its usefulness and ease of integration into teaching. The results suggest that digital learning repositories can significantly enhance teaching and learning experiences, providing a flexible and efficient platform for educators. The study highlights the importance of digitized educational resources and encourages further investment in educational technology to improve curriculum implementation and educational delivery in K-12 education.

Keywords: Learning Materials Repository Hub (LMRH), Digitized Learning Materials (DLM), Alternative Delivery Mode Learning Resource (ADMLR), Technology Acceptance Model (TAM), System Usability Scale (SUS)

Introduction

The COVID-19 pandemic has undeniably transformed education on a global scale, marking a permanent shift in how learning is delivered, accessed, and perceived. Traditional face-to-face education had to quickly adapt to online and hybrid models, accelerating the integration of technology into teaching and learning. Thus, COVID-19 pandemic has changed education forever (Li et al., 2020). Getting used to the New Normal education setup challenges school administrators, teachers, and students. The school administrators develop a continuity plan to prepare and properly implement educational programs. No program could have prepared teachers to teach in a pandemic (Torres, 2020). Teachers have to learn new strategies that they have never imagined before. They have to attend webinars that equip them to face a great educational shift. The students and their parents have doubts about their capacity to continue learning amidst the challenges of the pandemic in different aspects of their lives.

The Department of Education (DepEd), the government agency responsible for managing and regulating the country's basic education system, introduced "Blended Learning" as a pre-existing method to shift the delivery of education in a new normal set-up. Blended learning is a method that uses radio, television, online, and modular learning to deliver lessons to students (Department of Education, 2017). Different learning delivery options such as face-to-face, blended learning, distance learning, homeschooling, and other delivery approaches shall be implemented (Müller et al., 2023). Teachers' Preparation, especially online, takes a huge amount of time. One of the preparations of teachers is the development of educational materials. DepEd offers self-learning modules (SLMs) alongside alternative learning delivery modalities to cater to diverse learners across the Philippines (Department of Education, 2017a). Bates (2019) stated that a well-designed learning experience is characterized by clear learning objectives, well-structured content, balanced workloads for both faculty and students, effective integration of media, meaningful student activities, and assessments that align closely with the intended learning outcomes. These SLMs were created by the public school teachers following the standard of Alternative Delivery Mode Learning Resource of DepEd.

SLMs are being used to cater to the needs of the students who prefer to have printed modules in learning. Partial results from the Learner Enrollment and Survey Forms (LESFs) collected during the enrollment period indicate that 7.2 million students opted for modular distance learning, TV and radio-based education, and other modalities, whereas only 2 million preferred online learning for the 2020-2021 school year (Hernando-Malipot, 2020). It is a reality that not all students claim that they don't have access to the internet; some students prefer to use online learning to access the materials and learn, which is also part of blended learning.

Several studies have identified a key challenge: instructors are transferring their traditional teaching methods to online learning, which does not seem to be effective (Leuțanu, 2021). Therefore, the issue is that online teaching methods and online faculty training services should be looked at differently, considering innovative techniques to facilitate quality education for students (Lipschuetz, 2017). The Department of Education introduced the DepEd Commons to the public schools through the Office of the Undersecretary of Administration Memorandum No. 4019 on April 7, 2021. DepEd Commons is a digital platform designed to assist public school teachers in facilitating distance learning. Slide presentations, tests, e-books, and instructive videos are all available on the site. One particular observation on the DepEd Commons is using the Quizizz application for most of its assessments. The researchers' proposed study is far more advanced than simply using an application for assessment. Pear Deck combines an interactive slide presentation with an assessment in the proposed study.

Pear Deck is another online application that can be an add-on to Google Slide. With the features of Pear Deck, teachers can make an interactive presentation that can be used in synchronous and asynchronous sessions. The initiative of the researchers to create additional resources that can make students learn better in the new normal provides options for teachers to choose other forms of learning resources. This is the key reason this research needs to be pursued, as K-12 teachers are supported in addressing the current normal educational set-up.

The content of the learning materials that were developed in this study was based on the Most Essential Learning Competencies (MELCs) of DepEd. All developed learning materials were subjected to the acceptability evaluation.

Research Problem

In the evolving landscape of K-12 education, the integration of digital learning resources has become increasingly essential, particularly in blended and remote learning environments. However, a persistent challenge exists in ensuring that educational materials are centralized,

accessible, and aligned with national educational standards. Many teachers struggle with scattered, inconsistent, or low-quality digital resources, making it difficult to provide effective, engaging, and standardized education. The lack of a structured repository for digitized learning materials limits their ability to efficiently adapt to both synchronous and asynchronous teaching modes.

This study addresses this critical issue by developing a Learning Materials Repository Hub (LMRH) designed to centralize and organize high-quality digitized learning materials (DLMs). The primary problem lies in the absence of a unified platform that meets the Alternative Delivery Mode Learning Resource (ADMLR) standards set by the Department of Education (DepEd). This gap has scientific and pedagogical implications, as it affects educational effectiveness, curriculum implementation, and digital resource sustainability. By evaluating the usability, accessibility, and acceptability of the LMRH, this research seeks to contribute to the broader discourse on digital pedagogy and inform future developments in technology-driven education.

Research Focus

The research focused on the development of a Learning Materials Repository Hub (LMRH) to serve as a centralized digital platform for curating and managing digitized learning materials (DLMs) for K-12 education. It emphasized the digitization and organization of educational resources to enhance accessibility for teachers and students, ensuring alignment with the Most Essential Learning Competencies (MELCs) and the Alternative Delivery Mode Learning Resource (ADMLR) standards set by the Department of Education (DepEd). Additionally, the study explored the integration of educational technology, particularly Google Slides with Pear Deck, to facilitate interactive and engaging learning experiences. The evaluation of DLMs was conducted through expert assessments, measuring their content quality, educational design, technical aspects, and structural organization. Moreover, the research examined the usability and acceptability of the LMRH by employing the Technology Acceptance Model (TAM) and the System Usability Scale (SUS) to analyze teachers' perceptions of its effectiveness. By addressing these key areas, the study aimed to enhance digital educational material repositories and provide practical solutions for improving the implementation of online and blended learning in the K-12 education system.

Research Aim and Research Questions

The LMRH was designed to enhance educational delivery by providing structured, accessible, and high-quality digital resources that support both synchronous and asynchronous learning. By integrating various online learning materials, the platform aimed to address the challenges teachers face in accessing and utilizing digital educational resources, particularly in blended learning environments.

Specifically, this study sought answers to the following questions:

1. What were the features of the Learning Materials Repository Hub (LMRH) that was developed?
2. What were the topics covered in the development of digitized learning materials (DLM) in terms of:
 - 2.1 Grade Level
 - 2.2 Subject
 - 2.3 Unit Title
 - 2.4 Lesson Title

3. How were the digitized learning materials and learning materials repository hub developed?
4. What was the evaluation DLM by the experts based on:
 - 4.1 Content Quality
 - 4.2 Educational Quality
 - 4.3 Technical Quality
 - 4.4 Other Findings
 - 4.5 Integration of PearDeck
5. What was the level of acceptability of DLM as evaluated by the teachers based on:
 - 5.1 Perceived Usefulness
 - 5.2 Perceived Ease of Use
 - 5.3 Attitude Toward Using
 - 5.4 Intention to Use
6. What was the level of usability of the LMRH as evaluated by experts and teachers?

