System Requirements Of Authentic Assessment Information Systems Model Applications

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Abstract

Human needs to meet their needs cannot be separated from the role of information technology (IT) to provide data and information needs. In the education sector, the need for application of IT is carried out as an effort to support learning activities. One of application for education is a learning management system. Through this research, it will explain the system requirements for an authentic assessment information system based on web application. When conducting an authentic assessment, the teacher will assess the aspects of attitudes, knowledge and skills of student for vocational high school levels. The assessment tools for authentic assessments can be through by performance, writing, projects and portfolios assessments. The software development method used is the waterfall method, where for the needs analysis stage have used user requirement analysis and PIECES table. Meanwhile, for the design stage, we will use design tools by unified modeling language (UML). From the analysis and design of an authentic assessment information system based on web application, it is hoped that it can be one of the recommendations in building a learning management system media that is made in accordance with the assessment guidelines in the 2013 Curriculum.

Keywords: Learning Management System, Authentic Assessment, Information System, Unified Modeling Language, Web Applications.

1. Introduction

The transformation of information technology (IT) in life has also changed the perspective and mindset of people who originally made transactions through conventional media into digital transactions without time and place restrictions. The availability of the internet network that has penetrated the community, has an impact on the progress of science and technology today. Through the application of IT, it is considered to be able to increase people's productivity in meeting their daily and operational needs in their work. However, the implementation of IT also has consequences in the form of misuse of the data and information provided.

In the education sector, the application of IT itself can be in the form of making a learning management system. Where the learning management system can be used as a supporting medium for teaching and learning activities in schools. The learning management system itself can contain menus for managing academic data in the form of teaching materials, conducting assessments, conducting online learning and administrative management related to other educational operations. Data transactions that originally used paper for reporting are now also being transformed into digital. From the data owned by the school, an analysis can be carried out according to the desired information needs.

In accordance in Pasal 31 Undang – Undang Dasar Negara Republik Indonesia Tahun 1945, the Government of the Republic of Indonesia has formulated and established policies as guidelines for the implementation of the National education system through Undang - Undang (UU) Nomor 20 Tahun 2003 which concerning of the National Education System (NES). However, the Government's efforts did not stop until the formation of laws and regulations, but reformulated it through Peraturan Pemerintah (PP) Republik Indonesia Nomor 32 Tahun 2013 which concerning of guidance for implementation of National Education Standards. One of the application of PP No. 32 Tahun 2013 is the 2013 Curriculum, where this curriculum is used as a frame of reference for the implementation of learning.

One of output from this 2013 Curriculum is contextual teaching and learning (CTL), where CTL is a learning model which explaining learning methods that can be implemented in schools. CTL itself has 7 components in the academic process, namely: 1) constructivism; 2) inquiry; 3) questioning; 4) learning community; 5) modeling; 6) reflection; and 7) authentic assessment. Substantially, the assessment in CTL learning model can be done through: 1) attitude assessment; 2) knowledge assessment; and 3) skills assessment. Assessment instruments on the CTL learning model can be done by: 1) performance assessment; 2) written assessment; 3) project assessment; and 4) portfolio assessment. The portion and scope of the assessment for each level of education is carried out differently. [1]

This study will explain the analysis and design of a management information system (MIS) for an authentic assessment based on a web application, where the concept of SIM design is carried out in accordance with the assessment concept written in the Peraturan Menteri Pendidikan dan Kebudayaan (Permendikbud) Republik Indonesia Nomor 104 Tahun 2014 which concerning for assessment of learning outcomes by educators in primary and secondary education as well as an authentic assessment MIS model based on web applications. Making the design of an authentic assessment MIS based on this web application contains the process flow for authentic assessment during learning activities so that it can be developed into a media for a learning management system in the form of an application. Making process flow and assessment instruments is adjusted to the concept of authentic assessment that has been determined through the guidelines for the implementation of the assessment. To determine the actors who get access rights to an authentic assessment MIS based on web application, they are as follows: 1) teachers as educators in schools; 2) practitioners of the Business and Industry as lecturers in the industrial world; and 3) students as students at school. Meanwhile, the scope of analysis and design of an authentic assessment SIM based on a web application is the education level of a vocational high school under the DKI Jakarta Provincial Government.

In carrying out of this research, the use of previous research is used as a research gap. From the research that has been described by Yulius, Alfred., Kartono and Novia, Yuliana (2020), describing the usefulness of designing an information system for managing student academic scores conducted at SMA Negeri 1 Nanaga Taman Sekadau, it is
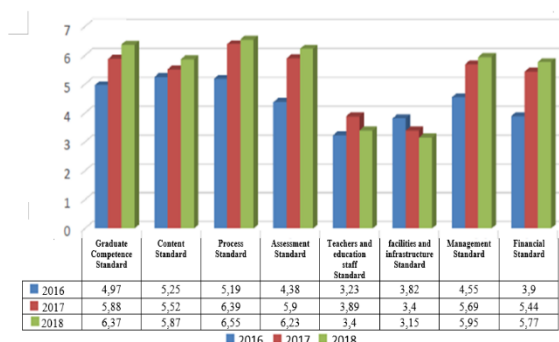
considered to be able to assist teachers in carrying out the process. authentic assessment effectively and efficiently. [2]

This is supported through research conducted by Setiawan, Ferdy Budi (2018), which states that an authentic assessment application is used as a media for the assessment process of academic activities at SMK Wijaya Sidoarjo. Through the assessment management system, it is considered to help users such as school principals, vice principals for student affairs and teachers to monitor data on the achievement of academic activity assessments from the school. [3]

