# Development of The LMS-E Book for Skills Acquisition and Performance in Automotive Technology: Interface Adaptation

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***Abstract*- This study developed and evaluated an innovative e-reference lecture manual for College of Industrial Technology (CIT) subjects at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology (DEBESMSCAT) during Academic Year 2023–2024. The project addressed the challenge of learning disruptions caused by faculty absences during seminars and training sessions by providing students with an accessible, interactive, and self-directed digital resource. The eBook was designed with user-friendly features, including QR codes, hyperlinks, multimedia content, and offline accessibility, to support independent study and enhance engagement with core technology topics. A descriptive research design was employed, utilizing quantitative methods with BSIT AT students and faculty as respondents. Data were collected through structured questionnaires and analyzed using descriptive statistics to assess usability, effectiveness, and acceptability. Results indicated that the eBook filled a gap in existing instructional resources, which were often limited in interactivity and accessibility. Both students and faculty rated the manual as highly acceptable in terms of design, functionality, and overall performance. The findings demonstrate that the e-reference is an effective supplementary tool that ensures learning continuity, nurtures student independence, and supports skill acquisition in automotive and electrical technology education.**

***Keywords*-E-reference manual, Innovative eBook, Self-directed learning, Technology education, Instructional material, Learning continuity, Digital learning tools.**

## I. Introduction

The digital transformation of higher education has significantly reshaped instructional delivery, particularly within technical and vocational disciplines where applied competencies are central to learning outcomes. Institutions offering automotive and industrial technology programs increasingly confront the challenge of maintaining instructional continuity while faculty members participate in professional engagements such as seminars, training programs, and institutional assignments. In such cases, reliance on conventional lecture-based instruction and printed manuals often results in interruptions to skill acquisition and conceptual development.

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These disruptions underscore the need for adaptive, technology-enhanced instructional systems capable of supporting independent and continuous learning.

Educational theory provides a strong foundation for integrating interactive digital tools into technical instruction. Dewey's experiential philosophy emphasizes that meaningful learning emerges through active engagement rather than passive content reception [1]. Similarly, Bruner's constructivist perspective advocates discovery-based learning processes that allow students to construct knowledge through exploration and contextual application [2]. In vocational education, where learners must translate theoretical understanding into operational competence, instructional materials must therefore facilitate interaction, repetition, and reflection.

The principles of adult learning further reinforce the relevance of self-directed instructional resources in postsecondary settings. Knowles' andragogical framework posits that adult learners benefit from autonomy, practical relevance, and flexible access to educational materials [3]. When instructional systems enable learners to revisit complex procedures and concepts independently, deeper retention and competence development are achieved. This perspective aligns with Gardner's theory of multiple intelligences, which recognizes that learners possess varied cognitive strengths requiring multimodal instructional approaches [4]. Digital modules incorporating multimedia, hyperlinks, and interactive features accommodate such diversity and enhance learner engagement.

Vocational and community college systems have undergone substantial curricular transformation in response to workforce demands. Contemporary reforms emphasize competency-based education, employability skills, and industry alignment [5], [6]. Institutional adaptation to management reforms and labor market expectations has shifted attention toward flexible and technology-integrated delivery models [7]. Despite these structural changes, instructional resources in many technical programs remain predominantly text-based and static, limiting opportunities for interactive engagement.

The emergence of Education 4.0 reflects broader societal digitalization and the integration of information and communication technologies (ICT) into daily and professional life [8]. Research indicates that effective ICT integration enhances student motivation, participation, and performance when pedagogically aligned with course objectives [9], [10]. Moreover, experiential learning frameworks such as "learning

by doing" emphasize the importance of repeated application and contextual practice in mastering technical skills [11]. In automotive and industrial technology education, where procedural accuracy and diagnostic reasoning are essential, instructional materials must extend beyond theoretical exposition to incorporate guided interaction and self-paced reinforcement.