Research Methodology

General Background

The rapid shift to digital education, accelerated by the COVID-19 pandemic, has reshaped the landscape of teaching and learning. Educational institutions worldwide have had to adapt to blended and online learning models, highlighting the need for accessible, high-quality, and well-organized educational materials. In the Philippines, the Department of Education (DepEd) introduced *Blended Learning* as a method of instruction that integrates various modalities such as radio, television, online platforms, and printed modules to ensure continuous learning. However, despite these efforts, challenges persist in terms of the availability, organization, and accessibility of digital learning resources.

To address these challenges, this study focuses on the development of a *Learning Materials Repository Hub (LMRH)*—a centralized digital platform designed to digitize, store, and manage educational resources for K-12 educators and learners. The LMRH aims to bridge the gap between traditional and digital learning materials by providing an interactive and structured repository aligned with the *Most Essential Learning Competencies (MELCs)* and *Alternative Delivery Mode Learning Resource (ADMLR)* standards set by DepEd.

The demand for innovative digital learning platforms is further underscored by the challenges teachers face in educational material development. While DepEd provides *Self-Learning Modules (SLMs)*, there is still a need for a more interactive and accessible system that can support synchronous and asynchronous teaching. In response, this study incorporates *Google Slides* and *Pear Deck* as key tools for interactive content delivery, allowing for a more engaging learning experience.

By leveraging educational technology, the LMRH serves as an innovative solution for managing and disseminating digitized learning materials efficiently. This study evaluates the system's usability and acceptability using expert assessments and teacher feedback, employing frameworks such as the *Technology Acceptance Model (TAM)* and the *System Usability Scale (SUS)*. The research highlights the role of digital repositories in enhancing educational delivery, ensuring that teachers and students have access to high-quality educational resources anytime and anywhere. Through this initiative, the study contributes to the ongoing efforts of improving digital learning infrastructure, fostering innovation, and supporting educators in navigating the evolving educational landscape.

Sample

The study involved 74 Graduate School students enrolled in Computer Education during the first trimester of the 2022-2023 academic year at a state university in Bulacan, Philippines. As part of their coursework, these students were tasked with developing Digitized Learning Materials (DLMs), ensuring comprehensive coverage across various grade levels and subject areas. The participants were teachers handling different subjects, including seven Social Studies, 21 English, two Values Education, nine Filipino, 19 Mathematics, six Science, and 10 Technology and Livelihood Education. Their involvement in the study stemmed from their enrollment in the Computer Education course during the said semester, making them key contributors to the development of DLMs.

To ensure the quality and effectiveness of these materials, subject-matter experts, including DepEd teachers and IT specialists, conducted evaluations focusing on content quality, educational design, technical aspects, and usability. There were 10 experts who evaluated the paper based on the criteria for development of new non-print resources from the Department of Education (2009).

Additionally, a separate group of 30 teachers from the Department of Education, randomly selected from the participants, assessed the acceptability and usability of the Learning Materials Repository Hub (LMRH) to determine its effectiveness in the teaching-learning process.

Instrument and Procedures

The study employed a developmental research approach to design, evaluate, and validate the Learning Materials Repository Hub (LMRH) and its Digitized Learning Materials (DLMs). To assess content validity, educational quality, and technical accuracy, the *Evaluation and Review Criteria for New Non-PRINT Resources* from the Department of Education (2009) was utilized. Additionally, the *Checklist for Designing and Using Visuals in the Classroom* from the British Columbia Institute of Technology (2010) was employed to evaluate the content, design, and technical quality of the DLMs, ensuring alignment with educational and visual standards. Following the initial evaluation, 72 materials were endorsed for review by a panel of 10 teachers from the Department of Education, each with at least three years of teaching experience in their respective subjects. The distribution of materials among the evaluators was as follows: nine materials for Technology and Livelihood Education, 17 for Mathematics (evaluated by two teachers), nine for Filipino, eight for Social Studies, six for Science, 21 for English (evaluated by three teachers), and two for Values Education. This structured evaluation process ensured a thorough review of the DLMs, aligning them with subject-specific pedagogical and technical standards.

To determine the usability and acceptability of the LMRH, the study applied the Technology Acceptance Model (TAM) Questionnaire (Davis, 1989), which examined teachers' perceptions of perceived usefulness, ease of use, attitude toward using, and intention to use the platform. Furthermore, the System Usability Scale (SUS) (Sauro & Lewis, 2011) was used to assess the overall usability and functionality of the system.

The research followed a systematic procedure, beginning with the development of DLMs by Graduate School students enrolled in Computer Education. These students created interactive educational content using Google Slides with the Pear Deck extension, ensuring alignment with the Most Essential Learning Competencies (MELCs) and the Alternative Delivery Mode Learning Resource (ADMLR) standards set by DepEd. Once developed, the DLMs underwent expert evaluation for content accuracy, educational effectiveness, and technical quality, with DepEd specialists reviewing language and formatting before their integration into the repository.

The subsequent phase focused on the design and development of the LMRH, establishing it as a centralized digital repository for storing, organizing, and accessing digitized educational materials, systematically categorized by grade level and subject. Following its development, usability and acceptability testing was conducted, where IT experts and teachers assessed the platform's navigation, functionality, and ease of use using the SUS and TAM evaluation tools.

The final phase involved system testing and implementation, ensuring that the LMRH was functional, efficient, and capable of supporting both blended and online learning modalities. These procedures ensured that the research effectively addressed the need for digitized educational resources, providing a sustainable and innovative digital learning solution for K-12 educators and learners.

Data Analysis

The data analysis in this study employed descriptive statistics to evaluate the effectiveness, usability, and acceptability of the Learning Materials Repository Hub (LMRH) and its Digitized Learning Materials (DLMs). To assess the quality of the DLMs, mean scores and standard deviations were computed based on the evaluations of teachers and subject-matter experts. These assessments focused on key areas such as content quality, educational effectiveness, technical aspects, and structural organization, allowing the study to determine the strengths and areas for improvement in the educational materials.

To measure the usability of the LMRH, the study utilized the System Usability Scale (SUS) (Sauro & Lewis, 2011). The System Usability Scale (SUS), developed by Brooke (1986) and analyzed by Sauro & Lewis (2011), is a standardized tool for assessing system usability. It consists of 10 items rated on a five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). To compute the SUS score, responses to odd-numbered items are adjusted by subtracting 1 from the given rating, while even-numbered items are adjusted by subtracting the rating from 5. The adjusted scores are then summed, resulting in a raw score between 0 and 40, which is multiplied by 2.5 to yield a final score ranging from 0 to 100. A score above 68 is considered above average, with 80.3 and higher indicating excellent usability, while scores below 50 suggest poor usability. This method provides a quick and reliable measure of a system's overall user experience. Higher SUS scores indicated better system performance and user experience, providing insights into the functionality, navigation, and overall user-friendliness of the platform. Evaluations were conducted by IT experts and teachers, ensuring that both technical and pedagogical perspectives were considered in determining the system's efficiency and usability.