The correlation between the education sector and information systems is explained through the research of Wahyudi, Apri et al (2015), which in this study describes the application of an education management information system (MIS) using a web-based application for SMK 3 Metro Lampung. The processes owned by the education SIM are: 1) the planning process; 2) the organizing process; 3) implementation process; and 4) monitoring and evaluation process. To measure performance in each process, it is carried out from the achievement of indicators and from the performance assessment, an evaluation process will be carried out to analyze the strengths and weaknesses so that from the results of the evaluation, recommendations can be given for the development and improvement of the quality of education. The results of the implementation of a web application-based educational management information system prove that the MIS can assist users in carrying out learning activities. The making of this web application-based educational MIS is done based on the needs for the interests and potentials possessed by students and can be accessed anytime and anywhere. The suggestions and recommendations in this study are in the form of making written standard operating procedures (SOP) that are used as guidelines in the implementation of education management information systems carried out by schools. The purpose of making the SOP is to make a mapping of the development of competencies that must be possessed by teachers and as a blueprint for the needs of technology and information systems to be used. [4]

This is also supported through research by Rahayu, Mugi (2015) who conducted research on elementary schools in Ngemplak District, Sleman, Yogyakarta. In this study, it was shown that the feasibility assessment of the application of the education management information system at the school received an average score of 88,3%, so from this it proves that information technology is considered very helpful in the academic implementation process. [5]

To support this research, supporting data is needed in the form of the gap phenomenon. The data was taken from data on the education quality map report for vocational high school education levels in 2019 obtained from Lembaga Penjaminan Mutu Pendidikan (LPMP) DKI Jakarta. In the report, it displays the results of the achievement of the quality of education from 2016 to 2018, where the results of these achievements have increased. The achievement data can be seen in the following picture 1. [6]

	Graduate Competence Standard	Content Standard	Process Standard	Assessment Standard	Teachers and education staff Standard	facilities and infrastructure Standard	Management Standard	Financial Standard
2016	4,97	5,25	5,19	4,38	3,23	3,82	4,55	3,9
2017	5,88	5,52	6,39	5,9	3,89	3,4	5,69	5,44
2018	6,37	5,87	6,55	6,23	3,4	3,15	5,95	5,77

Picture 1. Graphic of NES achievement for vocational high schol 2016 - 2018 [6]
Source: LPMP Provinsi DKI Jakarta (2019)

Then for the achievements of all SNPs at all levels of education from 2016 - 2018, it can be shown in table 1. [6]

Table 1. ACHIEVEMENT OF QUALITY REPORTS FROM 2016 - 2018 [6]
Source: LPMP Provinsi DKI Jakarta (2019)

Education Level	Achievement of the Year Quality Report		
	2016	**2017**	**2018**
Primary School	4,87	5,47	5,59
Junior High School	4,55	5,27	5,51
Senior High School	4,91	5,27	5,54
Vocational High School	4,42	5,27	5,42

Based on table 1, it can be explained that for the assessment standard at the vocational education level in 2018 the average value was 6,23. As for the achievements in the assessment standards, there are 4 assessment indicators that do not meet the SNP achievements and have not entered the 5 star category. However, the school is given recommendations as an effort to be able to meet quality achievements in the following year. [6]

Based on the explanation above, it is necessary to analyze and design an education management information system (MIS) that focuses on authentic assessment using web-based applications. This is intended to be the basis for making an authentic assessment application based on a web application that will be used as a medium for managing academic achievement data in schools. For the level of education that will be the subject of this research is a vocational high school. The results obtained from this study can be used for academic needs in the form of a literacy resource that can be used for research related to the design of the next web-based authentic assessment application. As for the practical benefits of this research, it can be used as a guide for stakeholders in the education sector to be able to assess the usefulness of the application of information technology in education as a supporting media for teaching and learning activities in schools.

2. Research Method
A. Research Method

In this study using the Research and Development (RnD) research method or research and development. As for the RnD method, there are 10 stages or steps in implementing the results of this study, namely: 1) research and information collecting; 2) make a plan; 3) development of a product draft; 4) initial field testing; 5) improve the main product; 6) field testing; 7) completion of field test products; 8) operational field testing; 9) final product revision; and 10) dissemination. [7]

B. Instrument And Method Of Collecting Data

For techniques in data collection in this study can be done with the following steps:
1) Data collection at this stage will be used as reference data in identifying problems. The data acquisition that will be used in this study is as follows:
   a) Primary data in the form of data about the model and the flow of the authentic assessment process obtained from the Vocational High Schools in the DKI Jakarta Province area using a questionnaire containing questions related to the steps in planning, implementing the assessment and evaluating learning outcomes; and
   b) Secondary data in this study were obtained from regulatory data, journals, books and ebooks related to the development of management information systems for authentic assessments which will be used as a source of development in the manufacture of research products.
2) Interview using a questionnaire with the Vocational High School in the DKI Jakarta Province area which carries out an authentic assessment process related to the business process flow and data and information needs as well as the required application functions. Questions on the questionnaire were made using the standards for planning and implementing authentic assessments and learning evaluations.

C. Development Software Method

The software development method in this study uses the waterfall method. The waterfall method is a method that is made systematically which has a series of stages to be used during software development using a classical life cycle approach and a linear sequential model. The waterfall method is made based on user requirements which is carried out sequentially starting with the planning stage, modeling stage, construction stage and software development stage (deployment) which is used as a basis in the manufacture or development software. The steps in the waterfall method include: [8]

1. System Requirements

In this step, the researcher analyzes the system requirements as the basis for designing systems and software. The system requirements analysis required is problem analysis, user analysis, software requirements analysis and hardware requirements analysis.

2. System and Software Design

In this second step, the results of the system requirements analysis will provide solutions through the overall architecture for the business process flow in the form of diagrams based on their functions and needs as well as the design of the application display.

3. Implementation and Unit Testing

From the results of the design of management information systems is used to implementation of applications based on business process flow.

4. Integration and System Testing

In this step, a trial will be carried out on the application in terms of the business process flow, appearance and function in accordance with the design that has been made. The purpose of this trial is to minimize the occurrence of failures or errors and then revise the design of management information systems and applications before they are implemented on a large scale.

