Development of an Electronic Learner Permanent Data Management System

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ABSTRACT

Electronic Learner Permanent Data Management System is a system designed to manage learners' academic records efficiently. It enhances the accuracy and security of the data of learners, reduces manual workload, and facilitates quick retrieval in the management of learners' permanent records, particularly the School Report Card and Learner Permanent Data. This study addressed the traditional manual record-keeping methods of managing learners' academic records. The study employed descriptive quantitative research design that enables the collection of numerical data that provides a clear and measurable assessment of the effectiveness of the system. The study where guided by the System Development Cycle (SDLC) through Agile Methodology, the ensured incremental improvements and constant feedback throughout the process. Mean and standard deviation were the statistical used and TAM to determine perceived usefulness, perceived ease of use, attitude towards the use of technology, and intention to use. The results revealed that the level of acceptance was rated a highly accepted perception towards the use of Electronic Learner Permanent Data Management System. The mean for Perceived Usefulness (PU) and Attitude Towards Use (ATU) were both 4.97, suggested that users strongly believe in the system's effectiveness and have a favorable attitude towards its use. Perceived Ease of Use (PEU) a mean of 4.97, indicated that users find it user-friendly. The mean of 4.97 for Intention to Use (IU) reflects a strong willingness and commitment among users to continue utilizing the system. The overall standard deviations varied with 0.03, shows a considerable spread in the data from the overall mean of 4.96, this suggests a strong overall positive reception and acceptance of the system among users. Lastly, the overwhelming positive response and very high acceptance rating from the respondents and stakeholders reinforced the value and relevance of the system, underscoring the importance of a well-structured strategic plan to ensure its successful and sustainable implementation.

Keywords: Education, Information Technology Integration, Learners Academic Data, Electronic Management System

INTRODUCTION

Background

Student Record Management System is a software that benefits both students and teachers. It involves various activities such as student registration and report generation [1]. Hence, the Electronic Learner Permanent Data Management System is a system designed to manage learners' records efficiently. It can significantly reduce administrative burdens, mitigate human errors, and improve transparency in educational institutions. [2] Inaccuracy from manual processes, along with retrieval challenges and inefficiency, are all problems associated with managing student academic records. Likewise, paper-based documents are susceptible to loss, mishandling, and damage. As a result, A computerized process is exemplified by the Computerized Record Management System [3]. [4] teachers have a positive attitude toward the learner information system, which manages learner information and improves collaboration among personnel in the Department of Education. Purcia [5] found that digitizing academic records can improve student registration and records management services of private schools in the Philippines. Patimo and Maribojoc [6] found that an electronic records management system can make

searching for records faster than manual processes.

The Developed Electronic Learner Permanent Data Management System addresses problems encountered among teachers on traditional record-keeping issues by introducing a centralized, secure, and user-friendly platform that leverages modern technology to ensure efficient, accurate, and accessible management of learners' data. The implementation of the Developed Electronic Learner Permanent Data Management System marks a significant step toward modernizing and streamlining the management of learners' permanent data in educational institutions. It comprised various elements to ensure data security and manage important information about individual teachers and learners. Features included creating individual teacher accounts, storing learner information, generating learner permanent data, and organizing learner records by grade level.

he system guarantees simplifies data management, and reduces errors related to human record-keeping. [7] it is a digital platform designed to efficiently manage, store, and retrieve student data and academic records. It may include an intelligent dashboard for teachers to access important data [8] and integrates formal and informal experiences to enhance personalization and interoperability [9].

This study was guided by the System Development Life Cycle through Agile Methodology. And, assessing perceived usefulness, perceived ease of use, attitude towards use and intention to use as key usability indicators based on the Technology Acceptance Model (TAM). This study used descriptive analysis as a research design to understand and quantify the respondents' perceptions of usability. This involved collecting data from respondents who used the developed ELPDS through adapted survey questionnaires.

Statement of the Problem

Generally, this study developed an electronic learner permanent data management system in Sarangani Division, SOCCSKSARGEN. Specifically, it sought answers to the following questions:

- How will the electronic learner permanent data management system be developed?
- What is the level of acceptance of the developed electronic learner permanent data management system?
- What will be the implementation plan for the developed electronic learner permanent data management system?