Additionally, the Technology Acceptance Model (TAM) Questionnaire (Davis, 1989) was used to examine the acceptability of the LMRH and DLMs. The questionnaire measured perceived usefulness, evaluating whether the platform contributed to effective teaching and learning; perceived ease of use, assessing how intuitive and user-friendly the system was; attitude toward using, gauging teachers' overall sentiment and willingness to adopt the platform; and intention to use, determining the likelihood of continued or future utilization of the LMRH in educational settings.

To ensure the reliability and validity of the research instruments and collected data, a systematic approach was employed throughout the study. The research instruments, including usability and acceptability assessment tools, underwent content validation by a panel of subject-matter experts, IT specialists, and experienced educators. These experts evaluated the instruments based on clarity, relevance, and alignment with the research objectives before their administration. Additionally, the System Usability Scale (SUS) and Technology Acceptance Model (TAM) questionnaire were adapted from validated sources to ensure their construct validity in assessing user perceptions of the Learning Materials Repository Hub (LMRH).

Through these analyses, the study provided valuable insights into the effectiveness, usability, and practical application of the LMRH. The findings highlighted the repository's potential to enhance educational delivery, support blended and online learning, and serve as a sustainable digital learning solution for K-12 educators. Based on the results, the study proposed recommendations for improving digital educational resources and optimizing the repository's usability for future educational applications.

Research Results

Features of the Learning Materials Repository Hub (LMRH)

The Learning Materials Repository Hub (LMRH) system serves as a central platform for accessing, sharing, and managing educational resources. Here are the key features typically found in this system:

The learning platform encompasses a comprehensive suite of features tailored to enhance user experience and ensure the integrity of the educational environment. It begins with robust user registration and authentication capabilities, facilitating the creation of accounts and ensuring secure identity verification through mechanisms like username/password, email verification, or social media login. Content upload and management functionalities empower registered users to contribute diverse learning materials, including documents, presentations, and PDF files, while tools for categorization, tagging, and metadata assignment streamline resource organization. A powerful search and browse functionality enables swift access to relevant materials, complemented by user profiles where individuals can manage personal information, preferences, and saved resources, as well as track learning progress and receive personalized recommendations. The platform prioritizes accessibility and inclusivity, adhering to standards like WCAG to ensure usability for users with disabilities, integrating features like alternative text for images and keyboard navigation. Analytics and reporting tools offer insights into usage metrics, user engagement, and content popularity, while content moderation and quality control mechanisms maintain the platform's integrity through review, approval, and management of user-contributed materials, alongside ensuring compliance with content guidelines and copyright regulations. Finally, stringent security and privacy measures, including encryption, secure authentication, and data access controls, safeguard user data and maintain confidentiality across the platform.

These features collectively enhance the functionality, usability, and value proposition of a Learning Materials Repository Hub system, providing a valuable resource for educators, learners, and other stakeholders in the education community.

Topics Covered in the Development of Digitized Learning Materials (DLM)

The development of digitized learning materials (DLM) encompasses a wide array of topics across different grade levels and subjects. Each grade level, from elementary to high school, involves the creation of tailored educational content to meet the learning needs of students. Subjects such as English, Mathematics, Science, Filipino, Social Studies, and ICT are covered, with unit and lesson titles ranging from fundamental concepts like rhyming words and numerical comparison to more advanced topics such as intermolecular forces and contextual comprehension. Grade 1 subjects include English, Mathematics, Filipino, Social Studies, and Science. Lessons cover various topics such as rhyming words, numerical comparison, the story of Miss Cabbage, understanding family, and exploring the five senses. Grade 2 consists of English focusing on naming words, Filipino delving into the same story, Social Studies exploring community jobs, and Science distinguishing between living and non-living things.

Grade 3 comes with living and non-living things in Science, initial letters of object names in Filipino, and types of sentences in English. Grade 4 delves into livelihood programs in Social Studies, intermolecular forces and states of matter in Science, expressions conveying concepts or views in Filipino, and exploring personal identity in Values Education, with English focusing on nouns. Grade 5 contents have topics such as the story of Miss Cabbage in Filipino, physical properties of materials in Science, degree of comparison in English, and intermolecular forces and states of matter in Science. Grade 7 includes folktales serving as proof in Filipino, territorial issues in Social Studies, cause and effect in English, and angles formed by parallel lines cut by a transversal in Mathematics, along with intermolecular forces and states of matter in Science. Grade 8 has context clues in English, teaching listening in Filipino, and triangle congruence in Mathematics. Grade 9 consists into physical science and mechanical energy in Science, theorems on special parallelograms in Mathematics, focus of verbs in Filipino, comprehension skill and context clues in English, and patterns in the sky in Science. Grade 10 contents have plane coordinate geometry in Mathematics and distinguishing between real and make-believe facts and images in English. Additionally, Grade 11 has Introduction to Computing in ICT, while Grade 12 includes an in-depth study of intermolecular forces, liquids, and solids in Science.

The Development of Digitized Learning Materials and Learning Resource Materials Hub

The development of the Digitized Learning Materials (DLMs) and the Learning Materials Repository Hub (LMRH) followed a structured developmental research approach to ensure that the educational materials were pedagogically sound, interactive, and aligned with the Department of Education's (DepEd) standards. The process involved planning, design, development, validation, usability testing, and implementation, ensuring that the final repository effectively addressed the needs of teachers and students in a blended learning environment.

The first stage, planning and conceptualization, involved identifying key challenges in educational material development and the lack of centralized access to quality digitized resources. The study focused on developing DLMs aligned with the Most Essential Learning Competencies (MELCs) and Alternative Delivery Mode Learning Resource (ADMLR) standards. A comprehensive review of existing literature on digital learning repositories and educational design frameworks guided the project's development, ensuring that the materials were structured, relevant, and adaptable to various learning contexts.

In the development phase, Graduate School students enrolled in Computer Education were tasked with creating interactive digital learning materials for various grade levels and subjects. The process involved content selection, structuring, and designing digital formats using Google Slides integrated with Pear Deck to create interactive presentations. These materials featured embedded quizzes, multimedia elements, and real-time feedback mechanisms to enhance engagement. Once developed, the DLMs underwent content validation by subject-matter experts, who assessed their content accuracy, educational effectiveness, and technical usability before inclusion in the repository.

Following the completion of the DLMs, the development of the LMRH began as a centralized platform for storing, organizing, and sharing educational resources. The LMRH system design incorporated a user-friendly interface with categorized subjects and grade levels, search and filtering features for efficient material retrieval, and compatibility across multiple devices to support both online and offline learning. The repository structure aimed to provide an intuitive experience, enabling teachers to easily upload, access, and share resources while integrating interactive tools like Pear Deck to enhance content delivery.