5. Operation and Maintenance

The last stage in the watrerdall method, the application can already be used by users and can be developed according to the needs of the organization's goals and users in the future. In the development stage it is also possible, the software development stage can be repeated from the initial stage, namely the system requirements analysis stage. To clarify the description of the stages in the waterfall method can be seen in picture 2.
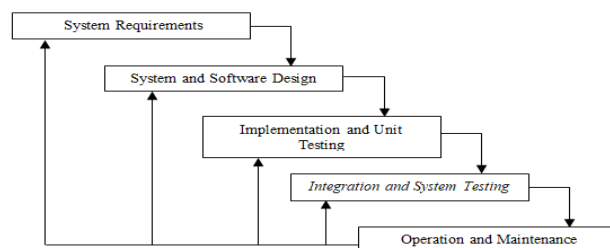
Picture 2. Waterfall Method [8]
Source: Pressman, Roger S. (2006)

2.2 Literature Review
2.2.1 Previous Resaerch

To obtain optimal research results, it is necessary to support data in the form of previous research for comparison in making research. The previous research is as follows:

Yulius, Alfred., Kartono dan Novia, Yuliana through a journal published in 2020 where research method uses a descriptive research method and uses a unified modeling language (UML) as a tool in carrying out its design. From the results of the research it is explained that in making an information system for assessment using a web-based application that is used for the value processing system. From the results of the application of the MIS assessment, it is considered to be able to assist in the assessment process because it can be accessed anytime and from anywhere because the application is online. [2]

Setiawan, Ferdy Budi through research conducted in 2018 with the research uses qualitative methods. The results of the study explain the success of the application of

authentic assessment information system in carrying out learning activities carried out in schools. [3]

Wahyudi, Apri. Sowiyah, dan Alben Ambarita in the journal published in March 2015 with research method used is a qualitative phenomenological method which contains research steps in the form of observation, documentation and surveys (interviews). From the results of the discussion, it is explained in the form of the steps used when implementing an academic management information system. [4]

Rahayu, Mugi in the journal published in March 2015 with results of this study indicate that the academic management information system is considered to have an effect on academic performance implemented in schools.[5]

From this research, it shows that the application of information technology (IT) functions can be carried out in the field of education where the use of IT can be used as a medium for a learning management system that is adapted from the CTL concept. The similarities between the previous research and this research are in the technique of designing an authentic assessment SIM using the unified modeling language (UML) technique. Meanwhile, for the analysis phase in this study, the analysis of user needs and the PIECES Table analysis framework were used.

2.2.2 Contextual And Teaching Learning (CTL)

Contextual and Teaching Learning (CTL) is a learning model in which the provision of teaching materials focuses on something related to the daily attitudes carried out by students in their lives so that in the understanding possessed by students they can understand the substance of the teaching materials provided by the teacher [9]. Also provides an understanding of CTL in the form of a learning concept that focuses on the process of student involvement in understanding the learning context in order to learn the material provided by the teacher which is associated with the conditions being lived [10]. Meanwhile, according to Nurhadi (2003), he also explained the understanding of CTL which is a learning concept that focuses on the attitudes possessed by students in family and community life and is applied in the school environment in order to foster knowledge for students [11]. CTL also has a goal to shape the attitudes, knowledge and skills possessed by students so that they can identify and determine the problems faced every day in the family and community environment and then can provide solutions to these problems through the academic process at school.

From the explanation of the definition of CTL, it can be concluded that the notion of CTL is a learning method that focuses on the formation and development of attitudes, knowledge and skills. Where the learning method is applied based on the guidelines for the implementation of the 2013 Curriculum. In the application of CTL, it can be combined with the function of information technology. The combination of these two things can be in the form of an application for learning management management. For the development of management information systems for the field of education, it can work well if the development of the MIS concept is based on the required learning model. In this case the development of a management information system for contextual learning must have 7 components of contextual learning, namely as follows: 1) modeling; 2) inquiry; 3) questioning; 4) learning community; 5) constructivism; 6) reflection; and 7) authentic assessment. [12]

In this study, the focus of making the application is aimed at the authentic assessment component. Where in authentic assessment there are 4 types of assessment, namely: 1) performance appraisal; 2) written assessment; project appraisal; and 4) portfolio assessment. (Kementrian Pendidikan dan Kebudayaan. 2013). To clarify the dimensions and tools for the authentic assessment, see the picture 2.
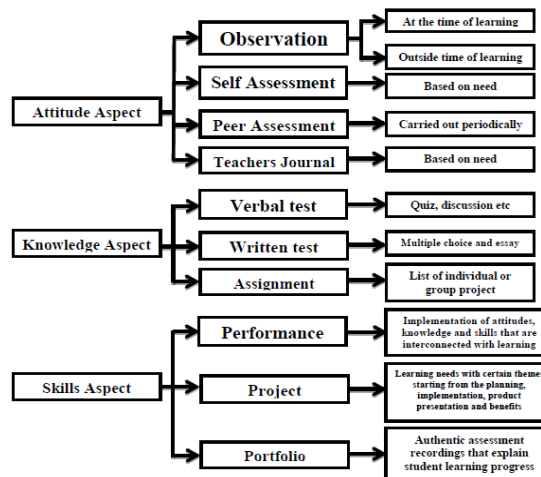
Picture 3. Authentic Appraisal Types [13]
Source: Ramadan, Zaka Hadikusuma (2015)

2.2.3 Management Information System

In the application of management information systems it allows users to collect and manage data and information into new knowledge. Implementation of management information systems can be done in all fields of work, one of which is in the field of education. In making the business process flow in the field of education, it will be formed into a system that can facilitate the user's work in carrying out all learning activities. Through the advancement of educational information technology, it is easier to implement an educational management information system which has the aim of being able to provide information regarding solutions to problems faced by users. The definition of a management information system (MIS) according to Rochaety, Eti et al (2009) is a series of activities contained in units in educational institutions that have input, process and output components that have limitations and can communicate through user interface with data stored in the database. One form of the application of a MIS is in the form of an application. Where the application will be made based on the process flow that has been made. [14]

