

Blended learning implementation of outcome-based education curriculum in learning management systems

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Abstract. This research explores the integration of Outcome-Based Education (OBE) into the curriculum through a blended learning approach within the Learning Management System (LMS) in secondary education. The study employs a systematic methodology, commencing with an in-depth literature review to establish a robust theoretical framework. The focused observational technique involves participant observation with student groups. The research aims to observe the direct implementation of outcome-based education through a blended learning platform, emphasizing student interactions and teaching effectiveness. The primary contribution of this study lies in discovering the implementation methods of outcome-based education on an LMS platform, which has a significant impact on integrating more effective assessment methods for student learning outcomes. The holistic approach of this study provides a comprehensive understanding of the dynamics and effectiveness of outcome-based curricula through blended learning in the Learning Management System in secondary education settings. The research findings indicate a success rate, demonstrating an average increase in student interest of 11.93122.

Keywords: Blended Learning, Educational Impact, Learning Management Systems (LMS), Learning Platform, Outcome-Based Education (OBE).

1 Introduction

Outcome-Based Education (OBE) has become a fundamental foundation in developing curricula across various higher education institutions. This concept primarily emphasizes the expected learning outcomes from students, shifting the focus from traditional teaching methods. To ensure the effectiveness of implementing outcome-based curricula, especially amid the dynamics of educational technology development, computer-based learning through Learning Management Systems (LMS) has emerged as a critical element in supporting the learning process [1].

Alongside the advancements in information technology, LMS has provided an effective means to integrate the principles of Outcome-Based Education into the learning process [2]. This article discusses the implementation of outcome-based curricula through a blended learning approach within Learning Management Systems. Blended learning, combining online and face-to-face learning, is considered a method that enhances interactivity and student engagement in the learning process [3].

Previous research, as revealed in [4] highlights the crucial role of Big Data analysis in understanding student behaviors within LMS. This analysis can provide in-depth insights into student needs and

preferences, enabling educational providers to tailor learning approaches more accurately. Furthermore, in the specific context of the field of study, research such as [5] explores how LMS data can be utilized to predict student success in specific courses.

The impact of technology use in education is also considered through research such as [6]. This cloud-based Learning Management System offers opportunities for more flexible and integrated learning, allowing students to access learning materials from various locations [7].

Additionally, the integration of computer-based concept mapping with LMS use in the study [8] provides an overview of enriching student learning experiences. This approach explores the potential of collaborative and independent learning, creating an environment where students can build their understanding [9].

A longitudinal study, as outlined in [10] offers a time-related perspective on the sustainability of students' LMS usage. This long-term analysis can provide in-depth insights into factors influencing the sustainability of LMS usage, helping educational institutions optimize implementation and support [11].

The importance of students' and teachers' perceptions of Learning Management Systems is also a focus in research like [12] Understanding the level of openness and user satisfaction with LMS can provide

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valuable insights for the development and improvement of the system [13].

Furthermore, the concept of automatic control in learning is introduced through the [14]. The system described in this research offers an integrated approach to learning management, using web services and the semantic web to strengthen automatic control in education [15].

In the context of technology acceptance by instructors, [16] provides insights into the factors influencing instructors' intentions to use specific tools in LMS. This understanding can aid in designing training strategies and support to ensure better acceptance [17].

The use of a mobile Learning Management System [m-LMS] is also noted in [18] This study investigates the relationship between m-LMS usage and the academic achievement of online students, highlighting the potential of mobile technology in supporting distance learning [19].

Furthermore, the article titled [20] delves into the nuanced interplay between individual learning styles and the overall success of a Learning Management System [LMS]. This research explores how different learning styles, characterized by varying preferences and approaches to acquiring knowledge, can moderate the effectiveness and user satisfaction with LMS [21].