To ensure the effectiveness of both the DLMs and LMRH, subject-matter experts, including DepEd teachers and IT specialists, conducted expert evaluations focusing on content validity, educational design, and technical quality. The findings confirmed that the DLMs met

high educational standards, while the LMRH was functional and accessible. However, areas for improvement were identified, particularly in subject-specific customization and content filtering to better cater to diverse teacher needs.

The next phase, usability testing and teacher assessment, involved gathering feedback from teachers and IT experts using the System Usability Scale (SUS) and the Technology Acceptance Model (TAM) questionnaire. The evaluation focused on key factors such as ease of use, system navigation, perceived usefulness, and integration with educational strategies. These assessments provided valuable insights into how effectively the Learning Materials Repository Hub (LMRH) supports digital educational resource management and its potential for widespread adoption in educational settings.

Following the validation and usability testing, the LMRH was implemented as a pilot digital repository for educators, allowing for real-world application and further evaluation. The study emphasized the importance of continuous refinement in digital education platforms to enhance their usability and effectiveness. Future improvements in the system include enhanced personalization features for subject-specific content, advanced search functionalities for more efficient resource retrieval, and the integration of learning analytics to track student engagement and optimize educational strategies. By addressing these areas, the LMRH can further support educators in digital learning environments, making educational resource management more efficient and accessible.

The development of DLMs and the LMRH followed a systematic, research-driven process, ensuring that the materials were high-quality, accessible, and effective in educational delivery. The iterative approach of design, evaluation, and refinement highlights the need for continuous innovation in digital education platforms. Moving forward, further system enhancements, AI-driven recommendations, and expanded teacher training will improve the platform's usability and long-term adoption in blended and online learning environments.

Evaluation of DLM by the Experts

The Digitized Learning Materials (DLM) were evaluated by the experts in terms of the quality of content, text, graphics, colors, background, and inclusion of Pear Deck.

Table 1 presents the descriptive measures on the quality of the learning hub materials in terms of its content as perceived by the teachers.

Table 1
Descriptive Measures of Teachers' Perception on the Quality of the Learning Hub Materials According to Content

Items	<i>M</i>	<i>SD</i>	Descriptive Interpretation
1. Content is consistent with topics/skills found in the DepED Learning Competencies for the subject and grade/year level it was intended.	3.62	0.15	Very Satisfactory
2. Concepts developed contribute to enrichment, reinforcement, or mastery of the identified learning objectives.	3.51	0.26	Satisfactory
3. Content is accurate.	3.66	0.18	Very Satisfactory
4. Content is up-to-date.	3.69	0.20	Very Satisfactory
5. Content is logically developed and organized.	3.66	0.18	Very Satisfactory
6. Content is free from cultural, gender, racial, or ethnic bias.	3.76	0.29	Very Satisfactory
7. Content stimulates and promotes critical thinking.	3.62	0.15	Very Satisfactory
8. Content is relevant to real-life situations.	3.55	0.39	Satisfactory
9. Language (including vocabulary) is appropriate to the target user level.	3.65	0.42	Very Satisfactory
10. Content promotes positive values that support formative growth.	3.69	0.20	Very Satisfactory
Overall	3.64	0.44	Very Satisfactory

The table presents descriptive measures of teachers' perceptions regarding the quality of learning hub materials based on different content criteria. The overall mean score for teachers' perception of the quality of the materials is 3.64, indicating a very satisfactory rating. The standard deviation (*SD*) of 0.44 suggests moderate variability in the perceptions among teachers. The highest mean score is observed for item 6, "Content is free from cultural, gender, racial, or ethnic bias," with a mean of 3.76, also classified as very satisfactory. On the other hand, the lowest mean score is for item 8, "Content is relevant to real-life situations," with a mean of 3.55, still classified as satisfactory.

The findings suggest that teachers generally perceive the learning hub materials positively, as indicated by the high mean scores across most criteria. However, there are areas, such as relevance to real-life situations, where there might be room for improvement or where perceptions vary more significantly among teachers. This analysis underscores the importance of continually assessing and refining educational materials to ensure they effectively meet the needs and expectations of educators and students.

Table 2 presents the descriptive measures on the quality of the learning hub materials in terms of its education as perceived by the teachers.

Table 2

Descriptive Measures of Experts' Perception on the Quality of the Learning Hub Materials According to Instruction

Items	M	SD	Descriptive Interpretation
1. Purpose of the material is well defined.	3.55	0.39	Satisfactory
2. Material achieves its defined purpose.	3.58	0.38	Very Satisfactory
3. Learning objectives are clearly stated and measurable.	3.31	0.45	Satisfactory
4. Level of difficulty is appropriate for the intended target user.	3.68	0.43	Very Satisfactory
5. Graphics/colors/sounds are used for appropriate educational reasons.	3.59	0.44	Very Satisfactory
6. Material is enjoyable, stimulating, challenging, and engaging.	3.50	0.45	Satisfactory
7. Material effectively stimulates creativity of target user.	3.57	0.44	Satisfactory
8. Feedback on target user's responses is effectively employed.	3.66	0.39	Very Satisfactory
9. Target user can control the rate and sequence of presentation and review.	3.69	0.20	Very Satisfactory
10. Instruction is integrated with target user's previous experience.	3.47	0.42	Satisfactory
Overall	3.56	0.41	Satisfactory

Table 2 shows the experts' perceptions regarding the quality of learning hub materials based on educational criteria. The overall mean score for experts' perception of the quality of the materials is 3.56, categorizing it as satisfactory. The standard deviation (SD) of 0.41 indicates moderate variability in the perceptions among experts. Examining the individual items, the highest mean score is observed for item 9, "Target user can control the rate and sequence of presentation and review," with a mean of 3.69, classified as very satisfactory. Conversely, the lowest mean score is for item 3, "Learning objectives are clearly stated and measurable," with a mean of 3.31, which still falls within the satisfactory range. While the experts' perceptions indicate a satisfactory level of quality for the learning hub materials, there are specific areas, such as the clarity and measurability of learning objectives, where there may be room for improvement. The analysis underscores the importance of considering expert feedback in refining educational materials to ensure they effectively meet the intended learning objectives and engage the target audience.

Table 3 presents the descriptive measures on the quality of the learning hub materials in terms of its technicality as perceived by the teachers.

Table 3
Descriptive Measures of Experts' Perception on the Quality of the Learning Hub Materials According to Technicality

Items	M	SD	Descriptive Interpretation
1. Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing.	3.46	0.43	Satisfactory
2. Visual presentations are clear and easy to interpret.	3.65	0.42	Very Satisfactory
3. Visuals sustain interest and do not distract the user's attention.	3.55	0.41	Satisfactory
4. Visuals provide accurate representation of the concept discussed.	3.54	0.41	Satisfactory
5. The design allows the target user to navigate freely through the material.	3.73	0.36	Very Satisfactory
6. The material can easily and independently be used.	3.72	0.37	Very Satisfactory
7. The material will run using minimum system requirements.	3.82	0.29	Very Satisfactory
8. The material is free from technical problems.	3.65	0.42	Very Satisfactory
Overall	3.64	0.42	Very Satisfactory

Table 3 outlines descriptive measures of experts' perceptions concerning the quality of learning hub materials with a focus on technical aspects. The overall mean score for the experts' perception of the materials' quality stands at 3.64, indicating a classification of "very satisfactory".