Review of Related Literature

DepEd Order No. 54, s. 2016, Learner Permanent Data such as Form 137 or Permanent Record, which serves as a permanent school learner record detailing the historical academic and co-curricular achievements of the learner, and Form 138 or Report Card, which indicates a learner's academic performance during a specific school year.

Electronic Student Record Management System (ESRMS). A study of Duruin et. al., [10], tells that, ESRMS is a digital platform designed to efficiently manage, store, and retrieve student data and academic records. Hence, Somani [11], says that the Development of School Records Management System (SRMS) enables tracking and maintaining several records. Further, the assessment of the SRMS further showed that it has an extremely high degree of compliance with ISO 25010 Software Quality Standards, stated by, Parangu [12].

System Development Life Cycle (SDLC). A study by, Yas [15], iterative model is one of the SDLC models that rely on implementing the requirements of software development through small units repeatedly to reach a completed system. Further, Agile development is currently one of the most prominent software development approach or strategy, Omonihe [17] stated.

In addition, PIECES Framework. A study of Fatoni [13], Performance, Information, Economics, Control, Efficiency, and Service Framework, was developed to assess and analyze the design, development, and evaluation of information systems**,** particularly in the context of their performance and effectiveness in an

organizational setting. In addition, PIECES Framework use to classify a problem, opportunities, and directives contained in the scope definition of analysis and system design, as stated by Fatoni [14].

The perceived ease of use is an essential factor that impacts the usability of the developed ELPDMS. Perceived Usefulness (PU), according to Davis by, Hussein [17], Perceived Usefulness (PU) is defined as a person's or organization's belief in a system that can facilitate their work. Further, Susanto and Aljoza [18], says, there are several dimensions of PU, namely making work easier, increasing productivity, increasing work effectiveness, and increasing job performance.

Further study by, Perez [20], on the perceived ease of use on learner data management asserted, that many research efforts have examined its perceived usefulness, centering on the advantages that users link to the systems. And it supports to the statement by, Yalcin et. al., [21], that, perceived ease of use refers to the extent to which an individual believes that using a specific system requires no effort.

Attitude Towards Use (ATU). A study by, Davis [22], attitude toward using, in turn, is a function of two major beliefs: perceived usefulness and perceived ease of use. As specified by Ming [23], behavioral intention to use refers to the extent of a person’s conscious planning to engage in or refrain from a certain behavior in the future. This implies that when users see technology as both beneficial and user-friendly, their intention to use it grows.

And users’ intention to use system increases as it perceived both useful and easy to use, stated by, Ming et.al., [24]. This supports Venkatesh [25], who stated that behavioral intention is a strong predictor of actual. Furthermore, as stated by, Ranadie and Sharif [26], BI can be described as an intention to do something, which will later become a habit.

This review and related literature emphasized the critical role of Electronic Learner Permanent Data Management System (ELPDMS) and underscores the importance of effective management and digitization in enhancing administrative efficiency, transparency, and decision-making within educational institutions.

Theoretical Framework

This study was anchored on Technology Acceptance Model (TAM), (Davis, 1989). TAM refers to predict or explain factors that influence information technology usage which provides a solid theoretical framework for understanding users' acceptance and adoption of technology.

Conceptual Framework

The following figure below provides the conceptual framework for this study.