As for there are 5 elements that must be owned by an information system has, namely 1) the process that is owned in the form of input, process and output; 2) user interface which is used as a media of communication between users (humans) and hardware; 3) boundary of the application; 4) limitations of the subsystems contained in the information system; and 5) subsystem which is a process flow that is owned by each work unit in an organization or company that is useful for monitoring every activity in every organization or company. [15]
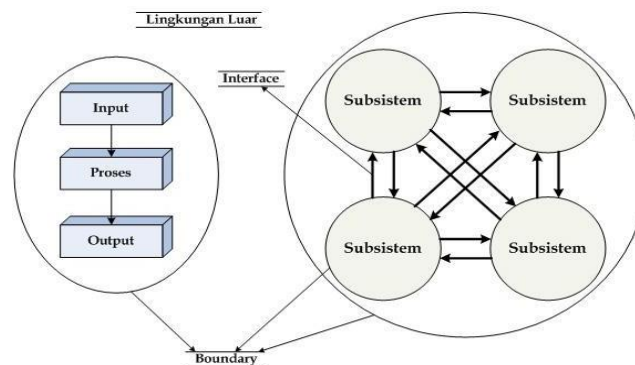
Picture 4. System Characteristics [15]

Source: Mulyanto, Agus (2009:3)

The understanding of the input on the MIS element is an input that will be filled in and stored in the application in the form of data. Then the data that has been filled in and stored will be processed through computer language and will be output in the form of information. The output of a system can be in the form of knowledge for recommendations, orders or in the form of reports. [15]

2.2.4 Analisis PIECES Table

The definition of pieces analysis is a framework that is used as a guide to analyze the comparison of 2 (two) systems used by the organization, namely the current system and the proposed system. The PIECES table analysis has 6 (six) components used in the comparative analysis of the two work systems, namely: 1) performance; 2) information; 3) economic; 4) control; 5) efficiency; and 6) services [16]. To explain each component in the PIECES table, see table 2.

Table 2. Component Description in the PIECES Table [16]
Source: Azizah and Wahono (2021)

Components	Description
Performance	This component explains the analysis carried out on the performance aspects resulting from the system, both from the system that is currently running and the system that is being proposed. The 2 things assessment criteria for this component are the criteria for achieving the number of products produced by the system and the response time required to produce the outputs generated from system performance in the form of data and information.
Information	This component explains the analysis for quality assessment and the type of information generated from the system that can be used as a basis for decision making from the two systems.
Economic	This component describes the analysis related to obtaining information about the benefits or benefits in the perspective of the costs obtained when using the 2 systems in the organization. Analysis of this component will provide an overview of the use of costs that will be used when implementing the two systems.
Control	This component describes the analysis related to obtaining information about the description for the control of data and information transactions that occur from the two systems. In this case, the intended control is the level of security in the use of data and information to users who do not have access rights to enter the application. Security in this case is not only related to data and information leakage, but also to data loss, both from human error and technical factors.
Efficiency	This component describes the analysis to obtain information about how many processes are used by both systems to generate data and information. Not only an assessment of the process, but this efficiency is seen from the use of resources used for the implementation of the two systems. These resources can be in the form of hardware used, software as application assistance for the implementation of the system and the internet network.
Services	This component describes the analysis to obtain information about the quality of service that can be

	provided by the two systems. The assessment criteria for services are carried out in terms of user-friendliness in using the application, both in terms of function, process flow and user interface.

2.2.5 Unified Modeling Language (UML)

Unified modeling language (UML) was invented by Grady Booch, Jim Rumbaugh and Ivar Jacobson in 1995. UML has a definition that is making application designs using a modeling language. From the design of the application it will be made into documentation for making application programs. [17]

Understanding UML according to Nugroho, Adi (2010) is a modeling language that is used as a software design specifically for object-oriented programming. The purpose of modeling languages is to simplify complex problems so they can be learned easily [18]. Meanwhile, for the purpose of using UML according to Herlawati and Widodo, Prabowo Pudjo (2011) are as follows: [19]

1. Design of information systems that contain the flow of business processes in the organization;
2. Make it easier for programmers to make applications that are in accordance with the design of the information system that has been made;
3. Identify the detailed system used to analyze the information system and software requirements; and
4. As an information system documentation that contains the flow of business processes and their arrangements in the organization.

3. Findings

In making an authentic assessment application based on a web application, it is based on an authentic assessment management information system model based on a web application for contextual learning that has been developed in other journals. The assessment components assessed in the authentic assessment model also refer to the 2013 Curriculum assessment guidelines, that are: 1) attitude component; 2) knowledge component; and 3) skills component. Meanwhile, the stages in the authentic assessment MIS model are as follows:

1. Mapping of the quality of learning that has been carried out in the previous year. From this mapping, it can be used as a reference in making lesson plans to be implemented;
2. Learning planning carried out by the management of the Education Unit in this case the School which will be used as a guide in the implementation of learning and assessment of learning outcomes;
3. Management of learning will also be carried out by the school management to arrange scheduling and distribution of resources for the implementation of teaching and learning activities to be carried out;
4. Implementation of the assessment will be carried out after the teaching and learning process is carried out. Where all data on the assessment of student learning outcomes carried out by teachers and practitioners of business and industry will be stored in the application. From the processing of the assessment data, it will be used as the basis for the formulation in the evaluation of learning;
5. The decision support system available in the application contains the processing of assessment data that will be used by education policy makers at the school to determine the achievement of the quality of learning that has been carried out and the basis for decisions in determining the direction of new learning strategy policies;
6. Supervision and evaluation here will be carried out by a team of auditors or assessors regarding learning outcomes. The team of auditors or assessors will see and control each process of implementing teaching and learning activities and check whether the implementation is in accordance with the learning planning document that has been made previously;
7. An audit of learning outcomes is carried out after the learning process is carried out. From the results of the audit, it will be used as a basis for education policy makers both in schools

and institutions that oversee learning outcomes. The output of the audit activity is in the form of an evaluation report on learning outcomes; and

8. The new learning development strategy will be carried out by all stakeholders in the school to be used as a reference in developing the implementation of teaching and learning activities in the following year. The learning development strategy is a roadmap containing activities in an effort to meet the improvement of learning outcomes within a certain period of time.