The standard deviation (*SD*) of 0.42 suggests a moderate level of variability in experts' opinions regarding technical aspects. Among the individual items, the highest mean score is attributed to item 7, "The material will run using minimum system requirements," with a mean of 3.82, also classified as very satisfactory. Conversely, the lowest mean score is for item 1, "Screen displays (text) are uncluttered, easy to read, and aesthetically pleasing," with a mean of 3.46, falling within the satisfactory range.

The results suggest that experts perceive the technical quality of the learning hub materials positively, with most aspects rated as very satisfactory. However, there may be opportunities for improvement in certain areas, such as ensuring screen displays are aesthetically pleasing and easy to read, where opinions among experts vary more significantly. This analysis highlights the importance of addressing technical considerations to enhance the usability and effectiveness of educational materials.

Table 4 presents the descriptive measures on the quality of the learning hub materials in terms of the structure of the material as perceived by the teachers.

Table 4

Descriptive Measures of Experts' Perception on the Quality of the Learning Hub Materials According to the Structure of the Material

Items	<i>M</i>	<i>SD</i>	Descriptive Interpretation
1. Conceptual errors.	3.49	0.40	Satisfactory
2. Factual errors.	3.64	0.15	Very Satisfactory
3. Grammatical and / or typographical errors.	3.38	0.39	Satisfactory
4. Other errors (i.e., computational errors, obsolete information, errors in the visuals, etc.).	3.54	0.42	Satisfactory
Overall	3.51	0.42	Satisfactory

Table 4 provides descriptive measures of experts' perceptions regarding the quality of learning hub materials, focusing on the structure of the material. The overall mean score for experts' perception of the materials' structural quality is 3.51, indicating a satisfactory level. The standard deviation (*SD*) of 0.42 suggests a moderate level of variability in experts' opinions regarding the structural aspects of the materials. Examining the individual items, the highest mean score is attributed to item 2, "Factual errors," with a mean of 3.64, classified as very satisfactory. Conversely, the lowest mean score is for item 3, "Grammatical and/or typographical errors," with a mean of 3.38, still within the satisfactory range.

The findings suggest that experts perceive the structural quality of the learning hub materials positively, with most aspects rated as satisfactory. However, there may be room for improvement in certain areas, such as minimizing grammatical and typographical errors, where opinions among experts vary more significantly. This analysis underscores the importance of meticulous editing and proofreading processes to enhance the structural integrity and credibility of educational materials.

Level of Acceptability of DLM as Evaluated by the Teachers

The level of acceptability of DLM was evaluated by thirty (30) teachers to assess its perceived usefulness, ease of use, attitude toward using, and intention to use in educational settings. Their evaluations were conducted using the *Technology Acceptance Model (TAM) Questionnaire*, which provided insights into how effectively the DLMs support teaching and learning. The results helped determine whether the digitized learning materials could enhance educational delivery and engagement in both synchronous and asynchronous learning environments.

Table 5
Level of acceptability of DLM as evaluated by the teachers in Perceived Usefulness

A. Perceived Usefulness	M	SD	Descriptive Interpretation
1. Use of DLM using Google Slides and Pear Deck helps me to control the pedagogy.	3.63	0.49	Strongly Agree
2. Use of DLM using Google Slides and Pear Deck enhances the teaching performance.	3.74	0.45	Strongly Agree
3. I find the DLM using Google Slides and Pear Deck useful in my class.	3.52	0.57	Strongly Agree
4. Use of DLM using Google Slides and Pear Deck makes it easier to catch individual students' needs.	3.70	0.47	Strongly Agree
Overall	3.65	0.49	Strongly Agree

Table 5 indicates that teachers generally perceive Digital Learning Materials (DLM) implemented through Google Slides and Pear Deck as highly useful in their teaching practices, with an overall mean score of 3.65, falling within the "Strongly Agree" category. The highest mean score is for the statement "Use of DLM using Google Slides and Pear Deck enhances the teaching performance" with a mean of 3.74, indicating strong agreement among teachers regarding the positive impact of these tools on teaching effectiveness. Participants articulated that the integration of Pear Deck in their prospective classrooms empowers them to implement a range of effective teaching strategies and methodologies. Contrarywise, the lowest mean score is for the statement "I find the DLM using Google Slides and Pear Deck useful in my class" with a mean of 3.52; however, it still reflects a high level of agreement. The standard deviation across all items is relatively consistent, ranging from 0.45 to 0.57, indicating a moderate level of variability in responses. Overall, the data suggests that teachers highly value the perceived usefulness of DLM through Google Slides and Pear Deck for enhancing pedagogy, teaching performance, and meeting individual student needs.

Table 6
Level of acceptability of DLM as evaluated by the teachers in Perceived Ease of Use

B. Perceived Ease of Use	M	SD	Descriptive Interpretation
1. It is easy to become skillful at using DLM using Google Slides and Pear Deck.	3.63	0.49	Strongly Agree
2. I find it easy to apply the DLM using Google Slides and Pear Deck in my class.	3.56	0.51	Strongly Agree
3. Use of DLM using Google Slides and Pear Deck is easy and understandable.	3.59	0.55	Strongly Agree
4. Use of DLM using Google Slides and Pear Deck is more flexible to teach than the traditional one.	3.67	0.48	Strongly Agree
Overall	3.61	0.51	Strongly Agree

Table 6 shows the evaluation of the level of acceptability of Digital Learning Materials (DLM) by teachers in terms of Perceived Ease of Use using Google Slides and Pear Deck, it's noteworthy to observe the highest and lowest mean scores among the provided items. The item with the highest mean score is "Use of DLM using Google Slides and Pear Deck is more flexible to teach than the traditional one" with a mean score of 3.67, indicating a strong level of agreement among teachers. While it's possible to gather feedback without utilizing technology such as Pear Deck, instructors may only receive responses from a few students simultaneously, limiting the scope of feedback. In contrast, when the entire class is prompted to respond to online questions displayed on the screen with the assurance of anonymity, students tend to participate confidently, thus encouraging even shy students to engage. Conversely, the item with the lowest mean score is "I find it easy to apply the DLM using Google Slides and Pear Deck in my class" with a mean score of 3.56, still falling within the "Strongly Agree" category. Despite this minor variation, all mean scores suggest a high degree of acceptability and positive perception regarding the ease of using DLM with Google Slides and Pear Deck in educational settings. This aligns with the overarching trend of strong agreement reflected in the overall mean score of 3.61, coupled with a relatively low standard deviation of 0.51, indicating a consensus among teachers regarding the perceived ease of use. A standard deviation of 0.51 indicates the average amount of deviation or dispersion of individual responses from the mean score of 3.61, suggesting relatively low variability among respondents' perceptions of the ease of using Dynamic Learning Maps with Google Slides and Pear Deck.