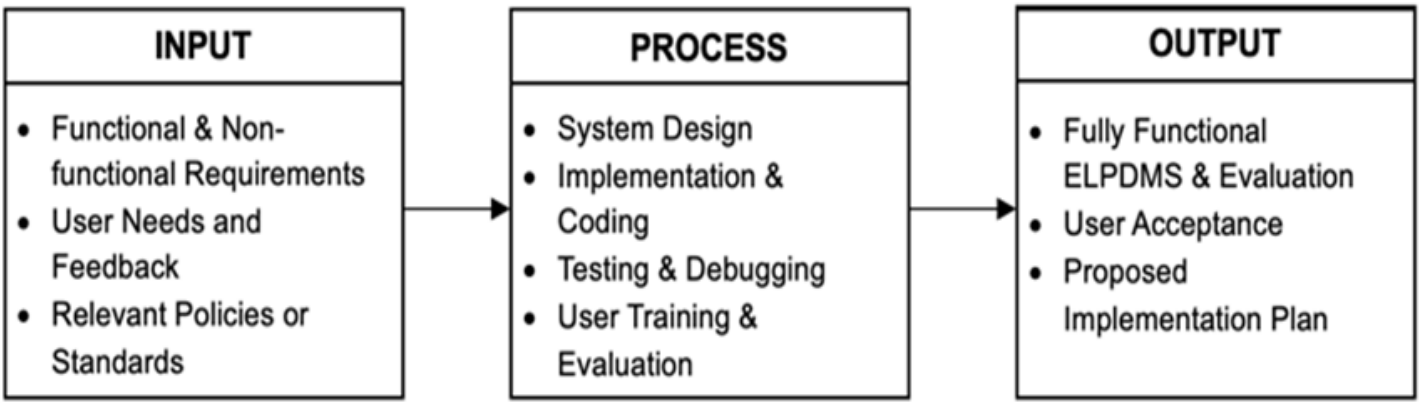

Fig. 1 The Conceptual Framework of the Study Developed Electronic

Learner Permanent Data Management System

The diagram represents the implementation of the Developed Electronic Learner Permanent Data Management

System. It begins with the Input (System Requirements. This is followed by the Process (Development of the System. And finally, the Output (ELPDMS & Implementation Plan), delivers a fully functional Electronic Learner Permanent Data Management System.

METHODOLOGY

Research Design

The study employed a descriptive-quantitative method research design grounded in the Technology Acceptance Model (TAM), by Davis [30], to examine users' acceptance. TAM provides a theoretical framework that explains how perceived usefulness and perceived ease of use influence individuals' behavioral intention to use a system. It involves the distribution of adapted survey questionnaire to the selected school respondents through the supervision and approval of the School Head. Moreover, it focuses on assessing perceived usefulness, perceived ease of use, attitude towards the use of technology, and intention to use as the key usability indicators. Lastly, to ensure the successful implementation, key strategic planning was crafted as it ensures a well-structured approach to system development, deployment, and long-term sustainability.

To help ensure successful development and implementation of the system, System Development Life Cycle (SDLC) was integrated into the research design. [28] Agile development is currently one of the most prominent software development approach or strategy. In the Planning phase, PIECES (Performance, Information, Economy, Control, Efficiency, and Service) Framework [27], served as a comprehensive analytical tool to evaluate and structure key system requirements. By applying this framework, the study can comprehensively evaluate the system from multiple perspectives, ensuring that the final design meets both technical and user needs while optimizing overall system performance and sustainability.

Designing phase, database is made to effectively manage permanent data of learners, and user roles are established to regulate the degree of access, the administrators and teachers. Developing phase, the design is used to build the system requirements. Testing phase guarantees the system's usability, and security. Test Cases Analysis was designed to verify the Developed Electronic Learner Permanent Data Management System functions according to its specified requirements [29] Test cases (TC) consist of the parameters of input, conditions of execution, and outcomes expected that were used for testing. Releasing phase, entails in the implementation in the system for practical application. And, Feedback phase, constant updates take care of security flaws, performance optimization, and usability issues.

Research Locale

The study conducted from the selected schools of Malungon 4 District, Sarangani Province, Region XII. Specifically, involving those actively participated in the educational manual record-keeping process. This locale provides a suitable setting due to its accessibility, availability of respondents, and relevance to the study's objectives.

This locale presents unique characteristics that aligned closely with the research focus, thus, enhanced validity and practicality of the study while providing meaningful insights grounded in the specific context of the community.

Research Respondents

The respondents of this study were selected based on their relevance of the system's intended users and stakeholders. These included school administrators and teachers from the participating educational institution.

Research Instrument

The table below shows the research instrument used in rating respondents' experience in using the developed ELPDMS. It was adapted from Weng [31]. Scales 5, 4, 3, 2, 1 pertain to Highly Acceptable, Acceptable, Moderately Acceptable, Unacceptable, Very Unacceptable, respectively.

