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The Design of "KIDOS" (Knowledge Information Domain System) in Education Management System

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ABSTRACT

This research aims to design and implement KIDOS (Knowledge Information Domain System) as an innovative solution within the educational management system in North Sulawesi Province. KIDOS is an advancement of the Education Management Information System (EMIS), utilizing artificial intelligence (AI) and text mining technologies. Specifically, the system is designed to manage qualitative knowledge from school principals through analysis of best practice essays, mapped against the 14 Principles of Educational Management. KIDOS provides a digital platform for principals to document and share best practices and delivers automated feedback, sentiment analysis, and actionable managerial recommendations. The research methods included system design, functional testing, and evaluation using the IS Success Model and Technology Acceptance Model (TAM). The results indicate that KIDOS operates effectively, is well-accepted by users, and provides strategic insights for educational policy-making. The system is expected to strengthen data- and knowledge-based management practices and serve as a model for AI-based EMIS development in other regions. KIDOS demonstrates the importance of adaptive and contextual digital transformation in improving the quality of education services.

Keywords: Knowledge Information Domain System, Education Management System, Technology Acceptance Model, IS Success Model.

INTRODUCTION

Information plays a central role in the managerial decision-making process of all types of organizations. The quality of available information highly influences the quality of decisions, whether they originate internally or externally (Laudon & Laudon, 2020). Human limitations in processing complex information make the availability of relevant, accurate, and timely data a key factor in reducing uncertainty and supporting the selection of optimal courses of action. Internal information provides insight into operational performance, while external information offers context for strategic adaptation.

A Management Information System (MIS) is generally defined as an integrated system that provides information to support operations, management, and decision-making functions within an organization (Laudon & Laudon, 2020). MIS collects data from various internal and external sources, processes it into meaningful information, and presents it in formats useful to managers at all levels. Its primary purpose is to enhance the effectiveness of decision-making and the efficiency of operations by delivering accurate, timely, and relevant information.

In the educational context, an Education Management Information System (EMIS) is a specific application of the MIS concept for the education sector. EMIS is designed to collect, process, analyze, and disseminate information about students, teachers, staff, curricula, finances, and other resources to support educational management at institutional, local, regional, and national levels (UNESCO Institute for Statistics, 2009). The system aims to provide key data and indicators needed for better planning, monitoring, evaluation, and policymaking in education.

The design of the KIDOS (Knowledge Information Domain System) represents an effort to address challenges and leverage opportunities within the context of educational management in North Sulawesi Province. KIDOS is positioned as a specific EMIS application tailored to local needs, with an innovative focus on qualitative knowledge management using AI and text mining technology. This approach is based on the recognition that, in addition to quantitative administrative data, the practical knowledge and experience (tacit knowledge) of school principals are valuable assets that must be explored and utilized to improve the overall quality of educational management.

KIDOS is unique in its application of knowledge management through best practice essay analysis. Knowledge management involves systematic efforts to capture, organize, share, and apply organizational knowledge to improve performance. By using AI to analyze principals' narratives and map them to the 14 Principles of Educational Management, KIDOS seeks to transform implicit knowledge into explicit insights that can be shared and used for feedback and collective learning—a method that complements the traditional functions of EMIS (Jordan, 2015).

Therefore, in response to the urgency of improving educational management quality in the global information era, the potential of AI-supported management information systems for analyzing qualitative knowledge, and the specific need for contextual solutions in the educational system of North Sulawesi, this study focuses on the design and implementation of "KIDOS" (Knowledge Information Domain System) as an innovative solution for educational management in the region.

METHOD

The research conducted is a type of Research and Development (R&D) study. This method aims to produce a product and test its feasibility. The product developed is an education management information system called KIDOS (Knowledge Information Domain System). The product was developed using the ADDIE model (Analysis, Design, Development and Implementation, Evaluation) as adapted from Lee & Owens (2004), although this study focuses only on the analysis and design stages.

The research is divided into two main stages:

1. Analysis

In this stage, the researchers identify the system requirements, objectives, target audience, and scope of the system to be developed. This phase also involves analyzing functional requirements, non-functional requirements, technical requirements, and user requirements.

2. Design

In this stage, the findings from the analysis phase are translated into a structured system plan. The design includes system flowcharts, use cases, and user interface design.