Understanding the diversity of learning styles is crucial in optimizing the design and functionality of an LMS to accommodate a broad spectrum of learners [22]. The study investigates how factors such as visual, auditory, reading/writing, and kinesthetic learning preferences influence the user experience within the LMS environment [23]. By identifying these moderating effects, the research aims to provide valuable insights into tailoring LMS features and content presentation to better align with individual learning styles [24].

This particular investigation recognizes that a one-size-fits-all approach may not be optimal in the context of learning management systems. Different learners may benefit from distinct features, interfaces, or instructional methods within the LMS [25]. The article seeks to contribute to the ongoing discourse on personalized learning experiences and how adapting LMS components to individual learning styles can enhance engagement, comprehension, and overall satisfaction [26].

In summary, the research on the moderating effect of learning styles on a learning management system's success strives to uncover the intricate connections between individual learning preferences and the efficacy of LMS implementation. This knowledge can inform educators, instructional designers, and LMS developers on crafting more inclusive and adaptable digital learning environments that cater to the diverse needs of learners in secondary education.

Based on these findings, this article aims to explain and analyze the implementation of outcome-based curricula through a blended learning approach within Learning Management Systems. By detailing the significant contributions from previous research, this article is expected to provide an in-depth insight into the

potential and challenges of implementing this learning model in secondary education.

In conclusion, the overarching goal of the research titled "Implementation of Outcome-Based Education Curriculum through Blended Learning in Learning Management Systems" is to contribute valuable insights and understanding to the realm of educational practices. Through an in-depth exploration of the implementation of outcome-based curricula using a blended learning approach within Learning Management Systems, this study aims to unravel the intricacies, potentials, and challenges associated with such a pedagogical model in higher education. By building upon the foundations laid by prior research, the objective is to shed light on the effectiveness of the outcome-based education paradigm and how the integration of blended learning further enhances its application. The investigation into the moderating effect of learning styles on the success of Learning Management Systems adds a nuanced layer to the research, offering a comprehensive understanding of the diverse needs and preferences of learners. Ultimately, this research endeavors to inform educators, instructional designers, and educational technologists, providing them with valuable insights to optimize digital learning environments. Through this, the study aspires to contribute to the ongoing discourse on advancing educational methodologies and fostering an inclusive, adaptive, and effective learning environment in secondary education.

2 Method

To understand, solve, and anticipate a problem, accurate data is required; hence, humans conduct research to obtain such data. To obtain accurate data, a proper method is needed to conduct research. Research method is a way to observe with precise thinking systematically through scientifically arranged stages to search, compile, analyze, and conclude data, so that it can be used to discover, develop, and test the truth of knowledge.

2.1 Research design

In this study, a quantitative research method is employed, where the research follows a hypothetico-deductive logic. It begins with deductive reasoning to formulate hypotheses, followed by the verification of empirical data and hypothesis testing based on empirical data, leading to conclusions drawn from the results of hypothesis testing. Hence, the role of statistics is crucial in this process.

In this research, a descriptive quantitative research method is utilized. Additionally, the type of research employed is experimental. An experiment is a method used to investigate possible cause-and-effect relationships [casual relationships] by applying treatment conditions to one or more experimental groups and comparing them to a control group not subjected to the treatment conditions.

In this thesis, the researcher employs the True Experimental Design research design. True Experimental [truly experimental] because in this design, the researcher can control all external variables that affect the course of the experiment, thus ensuring high validity. The main characteristic of True Experimental is that the sample used for both the experimental and control groups [K] is randomly selected from a specific population. Thus, its hallmark is the presence of a control group, and the sample is chosen randomly. Furthermore, the True Experimental Design takes two forms: posttest-only control design and pretest-posttest control group design.

Here, the researcher employs the pretest-posttest control group design research pattern, where in this design, a group of subjects is placed into an experimental group [E] and a control group [K]. The experimental group [E] is subjected to a specific treatment variable over a certain period, while the control group [K] does not undergo the treatment. Subsequently, both groups are subjected to the same measurement, and their results are compared.