Scholarly investigations into teacher effectiveness and curriculum change further highlight the role of instructional innovation in improving educational outcomes. Effective teaching practices involve not only subject expertise but also the strategic use of tools that foster engagement and comprehension [12]. Studies on curriculum transformation in automotive technology programs reveal the necessity of adapting instructional delivery to evolving industry standards and technological advancements [13]. Likewise, research on student engagement in community colleges underscores the importance of learning environments that promote autonomy and sustained academic involvement [14].

Competency-based curriculum models advocate structured skill development aligned with workforce needs [15]. However, such models require accessible and adaptable instructional materials to ensure consistent skill reinforcement outside direct classroom supervision. Digital e-reference systems, when properly designed, offer a viable mechanism for bridging this gap. By providing multimedia integration, offline accessibility, and structured modular content, such systems can support continuous learning even in the temporary absence of instructors.

Existing literature on ICT acceptance and educational technology adoption suggests that usability, accessibility, and perceived usefulness significantly influence student engagement with digital tools [16]. Therefore, the development of an interactive e-book tailored to automotive and industrial technology subjects represents not merely a technological enhancement but a pedagogically grounded intervention aimed at sustaining learning continuity and strengthening competency acquisition.

Anchored in experiential learning, constructivism, and adult learning theory, the present study develops and evaluates an innovative e-book designed for College of Industrial Technology subjects. The research examines its functionality, accessibility, and acceptability among students and instructors, positioning the e-reference as a structured digital instructional system that enhances flexibility, engagement, and skill development within automotive and related technical programs.

*The study specifically aims to:*

1. To develop a versatile e-reference lecture manual that ensures continuous and independent access to essential technology subjects, particularly during faculty absences.
2. To guarantee 24/7 accessibility of educational materials across various devices, enabling flexible and location-independent learning.
3. To enhance student engagement and self-directed learning by integrating interactive tools such as QR codes, hyperlinks, and multimedia content.
4. To provide comprehensive coverage of essential skills in the Technology Department, supporting both theoretical understanding and practical application.
5. To foster student independence, self-reliance, and resilience in their studies, thereby minimizing disruptions and strengthening long-term learning outcomes.

## II. Methodology

### *A. Research Design*

This study will utilize a descriptive research design with a focus on both quantitative and qualitative methods to evaluate the effectiveness of an e-reference lecture manual for Technology in mitigating learning disruptions due to faculty absence. The design will allow for comprehensive data collection on students' experiences, usage patterns, learning outcomes, and engagement with the e-reference manual, as well as insights into faculty perspectives on its implementation.

### *B. Survey Instrument*

**Population and Sampling**

The target population for this study consists of students enrolled in the CIT Department's automotive technology programs and faculty members involved in driving education. A purposive sampling approach will be used to select participants, ensuring that students who are directly impacted by faculty absences and instructors who are frequently engaged in seminars and training sessions are included.

### *C. Questionnaire*

A structured questionnaire will be administered to collect quantitative data on student usage, frequency of access, ease of navigation, and the perceived usefulness of the e-reference in supporting their learning. The Likert scale will measure levels of satisfaction, engagement, and self-reliance resulting from the e-reference features.

### *D. Descriptive Statistics*

Descriptive statistics will be used to summarize the questionnaire data, identifying trends in usage, satisfaction levels, and any correlations between eBook access and perceived improvements in learning continuity.

### *E. Respondents*

BSIT AT Students and instructors of technology and related Subjects were selected as experts at the Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology (DEBESMSCAT) Main Campus. These students are students of the Bachelor of Science in Industrial Technology. They were chosen as respondents because of their knowledge in the field of Technology Subjects, and the Instructors teaching in the AT subject areas and related subjects were intentionally selected as respondents to evaluate the acceptability of the designed modern e-reference instructional manual.

*F. Data Gathering Procedure.*

This procedure will ensure a comprehensive data collection process, capturing a full range of student and faculty experiences with the eBook and providing a strong basis for analysing its impact on learning continuity during faculty absences.