In this authentic assessment MIS application, it can be used by: 1) Teachers; 2 Practitioners of Business and Industry; 3) School management; 4) Sstudents; and 5) Government or related educational institutions. To clarify the description of the explanation above, in this study a development model for an authentic assessment SIM will be made which will be used at the Vocational High School level of education. For describe of the development model for an authentic assessment management information system based on this web application can be seen in the following figure 5.
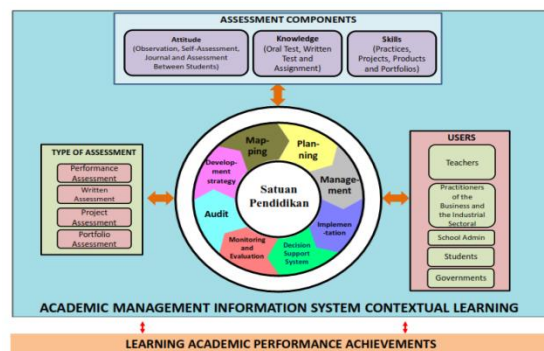
Picture 5. Final Model of Authentic Assessment Management Information System Based On Web Application For Contextual Learning

As for the problem of developing a model for software domain in contextual learning, it is expected to be able to overcome the problems contained in contextual learning by combining the functions of information technology as a learning medium to make it easier for students and educators as well as school management in implementing and monitoring learning outcomes. To clarify the description of the hypothetical model of software domain in
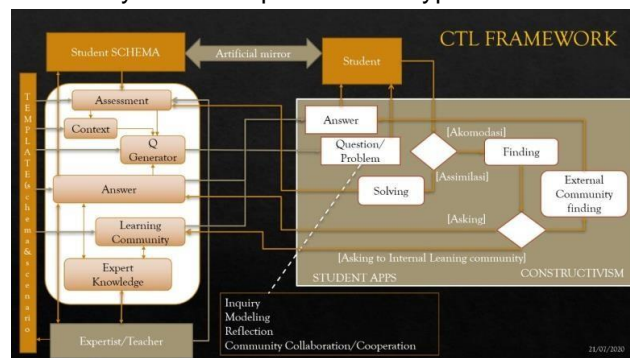
contextual learning, it can be seen in the following figure 6.

Picture 6. Final Model for Contextual Learning Media Based on Web Applications From Software Perspective (Domain)

3.1 Problem

Based on the explanation written on the background of the problem above, the problems obtained related to the development of a management information system regarding authentic assessment at the vocational education level in DKI Jakarta Province are as follows:

a. From the data presented in Figure 1 and table 1, the assessment standard at the vocational high school level in DKI Jakarta Province has a value of 6.23 where the sub-indicator of

supervision and authentic assessment carried out during the teaching and learning process has an achievement with a value of 6.31 and gets a 4-star category and a sub-indicator. aspects of the assessment that include aspects of attitudes, knowledge and skills get an assessment score of 6.75. Meanwhile, the sub-indicators in other assessment standards only reached SNP level 4 with a 4-star category; and

b. There is no model for the development of an authentic assessment management information system (MIS) in web application-based Vocational Schools that is used as a medium in managing academic achievement assessment data in accordance with the concept of authentic assessment in accordance with existing regulations.

3.2 Research Implementation
A. *User Requirements Analysis*

To obtain optimal management information system design results, this user analysis will describe the results for user needs where each application user has its own role and access rights. From the results of the analysis of user needs, this will be used as the basis for designing a management information system for authentic assessment. The results of the analysis of user needs can be seen in table 3.

TABLE 3. USER REQUIREMENTS ANALYSIS RESULT

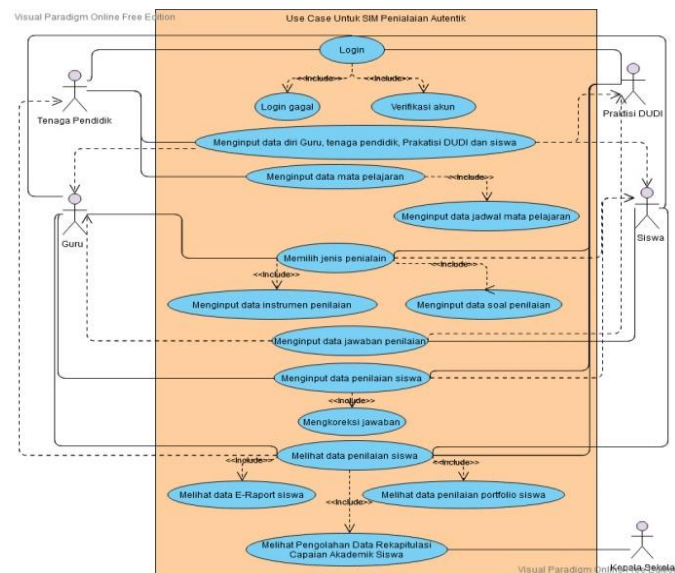| Actor	Description of Application User Needs
School Administrator	1 Entry in the personal data of the Principal, Teachers, Educators and Students (application users) through the application. From this personal data, it can be used as a user account for each application user in accordance with their respective access rights. 2 Entry in the subject name data through the application. 3 Entry in the subject schedule data per semester and class by the application.
System	1 Verify user data during the process of logging in to the application. So that users can get and fill in data according to their access rights. 2 Store application user data in the database. 3 Store subject data in the database. 4 Save the subject schedule data in the database. 5 Provide the type of assessment that will be filled by the teacher through the application display. 6 Save data on the type of assessment that has been selected by Practitioners of Business and Industry anf Teachers and Practitioners. 7 Provide an assessment instrument through the application. 8 Give the types of questions according to the type of assessment that has been chosen by the DUDI Teachers and Practitioners. 9 Storing the question data in the database. 10 Storing answer data that has been filled in by students in the database. 11 Save the assessment data according to the type of assessment that has been selected by the Practitioners of Business and Industry and Teachers in the database.
Teacher	1 Receive learning schedule data that will be carried out by the application. 2 Select the type of assessment by the application. 3 Entry in the assessment instrument data on the application. 4 Entry in the question data through the application. 5 Receive student answer data by the application and make corrections to the student's answers. 6 Entry in the student's academic achievement assessment data by the application. 7 Receive e-rapot data by the application.