Table 7

Level of acceptability of DLM as evaluated by the teachers in Attitude Toward Using

C. Attitude Toward Using	M	SD	Descriptive Interpretation
1. Use of DLM using Google Slides and Pear Deck in class is good.	3.59	0.50	Strongly Agree
2. Use of DLM using Google Slides and Pear Deck in class is favorable.	3.56	0.51	Strongly Agree
3. It is a positive influence for me to use DLM using Google Slides and Pear Deck in class.	3.81	0.40	Strongly Agree
4. I think it is valuable to use DLM using Google Slides and Pear Deck in class.	3.67	0.48	Strongly Agree
5. I think it is a trend to use DLM using Google Slides and Pear Deck in class.	3.78	0.42	Strongly Agree
Overall	3.68	0.46	Strongly Agree

The data provided in Table 7 indicates that teachers generally have a strongly positive attitude toward using Digital Learning Materials (DLM) specifically through Google Slides and Pear Deck in their classes. The overall mean attitude score is 3.68, which falls within the "Strongly Agree" category, suggesting a high level of acceptability. Among the individual items, the highest mean score is for the statement "It is a positive influence for me to use DLM using Google Slides and Pear Deck in class with the mean of 3.81, indicating that teachers strongly perceive the positive impact of these tools on their teaching practices. Pear Deck empowers educators by providing them with the capability to seamlessly embed interactive questions directly within their presentation slides, fostering active engagement and facilitating real-

time participation among students. This feature enhances the interactivity and effectiveness of educational content, allowing teachers to gauge comprehension, promote critical thinking, and tailor their teaching strategies to meet the diverse needs of learners.

The lowest mean score, though still indicating strong agreement, is for the statement "Use of DLM using Google Slides and Pear Deck in class is favorable", having the mean score of 3.56. The standard deviations across all items are relatively low, ranging from 0.40 to 0.51, indicating a relatively high level of agreement among the respondents. A standard deviation of 0.46 indicates that the attitudes of the teachers toward using Digital Learning Materials (DLM) with Google Slides and Pear Deck in class are relatively consistent and tightly clustered around the overall mean score of 3.68, reflecting a high level of agreement among respondents. This data suggests that teachers overwhelmingly view the use of DLM through Google Slides and Pear Deck as beneficial and valuable tools in their teaching practices, highlighting their acceptance and endorsement of these technologies for enhancing classroom instruction.

Table 8

Level of Acceptability of DLM As Evaluated by the Teachers in Intention to Use

D. Intention to Use	M	SD	Descriptive Interpretation
1. I tend to use DLM using Google Slides and Pear Deck in my class.	3.56	0.51	Strongly Agree
2. I increase the occurrences of DLM using Google Slides and Pear Deck in class.	3.59	0.50	Strongly Agree
3. Use of DLM using Google Slides and Pear Deck in my class enhances students' learning interest.	3.81	0.40	Strongly Agree
4. I'd love to use DLM using Google Slides and Pear Deck in my class.	3.67	0.48	Strongly Agree
5. I use DLM using Google Slides and Pear Deck to provide multi-approaches on teaching.	3.81	0.40	Strongly Agree
Overall	3.69	0.46	Strongly Agree

The data provided in Table 8 indicates a strong level of intention among teachers to use Digital Learning Materials (DLM) through Google Slides and Pear Deck in their classes, with an overall mean score of 3.69, falling within the "Strongly Agree" category. Among the individual items, the highest mean scores are tied between the statements "Use of DLM using Google Slides and Pear Deck in my class enhances students' learning interest" and "I use DLM using Google Slides and Pear Deck to provide multi-approaches on teaching," both with a mean of 3.81. These responses suggest that teachers strongly believe in the efficacy of these tools for enhancing student engagement and providing varied teaching approaches. It underscores the promising prospect of Pear Deck in elevating students' academic performance within the context of online education, suggesting that its implementation may lead to enhanced learning outcomes. This statement implies that Pear Deck holds the capacity to positively impact student achievement through its unique features and interactive functionalities tailored for online learning environments. The lowest mean score, though still indicating strong agreement, is for the statement "I tend to use DLM using Google Slides and Pear Deck in my class" with a mean of 3.56. However, all mean scores fall within the "Strongly Agree" range, indicating a

consistent positive attitude towards incorporating DLM in teaching practices. Additionally, the relatively low standard deviations across all items (ranging from 0.40 to 0.51) suggest a high level of agreement among respondents, further affirming the strong intention among teachers to utilize these technologies for educational purposes. A standard deviation of 0.46 suggests that the attitudes of teachers towards using Digital Learning Materials (DLM) via Google Slides and Pear Deck exhibit relatively low variability, indicating a high level of consensus among respondents regarding their intention to use these tools.

Level of Usability of the LMRH as Evaluated by Experts and Teachers

Usability testing assesses the ease of use and overall user experience of an interactive system, focusing on identifying potential usability challenges and collecting essential usability data.

Table 9

Level of Usability of the LMRH as evaluated by the IT Experts

System Usability Scale	<i>M</i>	<i>SD</i>	Descriptive Interpretation
1. I think that I would like to use the Learning Hub frequently.	4.67	0.58	Strongly Agree
2. I found the Learning Hub to be simple.	5.00	0.00	Strongly Agree
3. I thought the Learning Hub was easy to use.	5.00	0.00	Strongly Agree
4. I think that I could use the Learning Hub without the support of a technical person.	5.00	0.00	Strongly Agree
5. I found the various functions in the Learning Hub were well integrated.	4.33	0.58	Agree
6. I thought there was a lot of consistency in the Learning Hub.	4.33	0.58	Agree
7. I imagine that most people would learn to use the Learning Hub very quickly.	5.00	0.00	Strongly Agree
8. I found the Learning Hub very intuitive.	4.33	0.58	Agree
9. I felt very confident using the Learning Hub.	5.00	0.00	Strongly Agree
10. I could use the Learning Hub without having to learn anything new.	4.67	0.58	Strongly Agree
Overall	4.73	0.29	Strongly Agree
SUS Score	93.33		Excellent

Table 9 illustrates the System Usability Scale (SUS) of LMRH as evaluated by the experts. According to an evaluation by IT experts, the Learning Hub's overall usability rating is 4.73. ISO 9241–11:2018 (Ergonomics of Human-System Interaction) defines usability as the degree to which a product enables specified users to achieve their intended goals effectively, efficiently, and satisfactorily within a given context.

Specifically, all experts agreed that the hub is simple and easy to use with a mean of 5.00. The various functions were all integrated, consistent and intuitive with a rating of 4.33. Consistency in the user interface can improve accessibility and usability for all users. Moreover, experts concluded with a rating of 4.67 that the hub could be used without having to learn anything new.

It was found that the perceived usability of the evaluated Learning Hub is at an excellent level, having an SUS score of 93.33.