Preliminary Preparations. To obtain approval for the study's execution, the researcher wrote to the dean of the College of Industrial Technology. Following that, the researcher requested the respondent's consent.

Distribution of Questionnaires. The researcher then presented the purpose and justification for the evaluation to the respondents-participants after the letter had been approved. Next, the researcher demonstrated how the interactive e-book module was created using the program and described how to access and download a copy.

Retrieval of the Evaluation. After the respondents/participants answered the evaluation through the questionnaire. The researcher gives the data to the statistician for treatment.

## III. Results and Discussions

The research aimed to develop the Innovative E-Book for CIT Subjects for students' skills acquisition and performance in Automotive Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023-2024 as basis for Interface Adaptation. Specifically, it sought the review the predominant designs; discuss the development of e-book as to design and feature; functions and operations; accessibility of the developed system; functionality of the developed system as to requirement analysis; system and design and programming; determine the effectiveness of the e-book based on the perceptions of students and faculty as to design and feature; functions and operations; accessibility of the developed system; functionality of the developed system as to requirement analysis; system and design and programming.

Based on the review, there is no e book module on this five major subjects in the College of Industrial Technology at DEBESMSCAT; instead, there are some existing applications that needs to be bought, while others can be downloaded, read, or viewed for free. However, the interactivity of the prevalent design is limited.

The development of the Innovative E-Book for CIT Subjects for students' skills acquisition and performance in Automotive Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023-2024 as basis for Interface Adaptation e-book module delves on the design and feature; functions and operations; accessibility of the developed system; functionality of the developed system as to requirement analysis; system and design and programming. Lastly, ergonomics is mainly focused as user friendliness, functionality, and user support were taken into account in developing the management system of apps for students' skills acquisition and performance.

The students and faculty rate the management system of apps for students' skills acquisition and performance in Automotive Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023-2024 as basis for Interface Adaptation as highly acceptable. They strongly agreed that the management system of apps for students' skills acquisition and performance in Automotive Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023-2024 as basis for Interface Adaptation as to design and feature; functions and operations; accessibility of the developed system; functionality of the developed system as to requirement analysis; system and design and programming is highly Acceptable.

The utilization of the technology has barriers and challenges in terms of the researchers' experience in utilizing the management system of apps for students' skills acquisition and performance in Automotive Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023-2024 as basis for Interface Adaptation as an e-book module and the users of the apps when they downloaded, copied, read, and viewed the management system of apps e-book format compatible with the reader.

*A. Survey Result*

TABLE I: SUMMARY OF EXPERTS' ACCEPTABILITY RESULT

| | Development of the Innovative E-Book | |
|---|---|---|
| Quality Dimension | Average Weighted Mean | Descriptive Category |
| Design and Feature | 4.32 | Highly Acceptable |
| Content as to Skills or Competence in Automotive | 4.21 | Acceptable |
| Function and Operation | 4.42 | Highly Acceptable |
| Laptop and Computer | 4.22 | Acceptable |
| Tablets | 4.38 | Highly Acceptable |
| Android Phoned | 4.41 | Highly Acceptable |
| Requirement Analysis | 4.38 | Highly Acceptable |
| System and Design | 4.25 | Highly Acceptable |
| Programming | 4.22 | Highly Acceptable |

TABLE II: SUMMARY OF STUDENTS' ACCEPTABILITY RESULT

| | Development of the Innovative E-Book | |
|---|---|---|
| Quality Dimension | Average Weighted Mean | Descriptive Category |
| Design and Feature | 4.42 | Highly Acceptable |
| Content as to Skills or Competence in Automotive | 4.08 | Acceptable |
| Function and Operation | 4.50 | Highly Acceptable |
| Laptop and Computer | 4.25 | Acceptable |
| Tablets | 4.33 | Highly Acceptable |

| | | |
|---|---|---|
| Android Phoned | 4.25 | Highly Acceptable |
| Requirement Analysis | 4.08 | Highly Acceptable |
| System and Design | 4.33 | Highly Acceptable |
| Programming | 4.5 | Highly Acceptable |