Headmaster	1 Controlling data processing related to academic achievements that have been carried out during the learning process has been completed by the application.
	2 Make an evaluation of the performance of the academic achievement.
	3 Make a planning learning development strategies for the next time and fulfilling other academic achievements.
Practitioners of Business and Industry	1 Choose the type of assessment by the application.
	2 Entry in the assessment instrument data by the application.
	3 Entry in the question data through the application.
	4 Receive student answer data through the application and make corrections to the student's answers.
	5 Entry in student assessment data by the application.
	6 Receive student portfolio assessment data by the application.
Student	1 Receive question data by the application.
	2 Entry in the answer data by the application.
	3 Receive academic achievement assessment data by the application.

B. Design Of Authentic Assessment Information System Based On Web Application

In designing a management information system (MIS) for authentic assessment based on web application will be carried out using the Unified Modeling Language (UML) technique which contains 4 diagrams related to the flow of business processes and data on authentic assessment applications. The diagrams used are as follows: 1) use case diagrams; 2) activity diagrams; 3) sequence diagrams; and 4) class diagrams. To see the design of an authentic assessment management information system (MIS) can be seen in the following explanation.

1. Usecase Diagram

After analyzing user needs, an authentic assessment management information system design will be made in the form of making use case diagrams. Where in this use case diagram will explain the flow of the process carried out on the application for authentic assessment. To see the flow of the process can be seen in the following figure 7.

Picture 7. Usecase Diagram For Authentic Assessment IS
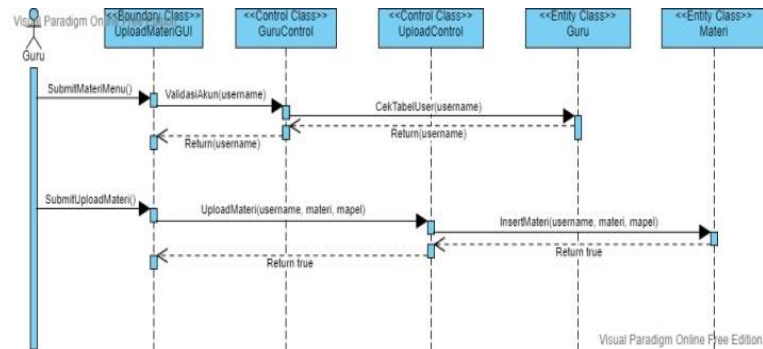
The explanation in figure 7 is as follows:
1. School administrators login by entering username and password data through the application. Then the application will verify the data to the database. If the data is in

accordance with what is filled in the database, then it gives access to enter the application, if it fails then the educators must do the login process again;

2. School administrators will enter personal data for School administrators, teachers, students and practitioners of Business and the Industrial and from this personal data it can be used as an application user account;

3. School administrators will enter subject data in the application. The subject data will be used as basic data in making class management data in the next process. School administrators will also store data on subject schedules to be made into class management;

4. practitioners of Business and the Industrial and teachers and will choose the type of assessment on the application. When choosing the type of assessment, practitioners of Business and the Industrial and teacher will choose the assessment method and instrument;

5. Students will input the answer data through the application to be corrected and given an assessment by the practitioners of Business and the Industrial and teacher;

6. practitioners of Business and the Industrial and teachers and will enter the assessment data of the corrected student answer sheets into the application. From the assessment data, it can be used as the basis for E-Rapot data and student portfolio data; and

7. Headmaster will control transasction of data and information related to the results of the recapitulation of academic performance achievements that have been carried out within the specified learning time period.

2. Activity Diagram

Making activity diagrams aims to explain the overall business process flow on the use of an authentic assessment management information system (MIS) based on the results of user needs analysis. Where the activity diagram explain the process flow for the entire process carried out to support assessment activities in the teaching and learning process. To see the activity diagram for the authentic assessment MIS, it can be seen in figure 8.