Table I: Range of Intervals Interpretation

Range of Means	Description	Interpretation
4.21-5.00	Very High	Exceed standard, full satisfactory
3.41-4.20	High	Meet most standards, generally satisfactory
2.61-3.40	Moderate	Meet some standards, but has areas for improvement
1.81-2.60	Low	Meets only minimal standards, largely unsatisfactory
1.00-1.80	Very Low	Does not meet acceptable standards at all

Data Gathering Procedure

In the data gathering phase, initial information was collected with the schoolteachers, administrators and stakeholders to identify the current challenges in managing data of learners. Based on the gathered data, a prototype of the Developed Electronic Learner Permanent Data Management System was designed and iteratively refined through feedback sessions.

To validate the functionality and reliability of the Developed Electronic Learner Permanent Data Management System, a series of system testing procedures were conducted such as functionality, integration, performance, and security test cases which was append in the Appendix section. This includes identifying and resolving technical issues. Feedback was collected through surveys to assess the system's usability, accuracy, and efficiency in managing learner data.

And, as part of the data gathering procedure, user testing was conducted to evaluate the usability and effectiveness of the system. Selected users, including school registrar and teachers, were participated to interact with the system in a controlled environment. Their interactions were observed and documented to identify any usability issues or functional limitations. Additionally, feedback was collected through questionnaires to gain insights into user satisfaction, ease of navigation, and overall system performance. The data obtained from this user testing phase played a crucial role in refining the system to ensure it met the practical needs and expectations of its intended users.

Statistical Tool

In this study, mean and standard deviation were used. Mean is used to compute the mean scores for each construct as the key usability indicators, which provided a quantitative measure of the users' acceptance level. And, Standard Deviation is used to measure the variability of responses across key constructs such as Perceived Usefulness (PU), and Perceived Ease of Use (PEU). Using standard deviation, assessed the consistency of respondent's perceptions.

Ethical Considerations

To ensure ethical procedure, the researchers made sure that ethical concerns were addressed in the study. Emphasis was placed on maintaining strict confidentiality when handling the gathered data.

In conducting this study, relevant ethical guidelines were considered, such as user safety, privacy, and the integrity of the research process throughout the system creation, validation, and user testing phases. In the three stages, informed consent was obtained from all participants, informing them of their voluntary participation and the right to withdraw at any time.

Participants were informed that interviews would be conducted several times to ensure that the system aligns with/answers their needs. During user testing, participants were informed of their extent of participation, such as manipulation of the system and answering the survey questionnaire. Likewise, special attention was given to avoiding bias or discrimination in system performance, ensuring that all user groups were treated equitably.

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RESULTS AND DISCUSSION

Development of Electronic Learner Permanent Data Management System

Planning Phase

Table II: Development of Electronic Learner Permanent Data Using Pieces Framework

Category	Problems	Opportunities	Cause	Effect
Performance	Manual data entry causes extra work and inaccurate data entry on learners' academic records	Implement an electronic record-keeping system for recording learner permanent data to minimize human error	Traditional method such as manually entering students' permanent data, are time consuming and prone to mistakes	Time-consuming, human error-prone, and loss in the updating of learners' permanent data
Information	Academic records of students that are inconsistent and lacking across subject areas	Implement a permanent electronic learner data management system	Data information in every school year kept separately with no central repository	Reduced operational efficiency, delayed responses to learners' requests, and inconsistent learners' permanent data
Economy	Difficulty in keeping of learners' permanent data due to problem in storage	Reduce paper used and handling expenses by putting in place an electronic learner permanent data management system	Operational expenses rise when paper forms and manual document handling are used	Excessive use of paper results in high overhead expenses, decreased productivity, and environmental effects
Control	Difficulty in keeping of learners' permanent data due to problem in storage	Implement a record-keeping management system that ensures proper data handling procedures and updates	No centralized control mechanism to ensure that data is kept accordingly	Risk of potential loss of stakeholder's trust.
Efficiency	Excessive time spent on manual encoding of learners' permanent data	Create a record-keeping management system that automates the generation and updates of learners' data	Learners' academic records are inputted manually, requiring significant time and effort from the teachers	Delays in retrieval, generating of reports, and increased teachers/administrative costs
Service	Difficulty in updating and retrieving learners' requests	Implement an electronic management system on learners' permanent data that tracks pertinent learners' academic records	Requests are handled and resolved	Unresolved requests, damage to the school's reputation, and loss of stakeholder's loyalty.