Summary of acceptability to the development of Innovative E-Book was found to have a very promising result. The rating is an indication that this app may have a future and it will be proposed to the college of DEBESMSCAT-Main Campus

### *B. Findings*

The research aimed to develop an Innovative E-Book for skills acquisition and performance in Automotive Technology: Interface Adaptation. Specifically, it sought the review the predominant designs; discuss the development of e-book as to design and feature; functionality of the developed system as to requirement analysis; system and design and programming; determine the effectiveness of the e-book based on the perceptions of students and faculty as to design and feature; functions and operations; functionality of the developed system as to requirement analysis; system and design and programming.

Based on the review of the design, there is no e-book module on these three major subjects in Automotive Technology at DEBESMSCAT; instead, there are some existing applications that need to be bought, while others can be downloaded, read, or viewed for free via Designrr. However, the interactivity of the prevalent design is limited. Specifically, there isn't a created e-book module on Driving Education, OSH, and Electrical Electronics system at DEBESMSCAT.

The development of Innovative E-Book for skills acquisition and performance in Automotive Technology: Interface Adaptation e-book module delves into the design and feature, functions, and operations; functionality of the developed system as to requirement analysis, system and design and programming. Lastly, the app is mainly focused on user friendliness, functionality, and user support, which were taken into account in developing the management system of apps for students' skills acquisition and performance.

The students and faculty rate the development of Innovative E-Book for skills acquisition and performance in Automotive Technology: Interface Adaptation as highly acceptable. They strongly agreed that the development of Innovative E-Book for skills acquisition and performance in Automotive Technology: Interface Adaptation as to design and feature; functions and operations; content as to skills competence; functionality of the developed system as to requirement analysis; system and design and programming is highly Acceptable.

The utilization of the technology has barriers and challenges in terms of the researchers' experience in utilizing the development of Innovative E-Book for skills acquisition and performance in Automotive Technology: Interface Adaptation as an e-book module and the users of the apps when they downloaded, copied, read, and viewed the management system of apps e-book format compatible with the reader.

## IV. Conclusion and Future Works

The development of the Innovative E-Book for College of Industrial Technology Subjects for students' skills acquisition and performance in Technology at Dr. Emilio B. Espinosa Sr. Memorial State College of Agriculture and Technology during Academic Year 2023–2024 demonstrated both acceptability and effectiveness as a basis for interface adaptation. Anchored in various theories of e-book technology and guided by copyright laws, the system was found to be highly functional in terms of design and features, accessibility, requirement analysis, and programming. Evaluation results revealed that both students and faculty perceived the e-book as highly acceptable and effective, confirming its potential as an instructional innovation that enhances independent learning, flexibility, and engagement in automotive and related technology courses.

Future work should build upon these findings by expanding the use of the Innovative E-Book to other Technology subjects and programs within the institution. Integration into the school's learning management system is recommended to maximize accessibility and support flexible learning modalities. Faculty members are encouraged to design and adapt their own e-books to align with course objectives and student needs, thereby promoting a culture of digital authorship and innovation. Adequate training should be provided to teachers and instructors to equip them with the skills necessary for e-module and e-learning development. Institutional support, including funding and resource allocation, will be vital to sustain and scale the implementation of e-book technologies across departments.

Moreover, future research may explore the long-term impact of e-book utilization on student performance, knowledge retention, and skill acquisition, as well as its adaptability across diverse disciplines. Incorporating advanced features such as analytics, gamification, and adaptive learning pathways can further strengthen the platform's effectiveness. These directions will ensure that the Innovative E-Book continues to evolve as a dynamic tool for modern education, equipping students with the competencies required for industry readiness and lifelong learning.

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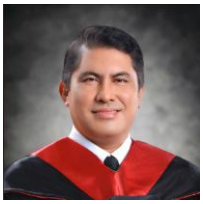

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