The steps in this research are as follows:

- Determining the population from all twelfth-grade students at SMK Negeri 1 Kwanyar Bangkalan and SMK Al Asya'ari Bangkalan.
- Determining the sample using cluster sampling, carried out by applying treatments to both the experimental and control groups.
- Determining the sample using cluster sampling, carried out by applying treatments to both the experimental and control groups.
- Developing Research Instruments
- Conducting a trial test for the questions in the selected classes designated as the experimental and control groups. For this research, XII TKJ A class at SMK Negeri 1 Kwanyar was chosen.
- Analyzing the trial test results to determine validity, reliability, discriminant power, and difficulty level.
- Determining the test items that will be used in the final test in the study based on the criteria identified through the analysis of the trial instrument.
- Conducting matching and pretest for normality and homogeneity testing. After confirming that both classes have similar abilities, treatments are then applied to both classes.
- Implementing the Learning Management System in active learning for the experimental group and non-intervention learning for the control group.
- Conducting observational activities during the course of the learning process for both the experimental and control groups.
- Analyzing test results as well as observation sheets and compiling the research report.

2.2 Research population and sample

2.2.1 Population

The population is a generalization area consisting of objects or subjects with specific qualities and

characteristics defined by the researcher for study and subsequent conclusions. In this study, the population comprises twelfth-grade students in the TKJ A and B classes at SMK Negeri 1 Kwanyar Bangkalan and the Multimedia A and B classes at SMK Al Asya'ari Kwanyar Bangkalan. The total number of students is 106.

2.2.2 Sample

A sample is a subset of the total number and characteristics possessed by the population. When the population under study is too large, a sample is taken for examination to facilitate the research process. Conclusions drawn from the study of the sample can then be applied to the entire population. Therefore, the sample taken from the population must be truly representative.

The sampling technique used in this research is Simple Random Sampling. It is called simple because the selection of sample members from the population is done randomly without considering the status within that population.

This technique has a high probability of determining a representative sample. In the research using the simple random sampling technique, the researcher selects a sample of students from SMK AL Asya'ari Kwanyar, specifically from Multimedia A and Multimedia B classes in the twelfth grade, and from SMK Negeri 1 Kwanyar, specifically from TKJ A and TKJ B classes in the twelfth grade. The selection of these twelfth-grade classes is done randomly from various classes in the two schools.

In this study, the TKJ A and B classes in the twelfth grade are used as the control group, while the Multimedia A and B classes in the twelfth grade are used as the experimental group. To assess the homogeneity of the control group [K] and the experimental group [E], both groups are given a pretest to determine if there are any initial differences between the control group [K] and the experimental group [E].

2.3 Research variables

A variable can be defined as an attribute of a person or object that exhibits 'variation' among individuals or between objects. Variables can also represent attributes within a specific field of knowledge or activity. They are called variables because they exhibit variation. For example, learning interest can be considered a variable because the learning interests of a group of students vary or are not the same.

2.3.1 Variable identification

In this research, there are two variables to be studied: the independent variable or the explanatory variable [X] and the dependent variable [Y]. The independent variable is the variable that influences or causes changes in the dependent variable. In this study, the independent variable is the Implementation of the Learning

Management System Efront. The dependent variables are the interest and learning outcomes of twelfth-grade TKJ students at SMK Negeri 1 Kwanyar and twelfth-grade Multimedia students at SMK Al Asy'ari.

2.3.2 Operational definition of variables

Operational definition is a definition based on the observable properties of the defined concept. In terms of observable concepts, it is open to the possibility for others besides the researcher to do similar things, making the researcher's actions open to retesting by others. In other words, an operational definition is a very clear statement that does not lead to misunderstandings in interpretation because its behavior can be observed and proven.

This research is limited to the influence of the implementation of the Virtual Learning Environment, in this case, using the Learning Management System, on the interest and learning outcomes of twelfth-grade TKJ and Multimedia students. The Learning Management System serves as the independent variable [explanatory variable], while interest and learning outcomes serve as dependent variables.