The Table 2 represents the assessment using the PIECES Framework revealed significantly insights into the system's overall effectiveness. From an economic standpoint, it optimizes costs and resource allocation. Strengthened control measures to ensure better security and compliance, while increased efficiency in managing learners' permanent data. Moreover, improved service quality enhances user satisfaction and support.

Designing Phase

During this phase, the user interface and system architecture were imagined. Prototypes and wireframes were created to help visualize the system design and procedure. The architecture of the security framework ensured adherence to excellent methods for safeguarding data. Stakeholders' input was obtained, resulting in before moving to iterative design improvements.

Developing Phase

In this phase, the core functionalities were implemented of the system's gradual development. Like, created necessary features such as efficient updating and retrieval, learners' permanent data generation, and user identification. During this stage, security procedures were incorporated to provide encrypted data storage and role-based access control. Throughout this phase, unit and integration testing are conducted to ensure that individual modules and its interactions perform correctly.

Testing Phase

This phase includes to guarantee functionality, performance, and security, the system was put through a thorough testing process. Each module was validated using both automated and manual testing. To make sure users have the right permissions, and role-based access control was tested. Along with the results of the study, Test Cases for the Developed Electronic Learner Permanent Data Management System were executed. (Sapna & Mohanty, et. al, 2010), Test cases (TC) consist of the input parameters, execution conditions, and expected outcomes utilized for testing.

Releasing Phase

In this phase, the system was put into use in a controlled setting when testing was finished. Administrators and teachers were granted access to test the platform under real-world circumstances, along with the final approval from stakeholders based on user acceptance testing (UAT). To acquaint users with the functionality of the system and releasing documentation, the training sessions were held with the provision of configurations and training manuals for the user instructions. Additionally, user training materials and feedback from pilot testing served as proof that end-users can effectively operate the system.

Feedbacking Phase

In this phase, the system was continuously checked for security and performance problems after deployment. To find areas that needed improvement, user feedback was gathered. This phase involves gathering of surveys, user support interactions, and system usage data to identify any issues, areas for improvement, and/or additional feature requests. This feedback was used to assess user satisfaction and ensure the system meets the intended goals and expectations.

Level of Acceptance of the Developed Electronic Learner Permanent Data Management System

A survey was conducted among respondents to assess their acceptance of the system based on the Technology Acceptance Model (TAM), (Davis, 1989). The findings are as follows:

Table III: Level of Acceptance of the Developed Electronic Learner Permanent Data Management System

Indicator 1. Perceived Usefulness (PU)	**Category Mean**	**Standard Deviation**	**Description**
1. It helps them in updating learners' data more quickly when using ELPDMS in their work.	4.96	0.20	Very High
2. It enhances their job performance as a teacher when using ELPDMS.	4.93	0.26	Very High

3. They find the ELPDMS useful in the management of learners' data	4.97	0.17	Very High
4. It makes them easier in updating and generating of learners' data using the ELPDMS.	4.96	0.20	Very High
Indicator 2. Perceived Ease of Use (PEU)	**Category Mean**	**Standard Deviation**	**Description**
5. It is easy to become technologically skilled especially in manipulating ELPDMS.	4.93	0.26	Very High
6. They find it easy to use the ELPDMS in their job as a teacher in managing learners' data.	4.97	0.17	Very High
7. It is easy and understandable to encode learners' data using the ELPDMS.	4.97	0.17	Very High
8. It is more flexible to work when they use ELPDMS than the traditional one.	4.97	0.17	Very High
Indicator 3. Attitude Towards Using ELPDMS(ATU)	**Category Mean**	**Standard Deviation**	**Description**
9. It is very beneficial in managing learners' data when they use ELPDMS at work.	4.97	0.17	Very High
10. Using the ELPDMS in updating and generating learners' data is favorable.	4.96	0.20	Very High
11. It has a positive influence for them when they use ELPDMS in their job as a teacher.	4.96	0.20	Very High
12. They think it is valuable to use ELPDMS in managing learners' data.	4.96	0.20	Very High
Indicator 4. Intention to Use (AU)	**Category Mean**	**Standard Deviation**	**Description**
13. They tend to use ELPDMS in updating of learners' permanent data.	4.96	0.20	Very High
14. It increase their occurrences of using ELPDMS in their job as teacher.	4.97	0.17	Very High
15. They plan to use again ELPDMS to enhance their work interest.	4.97	0.17	Very High
16. They love to use again ELPDMS in their job as a teacher.	4.97	0.17	Very High
17. They will use ELPDMS to provide multi-approaches on working	4.97	0.17	Very High
Overall Category Mean	**4.96**	0.03	**Very High**