Picture 8. Activity Diagram For Authentic Assessment IS

The explanation in figure 8 is as follows:
1. School administrators login by entering username and password data through the system;
2. System will automatically verify the data to the database. If the data is in accordance with what is filled in the database, then it gives access to enter the application, if it fails then the educators must do the login process again;

3. School administrators will entry personal data for educators, teachers, students and practitioners of the Business and Industrial through the system so that personal data can be stored in the database and can be used as user accounts for teachers, educators, practitioners of the Business and Industrial and students;
4. System will save the data itself into the database;
5. School administrators will entnry subject data containing subject code data; subject names and number of learning hours. From this subject data can be used as basic data in making class management and assessment data;
6. System will save the subject data into the database;
7. School administrators will enter data on the schedule of subjects per semester and class. This class management data contains subject data and teacher and student personal data according to the academic year, semester and class intended;
8. System will save the schedule data of these subjects into the database. From the subject schedule data, it can be used as a reference for teaching and learning activities;
9. Teacher receives the learning schedule data and carries out teaching and learning activities in accordance with the learning guidelines that have been made through the system;
10. Teachers and practitioners of the Business and Industrial will choose the type of assessment that has been provided by the system;
11. System will provide the type of assessment that has been selected by Teachers and practitioners of the Business and Industrial and proceed to the next process.
12. Teachers and practitioners of the Business and Industrial will store instrument data through the system;
13. System will provide a choice of assessment instruments according to the type of assessment and save the question data in the database and proceed to the next process;
14. Teachers and practitioners of the Business and Industrial will store data about questions according to the type, method and assessment instrument into the database;
15. Data about questions that have been stored in the database will be received by students through the system;
16. Students will save answer data in the system to be corrected and scored by the Teachers and practitioners of the Business and Industrial;
17. System will save the student's answer data into the database. From the data, the answers will be corrected by Teachers and practitioners of the Business and Industrial;
18. Teacher will make corrections to the student's answer data. 19. After correcting student answer data, Teachers and practitioners of the Business and Industrial will enter assessment data through the system;
19. System will save the assessment data into the database;
20. Teachers and students will receive assessment data for all subjects that have been passed by students in the form of E-Rapot data. From this data, the teacher can evaluate student learning outcomes and provide the information to the student's guidelines;
21. Practitioners of the Business and Industrial will receive student portfolio data;
22. With this data, practitioners of the Business and Industrial can be used as a reference for companies to determine the selection of ready-made workers according to company needs and the specifications and assessment criteria possessed by students;
23. Headmaster control the recapitulation of academic performance achievements that have been running through the system;
24. System provides information related to the results of data processing performance achievements to Headmaster;
25. Headmaster together with teachers and teaching staff will conduct joint evaluations for the achievement of academic performance that has been running; and
26. Headmaster together with teachers and teaching staff will make a strategic planning document for academic development and fulfillment of other academic performance achievements for the following year.

3. Sequence Diagram

　　　　Sequence diagrams on the design of an authentic assessment management information system (MIS) there are 11 diagrams for data flow for each process in an authentic

assessment application. The 11 diagrams are used for the following processes: 1) login process; 2) the process of filling in subject data; 3) the process of filling in the subject schedule data; 4) the process of filling in user data; 5) the process of filling out learning materials; 6) the process of filling out the performance appraisal; 7) the process of filling out written assessments for teachers; 8) the process of filling out project assessments for teachers; 9) the process of filling out the portfolio assessment; 10) the process of filling out written test answers for students; and 11) the process of uploading student project assignment files. To see the sequence diagram for each of these processes, it can be seen in figure 9 - 11.

Picture 9. Sequence Diagram For Entry Data Of Material Learning Process

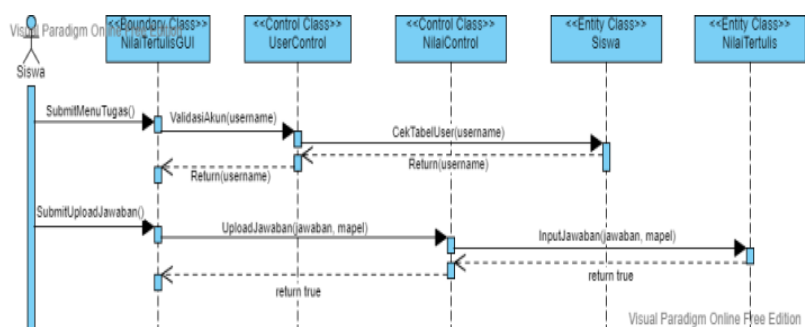The explanation in figure 9 is as follows:
1. Material table object will return a message to the upload control object and the learning material menu display object in the form of a true value in response to the successful validation of filling in the learning material data.
2. Teacher actor presses the learning material menu button on the application to the material upload display object;
3. Material upload display object sends an account validation method in the form of a username variable for access rights on the learning material menu to the teacher control object;
4. Teacher controll object sends a method to check the user table on the database in the form of a username variable to the teacher table object;
5. Teacher table object will send a message back to the control teacher object in response to access rights on the learning material menu. If the message received is failed, then the actor is required to re-login;
6. If the account validation has been successful, the teacher actor will press the learning material menu button on the application to the material upload display object;
7. Material upload view object sends the material upload method in the form of username, material and folder variables to the upload controll object; and
8. Upload controll object sends the material insert method in the form of username, material and folder variables to the material table object.
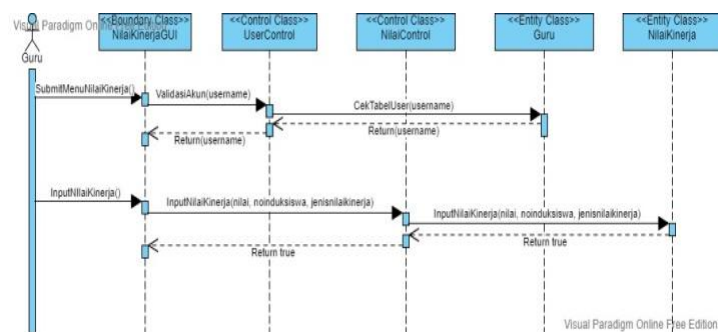
Picture 10. Sequence Diagram For Entry Data Of Performance Assessment Process

The explanation in figure 10 is as follows:
1. Teacher presses the performance value menu button in the application to the performance value display object;
2. Performance value display object sends the account validation method in the form of a username variable for access rights on the performance value menu to the user control object;
3. User control object sends a method to check the Teacher table on the database in the form of a username variable to the teacher table object;
4. Teacher table object will send a message back to the control value object in response to the permissions on the performance values menu. If the message received is failed, then the actor is required to re-login;
5. If the account validation has been successful, then the Teacher actor will press the performance value menu button on the application to the performance value display object;
6. Performance value display object sends the performance value input method in the form of value variables, performance value types and student numbers to the controll value object;
7. Controll value object sends the input method of performance values in the form of value variables, types of performance values and student numbers to the performance value table object; and
8. Performance value table object will return a message to the control value object and the performance value menu display object in the form of a true value in response to the successful validation of filling in the performance value data.