Table 10
Level of Usability of the LMRH as evaluated by the Teachers

System Usability Scale	M	SD	Descriptive Interpretation
1. I think that I would like to use the LMRH Hub frequently.	4.00	0.00	Agree
2. I found the LMRH to be simple.	3.96	0.19	Agree
3. I thought the LMRH was easy to use.	3.89	0.42	Agree
4. I think that I could use the LMRH without the support of a technical person.	4.00	0.00	Agree
5. I found the various functions in the LMRH were well integrated.	3.96	0.19	Agree
6. I thought there was a lot of consistency in the LMRH.	3.93	0.27	Agree
7. I imagine that most people would learn to use the LMRH very quickly.	4.00	0.00	Agree
8. I found the LMRH very intuitive.	3.96	0.19	Agree
9. I felt very confident using the LMRH.	3.96	0.19	Agree
10. I could use the LMRH without having to learn anything new.	3.96	0.19	Agree
Overall	3.96	0.17	Agree
SUS Score	74.07		GOOD

The findings presented in Table 10 indicate that teachers perceive the Learning Materials Repository Hub (LMRH) as highly usable and user-friendly, with an overall System Usability Scale (SUS) score of 3.96 and an *SD* of 0.17. The relatively low standard deviation suggests a high level of agreement among respondents, reinforcing the consistency of positive perceptions regarding the platform's usability. Furthermore, the SUS score of 74.07, categorized as "GOOD," validates the effectiveness of the LMRH in supporting educational delivery and digital learning. This suggests that teachers generally find the system functional and effective in facilitating access to digitized learning materials.

A closer examination of individual survey items reveals that all usability aspects were rated above 3.89, confirming strong agreement on key factors such as simplicity, ease of use, integration of functions, consistency, intuitiveness, and confidence in using the platform. Teachers found the system intuitive and easy to navigate, requiring minimal effort to learn and use effectively. The integration of functions within the platform ensured seamless usability, allowing users to efficiently access and manage educational materials. The consistent design and intuitive interface contributed to a smooth user experience, making it easier for teachers to adopt the LMRH in their educational practices. Additionally, the high ratings on confidence in using the platform indicate that teachers were comfortable navigating and utilizing the system without extensive training or technical support.

The broader scope of the LMRH may have introduced challenges in standardization, navigation, and content accessibility, which could explain why some teachers rated it slightly lower. Teachers handling different subjects may have encountered varying levels of ease in accessing materials relevant to their disciplines. Additionally, the learning curve for navigating a multi-subject repository may be more complex compared to a subject-specific platform. Despite

these challenges, the findings suggest that the LMRH remains a functional and effective digital repository that can support K-12 educators in managing and accessing educational resources.

To further enhance user satisfaction and system usability, several improvements could be considered. First, optimizing content organization by refining the classification of materials per subject and grade level would facilitate quicker retrieval of relevant resources. Additionally, enhancing navigation features through improved search and filter functions could provide a more intuitive and user-friendly browsing experience. Teachers may also benefit from short training sessions or video tutorials that introduce the platform's functionalities and guide them in maximizing its features. Furthermore, introducing customization options, such as subject-specific interfaces or adaptive features that cater to different educators' preferences, could improve overall usability and acceptance.

The findings confirm that the Learning Materials Repository Hub (LMRH) is highly usable and positively received by teachers, as reflected in its consistent high ratings and a "GOOD" SUS score of 74.07. However, when compared to a subject-specific learning hub that received a higher usability rating, it becomes evident that LMRH could benefit from refinements in content organization, navigation, and customization. Despite these areas for enhancement, the study demonstrates that the LMRH is a valuable digital repository for educational materials and has strong potential for continued adoption and improvement in supporting K-12 education.

Discussion

The development of Digitized Learning Materials (DLMs) and the Learning Materials Repository Hub (LMRH) followed a structured research-driven approach to enhance educational delivery in digital learning environments. The process included planning, development, validation, usability testing, and implementation, ensuring alignment with DepEd's MELCs and ADMLR standards. Graduate School students developed interactive DLMs using Google Slides and Pear Deck, which were validated by subject-matter experts. The LMRH served as a centralized platform for organizing and sharing materials, incorporating user-friendly navigation, search functions, and compatibility across devices. Future enhancements, including customization features and learning analytics, will further improve usability and effectiveness.

The findings of this study highlight the effectiveness and usability of the Learning Materials Repository Hub (LMRH) in supporting digital learning for K-12 education. The evaluation of the Digitized Learning Materials (DLMs) by both teachers and experts revealed high satisfaction levels across multiple dimensions, including content quality, educational effectiveness, technical usability, and structural integrity. While the results indicate strong positive perceptions, areas for refinement were also identified, emphasizing the need for continuous improvement in educational materials to enhance their relevance, accessibility, and pedagogical impact.

Teachers and subject-matter experts highly rated the quality of the DLMs, particularly in their alignment with the Most Essential Learning Competencies (MELCs) and Alternative Delivery Mode Learning Resource (ADMLR) standards set by the Department of Education (DepEd). The materials received "Very Satisfactory" ratings in aspects such as content accuracy, logical organization, and inclusivity. However, a slightly lower rating was observed in the criterion of real-life application, suggesting the need to further contextualize learning materials to reflect authentic, real-world experiences. This finding aligns with prior research indicating that educational resources are more effective when they establish strong connections between theoretical knowledge and practical application (Bates, 2019). Moreover, Moskalenko (2023) found that the digital visualization of educational content for future mathematics teachers received positive evaluations. The integration of digital tools not only enhances the clarity and engagement of mathematical concepts but also ensures that educational materials align

with established educational frameworks. This approach supports effective teaching strategies, fostering better comprehension and application of mathematical principles among learners.

In terms of educational quality, the study found that the DLMs were well-structured, engaging, and adaptable for both synchronous and asynchronous teaching. Teachers appreciated the integration of Pear Deck with Google Slides, which enhanced interactivity and formative assessment opportunities. The immediate feedback mechanism of Pear Deck was particularly valued, as it facilitated active student engagement, real-time formative assessment, and differentiated instruction, aligning with findings by Randall et al. (2023) that emphasize the role of interactive technology in fostering student participation. Sametova et al. (2022) highlighted the effectiveness of well-structured digital educational resources in teaching Russian language and literature. These resources incorporate video tutorials, audio materials, and interactive tasks, designed to capture students' attention and enhance engagement, particularly in remote learning environments. The study emphasizes the importance of digital tools in maintaining student interest while supporting both synchronous (live) and asynchronous (self-paced) teaching methods. This flexibility allows educators to adapt their educational strategies based on student needs and lesson contexts, ensuring effective and personalized learning experiences.

The usability assessment of the LMRH yielded positive results, with teachers and IT experts expressing strong agreement regarding the system's simplicity, ease of navigation, and functionality. The System Usability Scale (SUS) score of 74.07 categorizes the platform's usability as "Good," reinforcing its effectiveness in facilitating digital educational resource management. The study of Estrada-Molina et al. (2021) recognized that a well-designed digital platform enhances educational delivery by making learning materials easier to navigate and use. However, when compared to the Santos et al. (2023) study, where a similar hub designed for a specific subject area scored 88.02 ("Best Imaginable"), the LMRH received a lower usability score. This discrepancy suggests that multi-subject digital repositories, like the LMRH, may face greater challenges in standardization and user experience compared to subject-specific repositories that cater to a more specialized audience.