Table 3 presents the summary of the overall category mean and standard deviations for the key constructs related

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to the Developed Learner Permanent Data Management System. Based on respondents' impressions, each construct is assessed, showed a positive and consistent opinion across all dimensions.

The result shows that respondents uniformly perceive the Developed Learner Permanent Data Management System as highly easy to use, useful, and favorable, with a highly intention to continue using the system, as reflected by the overall category mean of 4.96 and the standard deviations of 0.03 across all constructs.

Perceived Usefulness of ELPDMS. The results revealed that respondents highly accepted wherein they were enabled to find ELPDMS useful in the management of learners' data, as reflected by the highest mean of 4.97 and the lowest mean of 4.93. [31], which exceeded the average of 3.5 on the scale, indicating a certain level of acceptance by users following their participation in the experience. This implies that ELPDMS can improve the overall student information management performance.

Perceived Ease of Use of ELPDMS. The results revealed that respondents highly accepted that it was easy to become technologically skilled in manipulating ELPDMS as reflected by the highest mean of 4.97 and the lowest mean of 4.93. The study found that users had a favorable attitude toward adopting the system.

Attitude Towards Using the ELPDMS. The results shows that respondents highly accepted that it was very beneficial in managing learners' data when using ELPDMS as reflected by the highest mean of 4.97 and lowest mean of 4.96. From the result, this suggests that the respondents highly accepted on the attitude towards using ELPDMS. This implies that, indeed, using ELPDMS was beneficial.

Intention to Use in ELPDMS. The results revealed that respondents highly accepted to use ELPDMS increase occurrences in their job as teachers, and loved to use again, as reflected by the highest mean of 4.97 and lowest mean of 4.96. Users' intention to use system increases as it perceived both useful and easy to use [32].

Overall, Perceived Usefulness (PU) has a significant positive impact on Perceived Ease of Use (PEU)**,** suggesting that when users find the system easy to use, they also perceive it as more beneficial. Additionally, both PU and PEU positively influence Attitude Toward Use (ATT)**,** implying that users are more likely to develop a favorable attitude toward the system when they consider it easy to use and useful. Furthermore, Attitude Toward Use (ATT) strongly predicts Intention to Use (IU)**,** demonstrating that a positive attitude leads to a higher likelihood of adoption.

Implementation Plan for the Developed Electronic Learner Permanent Data Management System

Table IV: Strategic Plan for The Integration and Implementation of The Developed Elpdms

Areas of Concern	Objectives	Strategies	Persons Involved	Budget	Source of Budget	Timeframe	Expected Outcomes	Remarks
A. Deployment								
Proposal and Infrastructure Assessment	Secure approval and IT infrastructure for the system	Submit proposal to the institution and conduct comprehensive evaluation of IT facilities	Researcher, ICT Coordinator	1,000	Other Operating Expenses (MOOE Fund)	June 2, 2025	Approved project proposal and assessment report	Proposition endorsement is needed beforehand proceedings.
Data Entry and Retrieval in the ELPDMS	Established data entry standards and protocols	Create validation rules to minimize errors during data input.	Teachers, Registrar, School Head, ICT Coor., Researcher	1,000.00	Other Operating Expenses (MOOE Fund)	June 6, 2025	Implemented a standardized and systematic data entry process across academic levels	The data entry processes in the ELPDMS was carried out with strict adherence to accuracy and timeliness
	Build Teacher's Capacity for Accurate Data Entry	Conduct training workshops on ELPDMS for school teachers and administrators						
Secure backup system of data within ELPDMS	Implement regular and automated backup procedures	Schedule regular testing of back-up files to ensure data integrity and usability	School Head, ICT Coor., Registrar	500.00	Other Operating Expenses (MOOE Fund)	Every end of the school year	Implemented an efficient, secure, and regularly monitored backup	Guaranteed continuity, reliability, and security of learner data through