Picture 11. Sequence Diagram For Entry Data Of Written Assessment For Student Process

The explanation in figure 11 is as follows:
1. Student presses the written value menu button on the application to the written value display object;
2. Written value display object sends the account validation method in the form of a username variable for access rights on the written value menu to the user control object;
3. User control object sends a method to check the user table on the database in the form of a username variable to the student table object;
4. Student table object will send a message back to the control value object in response to the permissions on the written grades menu. If the message received is failed, then the actor is required to re-login;
5. If the account validation has been successful, the Student actor will press the written value menu button on the application to the written value display object;
6. Written value display object sends the answer submit upload method in the form of answer variables and folders to the controll value object;
7. Controll value object sends the answer submit upload method in the form of answer variables and folders to the written value table object; and

8. Written value table object will return a message to the control value object and the written value menu display object in the form of a true value in response to the successful validation of filling in the written value data.

4. Class Diagram

Class diagram for an authentic assessment application consists of 12 (twelve) tables in the database including: 1) admin table; 2) teacher's table; 3) practitioner of business and industry table; 4) student table; 5) attendance table; 6) schedule table; 7) class table; 8) maple table; 9) performance value table; 10) table of written values; 11) project value table; and 12) table of portfolio values. The class diagram also has 5 (five) operational relations that connect tables in the database, including 1) the admin table has a relationship with the table of Teachers, Students and practitioner of business and industry; 2) admin table has relation with schedule, class and maple tables; 3) the teacher table has a relationship with the table of performance, written, project, portfolio and attendance scores; 4) the table of practitioner of business and industry has a relationship with the project value table; and 5) the student table has a relationship with the table of written scores and projects. To clarify the description of the class diagram can be seen in Figure 12.
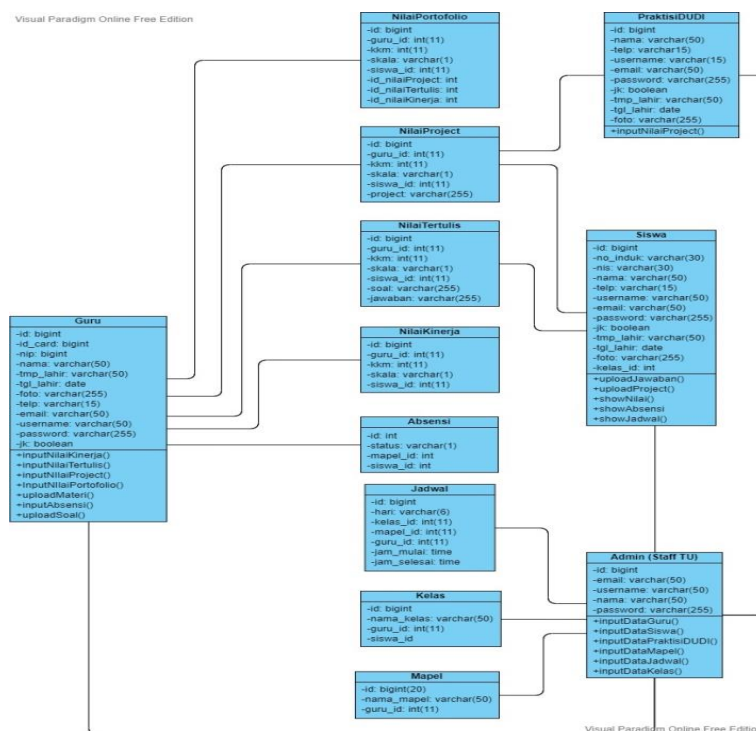
Picture 12. Class Diagram Of Authentic Assessment Application

4. Conclusion

After discussing the analysis and design of a management information system (MIS) for an authentic assessment based on web applications above, conclusions from the results of the discussion in the PIECES table, it is explained that the application of an authentic assessment management information system (MIS) based on this web application is considered to have a positive impact on users for the components of performance, information, economy, control, efficiency and service. Where from the five aspects, the

application of an authentic assessment SIM based on a web application has advantages when compared to the authentic assessment process through a manual system because it provides ease of use.

In the authentic assessment process, there are types of assessments that must be carried out by the teacher. On this SIM an authentic assessment based on a web application is available, as for the assessment tools used for each type of assessment available on this MIS, including: 1) performance assessment using an online questionnaire to assess student attitudes during academic activities at school; 2) written assessment using essay and multiple choice questions to assess the knowledge ability possessed by students in answering questions on the questions; 3) project assessment using data sets on project assignments that have been carried out by students, both data on assignments carried out while working on practical work and assignments given by teachers during learning activities to assess the knowledge and skills possessed by students; and 4) portfolio assessment which contains the accumulation of student assessments from performance, written and project assessments that are used as a result of students' academic achievements. Because this authentic assessment SIM uses an online method, the application can be accessed anytime and anywhere as long as the computer is connected to the internet network.

In terms of data security, it must be prepared properly so that there is no misuse of data by unauthorized parties. For this reason, schools must make standard operating procedures (SOP) as guidelines and make plans for the application of technology and information systems for a certain period of time.

About implementation requires a large amount of money, the school must communicate with the DKI Jakarta Provincial Education Office to incorporate the budget plan into the DKI Jakarta Provincial Government's budget and expenditure plan.

For the readiness of human resources (HR), the school must provide special training and assistance to teachers who are less qualified in using computer devices and applications.

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