2.3.3 Implementation of the learning management system

In this research, the implementation of the Learning Management System refers to the utilization of the efront learning media in the application of virtual classroom learning as one of the alternatives for modern education. The learning model harnesses the advancements in computer technology and the internet. The Learning Management System is used as a medium or learning resource for students to enhance their interest and learning outcomes.

In the development of the Learning Management System, attention needs to be given to specific aspects. The criteria for evaluating learning media consist of three aspects: 1) Software engineering/programming aspects; 2) Learning design/Technical quality and program effectiveness; and 3) Visual communication aspects/program appearance. By considering these three criteria in the development of learning media, it is expected that a program can be created that is truly useful according to the needs and functions. Therefore, based on the above explanation, it can be concluded that the development of computer-based learning media must meet specific criteria to ensure the developed program has good quality and aligns with its development objectives.

2.3.4 Learning interest

Interest is a desire driven by a wish after seeing, observing, comparing, and considering it with the desired needs. Ahmad Fauzi, who defined learning as 'A process in which a behavior is generated or improved through a series of reactions to situations [or stimuli] that occur.' Then Slameto presented the opinion of

Gronback, stating, 'Learning is shown by a behavior as a result of experience.'

In this research, interest can be interpreted as a desire or hope to achieve something that arises based on motivation within an individual. So, learning interest can be defined as a learner's desire to learn based on existing motivation. Motivation here can enhance the participation or involvement of learners in the classroom and actively participating in learning can influence other learners.

The improvement of students' learning interest in this thesis aims to encourage individual learners to study to the fullest extent possible without assistance from others, utilizing available resources. Thus, the high interest of learners in actively participating in classroom learning activities can enhance their learning outcomes.

2.3.5 Learning outcomes

Learning outcomes are the abilities possessed by learners after they have undergone learning experiences. In this context, the learning outcomes of students can be determined by the experiences they receive during the learning process.

The learning outcomes in this thesis refer to the grades or scores obtained by students in the form of assessments given by the subject teacher at the end of the material discussion. Learning outcome indicators represent the abilities that individuals must achieve and are the results of learning, including: 1) cognitive, 2) affective, and 3) psychomotor. However, in this research, the focus is specifically on learning outcomes, particularly in the cognitive aspect or academic achievement.

Then, the development of indicators used in this research includes: 1) Completeness of material summaries, 2) Ability to work on posttest questions, 3) Delivery of material according to the lesson plan, 4) Improvement in students' learning achievement, 5) Enhancement of students' understanding.

2.4 Data collection techniques and tools

Data is the foundation for solving research problems. Data must be collected using specific methods and tools, following certain procedures. Data collection methods are techniques or steps taken to gather data or evidence in support of the hypotheses of the research, which are then processed to test the validity of the predetermined theory.

2.4.1 Observation and testing

Observation is a complex process, consisting of various biological and psychological processes. Two of the most important are the processes of observation and memory. Data collection through observation is used when the research concerns human behavior, work processes, natural phenomena, and when the observed respondents are not too large in number.

Before conducting observation, the researcher must first create a reference, referred to as the observation notes or guidelines, regarding the things that need to be observed in line with the research objectives. Simply put, the observation guidelines should at least specify the object to be observed, the issues to be explored, and the requirements. Once the formulation is prepared, the next step is to determine how the observation and recording process will be carried out.

In this research, the researcher conducted on-site observation to gather initial data, such as the class schedule and the condition of the students in the field. Additionally, the researcher aimed to understand the learning activities taking place in the classroom. During this activity, the researcher also determined the group to be studied, where the twelfth-grade TKJ A and B students were designated as the control group [K], and the twelfth-grade Multimedia A and B students were designated as the experimental group [E].

A test is a series of questions, exercises, or other tools used to assess the skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups.