RESULTS AND DISCUSSION

The design of the Knowledge Information Domain System (KIDOS) in North Sulawesi Province employs the ADDIE research model, focusing on two main stages: the analysis stage, which includes observations and interviews as the foundation for designing the KIDOS Education Management System, and the design stage, which involves the development of the AI model, navigation structure, system flowchart, and interface design. The product outcomes of the KIDOS design process are as follows:

Analysis

This platform is intended to function as a knowledge management system focusing on the collection, analysis, and presentation of insights derived from best practice essays written by school principals in North Sulawesi Province. These insights will generate recommendations based on the 14 Principles of Educational Management and provide sentiment outputs based on the submitted essays.

KIDOS will utilize Artificial Intelligence (AI) techniques, particularly Text Mining for preprocessing and feature extraction, and the K-Means Clustering algorithm to group essays by thematic or practice similarity, thereby supporting decision-making and improving education quality. Based on the observation and interview results, the needs analysis includes the following components:

Functional Requirements

The functional requirements define the essential capabilities that the KIDOS system must provide, including user management, handling of best practice essays, text processing through text mining, clustering analysis using the K-Means algorithm, visualization and interpretation of analytical results, as well as search and filtering features.

Non-Functional Requirements

The non-functional requirements describe how the KIDOS system is expected to perform based on quality attributes and constraints, including performance, security, reliability, usability, maintainability, and the accuracy of the AI algorithms.

Technical Requirements

The technical requirements describe the technological aspects to be utilized in the system, including the system development environment, the production/implementation environment, and the overall system architecture.

User Requirements

The user requirements describe who will use the system and what they need from it, specifically including School Principals and System Administrators (Researchers/Designated Officers).

Design

The system design is divided into several components:

1) AI Model

The AI model consists of a pipeline for text data processing, which includes the following key stages:

Stage 1: Text Mining – Text Preprocessing
Stage 2: Text Mining – Feature Extraction / Vectorization
Stage 3: Clustering – K-Means Algorithm

2) Flowchart

The system flowchart illustrates the user interaction flow based on initial analysis derived from interviews and observations. The system flowchart is presented in Figure 1.

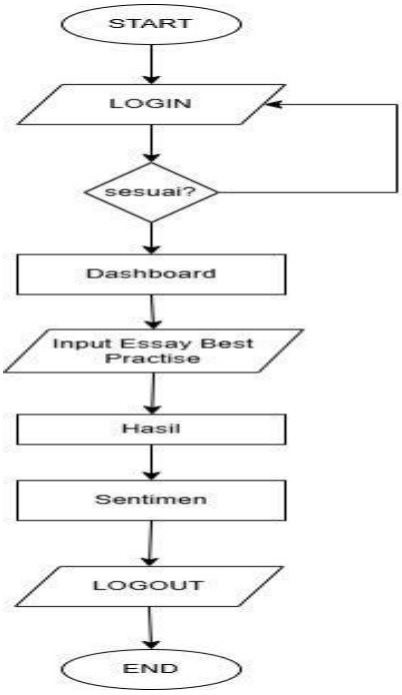

Figure 1. Flowchart system

In addition to the system flowchart, the KIDOS system also includes use cases as illustrated in Figures 2 and 3.