							system that safeguards electronic learner data	backup strategy
System Implementation	Deploy the system's final version into operation	Roll out the system	Researcher, ICT Coor., Teachers, School Head, Researcher	1,000.00	Other Operating Expenses (MOOE Fund)	June 9, 2025	System all-out executed and implemented	Required continuous monitoring and support
Stakeholder Engagement	Engage all relevant stakeholders to ensure active involvement in the system's adoption and success	Hold orientation and sessions designed to introduce the ELPDMS	School head, teachers, ICT Coor., Stakeholders/Parents	2,000.00	Maintenance and Other Operating Expenses (MOOE) Fund	May 16	Strong stakeholders buy-in, ensuring acceptance and effective use of ELPDMS	Continued communication will be essential for sustained engagement
B. SYSTEM SUPPORT								
System Maintenance and Sustainability	Establish a structured maintenance plan	Conduct system updates such as back-up and upgrading of storage and Continuous user feedback mechanisms	School head administrators and teachers/advisers, ICT Coordinator, IT experts	Php 5,000	Other Operating Expenses (MOOE) Fund	Every end of the Quarter in every School Year	Well-functioning, secure, and reliable ELPDMS that supports efficient learner data management	Enable quick resolution of issues, reducing disruptions in data access and management

Table 4 represents the formulation of Strategic Plan for the Integration and Implementation of the Developed Electronic Learner Permanent Data Management System was driven by the pressing need and serves as a comprehensive guide to streamline and enhance the management of learner records across all educational levels, addressing longstanding challenges associated with manual and fragmented data handling. This emerged in response to the growing demand for a more reliable, accurate, and accessible system that supports both administrative efficiencies. The school's strong eagerness to adopt and deploy the system further fueled the initiative, recognizing its potential to significantly improve record-keeping.

CONCLUSION AND RECOMMENDATION

Findings

The implementation of the developed Electronic Learner Permanent Data Management System marks a significant step toward modernizing and streamlining the management of learners' permanent data in educational institutions.

The study revealed several key findings related to sustainability, user acceptance, efficiency, and security. Learners' data are now much more accurate and easily accessible, which also lessens administrative burden and the mistakes that come with manual record-keeping. Overall, the system has brought significant improvements to learner data management, addressing technical, training, and resource-related challenges is essential for its continued success and widespread adoption.

CONCLUSIONS

The successful development of Learner Permanent Data Management System used the Agile methodology that highlights the effectiveness of an iterative, collaborate, and user-centered approach in creating a functional and responsive solution to educational data management challenges. Through PIECES Framework the system was designed to optimized data accuracy, accessibility, and the overall usability. Further, Test Cases ensured that all functional requirements were met, with each component performing reliably under various scenarios. long-term sustainability.

Using the Technology Acceptance Model (TAM), culminated in highly positive results, as evidenced by the very high level of acceptance indicates that it exceeds standards and full satisfactory that effectively meets user expectations in terms of functionality, usability, and overall performance.

The development of the Learner Permanent Data Management System, guided by a well-structured strategic plan and systematic implementation process, proved to be highly successful in addressing the needs of educational institutions for efficient and reliable learner data management. The strategic plan provided a clear roadmap that ensured all phases from system design to deployment were aligned with institutional goals and user requirements.

Recommendations

Considering the study's findings on the successful development and high acceptability level of the Learner Permanent Data Management System, it is recommended that the full execution of the implementation plan be carried out in phases to ensure a smooth transition and minimal disruption to existing processes. Training sessions and continuous support should be provided to all users and establish a dedicated monitoring and evaluation team to oversee the implementation. Given the high level of user acceptance, scaling the system for wider institutional adoption is highly feasible, provided that technical support and system updates are regularly maintained to meet evolving needs.

The developed Learner Permanent Data Management System has some limitations that require strategic attention. To address these, it is recommended to upgrade system's infrastructure for scalability and efficiency, enhancing user accessibility and ensuring compatibility with other institutional systems, conduct additional research focusing on its limitations, and continuous development of the system. Further, in the future studies, include more participants so more schools that will benefit the system.

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