Additionally, IT experts rated the system exceptionally high, with an SUS score of 93.33 ("Excellent"), emphasizing the seamless integration of functions and the minimal learning curve required for users. Teachers also strongly agreed that the LMRH was intuitive, functionally cohesive, and easy to use without technical support. These findings support the study of Sametova et al. (2022) wherein digital educational resources have been rated highly by educators, indicating that the system is user-friendly and effective. Teachers found the platform intuitive, which suggests that they could navigate and utilize the resources without extensive training or technical support. However, areas such as content organization and search functionality could be refined to further enhance user accessibility and navigation. Prior research suggests that efficient content retrieval mechanisms significantly impact user satisfaction and system adoption (Dwivedi et al., 2017).

Teachers' Perception of Digital Learning Materials (DLMs) and Interactive Tools
Teachers strongly endorsed the usability and effectiveness of DLMs integrated into the LMRH, particularly in terms of perceived usefulness, ease of use, attitude toward using, and intention to use. The overall mean ratings exceeded 3.65 ("Strongly Agree"), confirming that teachers found the DLMs to be valuable educational resources that enhance pedagogical flexibility and student engagement. The highest rating was observed in "Use of DLM using Google Slides and Pear Deck enhances teaching performance" (mean = 3.74), underscoring teachers' confidence in the platform's ability to improve lesson delivery and learning outcomes. The findings of this study resonated with the study of Vidal-Esteve and Martín-Gómez (2023) which stated that teachers strongly endorse digital didactic materials, recognizing their usefulness in enhancing pedagogy and student engagement. They find digital learning materials easy to integrate, reflecting a broader confidence in technology. While specific tools aren't highlighted, educators critically

assess digital resources, ensuring their effectiveness for early childhood and primary education. However, in the study of Byeon (2024) teachers expressed mixed feelings about the usability and effectiveness of the intelligent science lab platform. Many reported low usability, which hindered their ability to integrate the platform into their lessons effectively.

The ease of use of the DLMs was also highly rated, with teachers appreciating the flexibility and accessibility provided by the digital format. A notable finding was the positive impact of Pear Deck in increasing student engagement, as supported by studies indicating that interactive learning tools encourage active participation and provide educators with valuable real-time feedback on student understanding (Javed & Odhabi, 2018). Teachers also expressed strong intention to continue using DLMs ($M = 3.69$), reinforcing the platform's sustainability and long-term adoption potential. Similarly, in the study of Sia and Mohamad (2023), teachers appreciate digital learning tools for their ease of use, flexibility, and positive impact on student engagement. They strongly support long-term adoption but face challenges like training gaps and technical issues. Addressing these concerns through institutional support and resource investment is essential for maximizing the benefits of digital education.

While the LMRH performed well in usability and teacher acceptance, its comparatively lower SUS score than the Santos et al. (2023) learning hub suggests areas for improvement. The broader subject coverage of the LMRH may have contributed to diverse teacher perceptions regarding its efficiency, particularly in terms of customization and subject-specific usability. To further enhance the platform, subject-specific filtering, advanced search options, and customizable user dashboards could be integrated to cater to teachers' specific educational needs. Similar results from the study of Schoors et al. (2022), wherein enhancing digital personalized learning (DPL) platforms requires subject-specific filtering, advanced search options, customizable dashboards, learning analytics, and professional development resources. These features enable teachers to tailor education, track student progress, and improve engagement. Integrating these tools fosters data-driven teaching strategies, enhancing personalized learning and overall educational outcomes.

Furthermore, the findings highlight the importance of structured content curation to facilitate ease of use. Aurangzeb et al. (2024), in their study, mentioned that structured content curation enhances technology adoption by improving perceived ease of use (PEoU) and perceived usefulness (PU) among teachers. It aligns with the Technology Acceptance Model (TAM) by making digital resources intuitive and relevant. Additionally, structured curation supports training programs and fosters inclusive technology integration in education. While previous research suggests that well-organized repositories with intuitive design elements significantly enhance user satisfaction (Youngblood & Youngblood, 2013). Enhancing visual aesthetics, providing content previews, and offering guided tutorials may further improve user experience and adoption rates.

Conclusions and Implications

This study has successfully developed and validated Digitized Learning Materials (DLMs) and the Learning Materials Repository Hub (LMRH) as innovative solutions to enhance educational delivery in digital and blended learning environments. The research has established the pedagogical effectiveness of the DLMs, which were designed using Google Slides integrated with Pear Deck, ensuring interactive and engaging learning experiences. These materials were evaluated by subject-matter experts and confirmed to be aligned with the Most Essential Learning Competencies (MELCs) and Alternative Delivery Mode Learning Resource (ADMLR) standards, meeting high educational quality standards.

Furthermore, the study has developed and implemented the LMRH, a centralized digital repository that allows teachers to store, organize, and access educational materials efficiently.

The platform was assessed through usability testing, where teachers and IT experts confirmed its functionality, ease of navigation, and user-friendliness. While the System Usability Scale (SUS) score of 74.07 ("Good") affirmed its effectiveness, the study also identified areas for improvement, particularly in subject-specific customization, search optimization, and content filtering to enhance its adaptability across diverse disciplines.

The findings of this research have confirmed the critical role of structured digital repositories in improving resource accessibility, educational efficiency, and teacher engagement in online learning environments. The study also highlights the importance of continuous innovation and refinement in digital education platforms to meet evolving educational needs.

For future educational practice, the integration of learning analytics, AI-driven recommendations, and enhanced search functionalities is recommended to further personalize and optimize the user experience. Additionally, expanding teacher training programs on digital educational material development will ensure the sustained adoption and effective utilization of platforms like the LMRH. Future research may explore the impact of digital learning repositories on student learning outcomes and investigate how adaptive technologies can further support differentiated instruction.

This study has successfully developed, validated, and implemented a comprehensive digital learning repository, demonstrating its potential to transform educational resource management and improve digital learning experiences. By addressing the identified areas for enhancement, the LMRH can serve as a sustainable and scalable educational technology solution, supporting the ever-evolving needs of 21st-century education.

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Declaration of Interest

The authors declare no competing interest.

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Joseline M. Santos (Corresponding author)	PhD, OIC-Director, Head of Research Management Office, Bulacan State University, Philippines. E-mail: joseline.santos@bulsu.edu.ph ORCID: https://orcid.org/0000-0002-6652-3117
Raquel C. Adriano	College of Information and Communications Technology, Bulacan State University, Philippines. E-mail: raquel.adriano@bulsu.edu.ph ORCID: https://orcid.org/0000-0001-8708-7062
Marian Minneli S. Cruz	Bulacan State University, Philippines. E-mail: marian.cruz@bulsu.edu.ph
Mayleen Dorcas B. Castro	Bulacan State University, Philippines. E-mail: mayleen.castro@bulsu.edu.ph ORCID: https://orcid.org/0000-0002-6618-6958
Eunice B. Custodio	Bulacan State University, Philippines. E-mail: eunice.custodio@bulsu.edu.ph
Gerriper T. Bernardo	Bulacan State University, Philippines. E-mail: gerriper.bernardo@bulsu.edu.ph