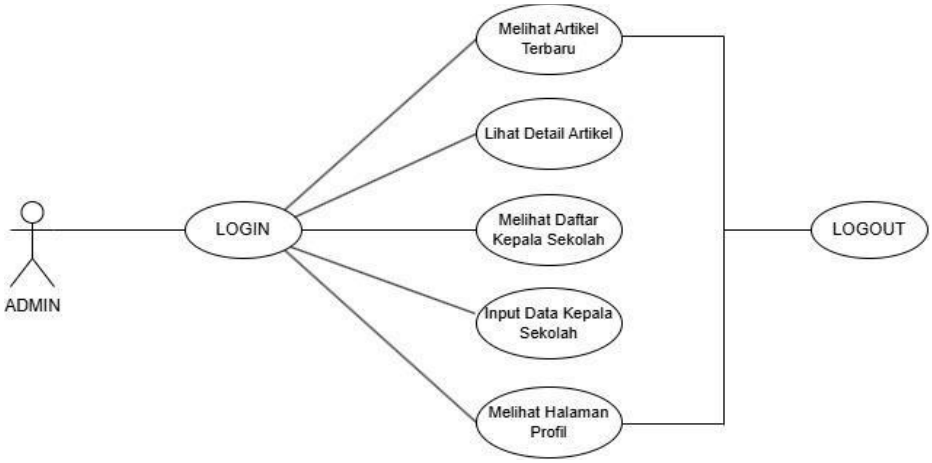

Figure 2. Use case Admin

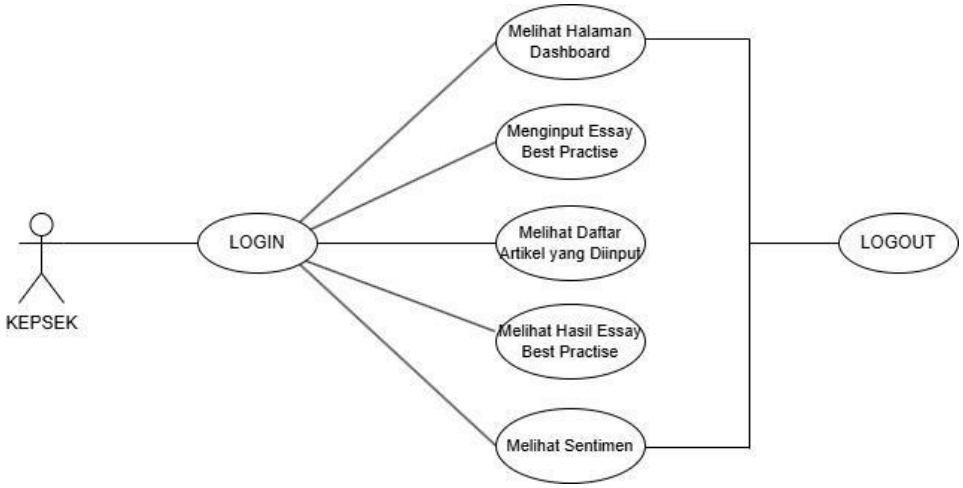

Figure 3. Principal Use Case

System Interface Design

To develop the KIDOS education management system, an interface design was created to serve as a guideline for building the user interface, as illustrated in the following figures

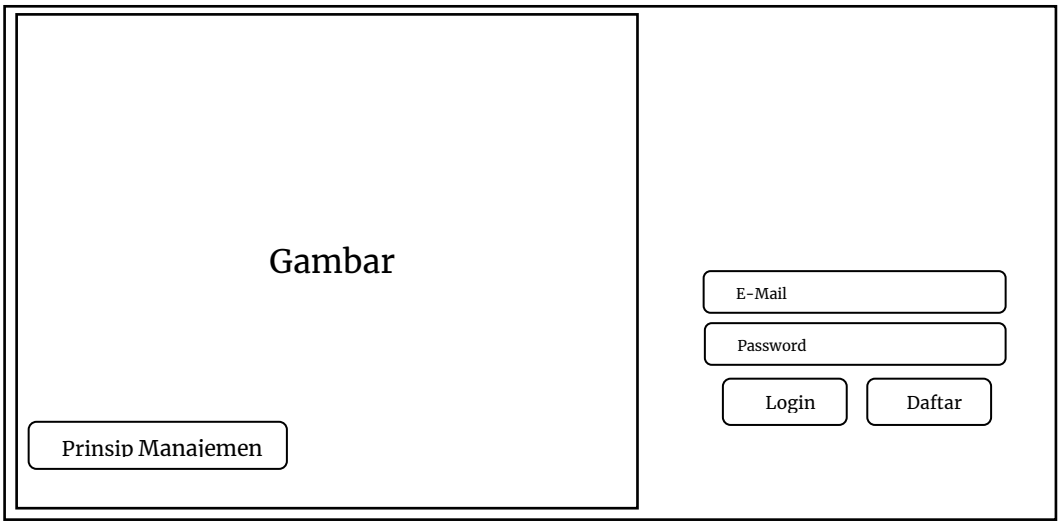

Figure 4. Design Login Page

After the design phase is completed, the system development begins. The system is built according to the established design specifications, as outlined below:

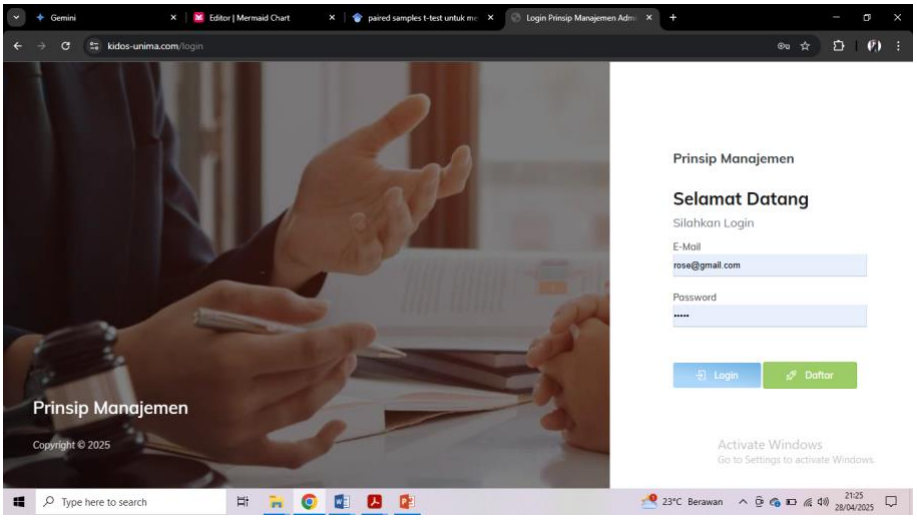

Figure 5. *login page*

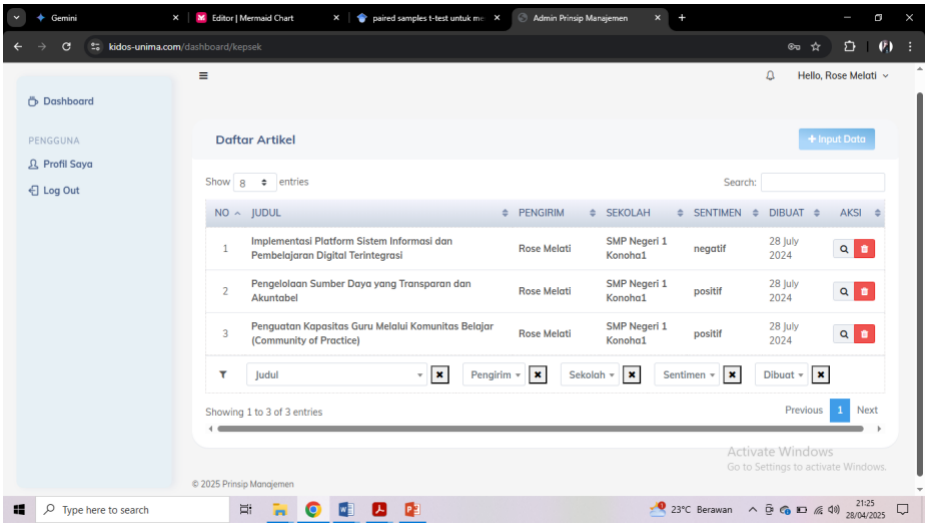

Figure 6. School Principal Dashboard

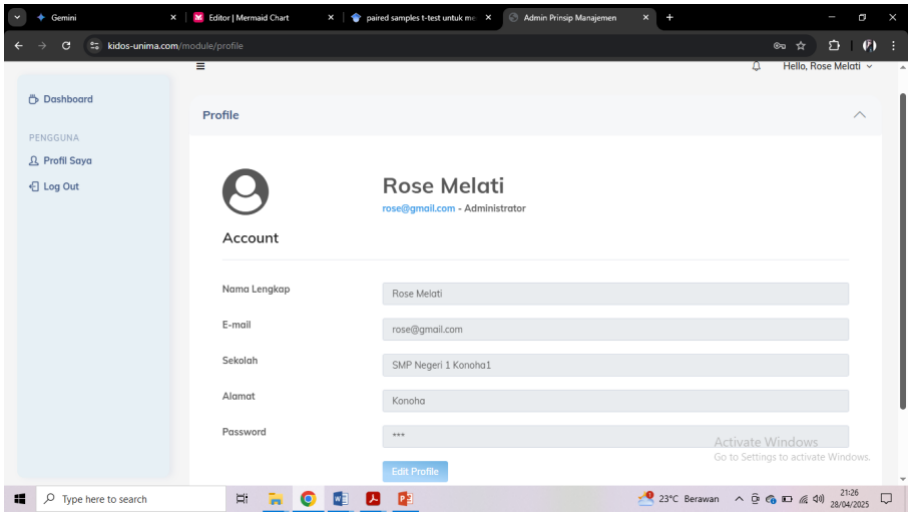

Figure 7. School Principal Profile Page

CONCLUSION

This study has successfully produced a design for an education management system called "KIDOS" (Knowledge Information Domain System) tailored for the Education Management System in North Sulawesi Province. Functionally, KIDOS is capable of providing analytical results on school principals' best practice essays, along with sentiment analysis for each submission. The system was developed using Artificial Intelligence technology, enabling in-depth analysis of the essays based on the 14 Principles of Educational Management. Each best practice essay submitted by principals is accompanied by sentiment interpretation. Ultimately, KIDOS offers practical contributions to school principals in North Sulawesi by enhancing the quality of leadership and the schools they manage.

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