In this research, the researcher will conduct pretests and posttests given to the experimental and control groups to assess the abilities of both groups, whether they receive treatment or not. The pretest is given to both groups to determine the initial abilities of the subjects to be studied, while the posttest is conducted to assess the abilities of both groups after the intervention.

The data collection method using tests is employed to identify the differences between the control group and the experimental group after the pretest and posttest. The test used is an objective test in the form of multiple-choice questions. This choice is made because the test has a wide and directed coverage, is objective in nature, and facilitates the correction of test results.

2.4.2 Questionnaire

A questionnaire is a data collection technique conducted by providing a set of written questions or statements to respondents for them to answer.

In this case, the learning interest questionnaire is administered twice, before and after the intervention, to the students to determine the extent of the influence of the Learning Management System implementation on the learning interest in the Creative Product and Entrepreneurship subject for twelfth-grade TKJ students at SMK Negeri 1 Kwanyar and the Audio and Video Processing Techniques subject for twelfth-grade Multimedia students at SMK Al Asy'ari. The initial interest questionnaire provided at the beginning of the study is used to gather data on the initial interest before treatment for both groups. Meanwhile, the final interest questionnaire is given to assess the students' interest in participating in the learning process after the treatment.

Furthermore, a media evaluation questionnaire is also provided to users [teachers and students] as well as media experts to understand the characteristics of the application program needed to align with the needs of

the entities and for further program development improvements if necessary.

2.4.3 Documentation

A document is any written or filmed material. Documents have long been used in research as a source of data because, in many ways, documents can be utilized for testing, interpreting, and even predicting.

Documentation in this research is used as evidence that the researcher truly conducted direct field research. The collected documentation includes data on students and teachers, teaching materials for the Creative Product and Entrepreneurship subject for twelfth-grade TKJ students and the Audio and Video Processing Techniques subject for twelfth-grade Multimedia students, learning materials, an overview during the classroom learning process, during learning using the Learning Management System, and screenshots of the User Interface of the Learning Management System, as well as obtaining a list of student names and school profiles.

2.5 Instrumentation for research

Instrumentation refers to the tools or facilities used by researchers to collect data, making their work easier and results more accurate, thus facilitating further analysis.

2.5.1 Development of instruments

The steps taken in developing research instruments involve several stages. The procedure includes planning, writing item questions, editing, testing, analyzing results, and making revisions. The steps taken by the researcher in creating instruments for this research include developing a matrix of instrument items. From this matrix, an initial instrument draft is created. The matrix and draft are then consulted to verify their suitability. If necessary, adjustments are made based on the consultation feedback. The final step is to conduct a trial on the research subjects.

After understanding the process of instrument creation, the next stage is to implement it in the form of instrument development for the upcoming research. The starting point for development is the research variables designated for investigation. Operational definitions are provided for these variables, and then the indicators to be measured are determined. These indicators are then elaborated into specific questions and statements. To facilitate the instrument development process, it is necessary to use an 'instrument development matrix' or 'instrument matrix.'

To determine the indicators for each researched variable, a broad and in-depth understanding of the variables and supporting theories is required. The use of theory in constructing instruments should be done with precision to obtain valid indicators.

2.5.2 Validation and reliability testing of instruments

The main goal in any research is to obtain valid data, meaning data that accurately reflects the intended reality. By using valid and reliable instruments in data collection, the expectation is that the research results will be valid and reliable. Therefore, having valid and reliable instruments is a fundamental requirement for obtaining valid and reliable research results. Additionally, the conditions of the studied objects and the abilities of the individuals using the instruments to collect data also influence the validity of the research results.

Hence, researchers must be able to control the studied objects and enhance their abilities in using instruments to measure the variables under investigation. A measurement tool is considered valid when it demonstrates precision and accuracy in its measuring function, providing measurement results that align with the intended purpose of the measurement.

2.5.3 Validity

Validity means that the instrument is used to measure what it is supposed to measure. Validity is a measure that indicates the levels of validity or accuracy of an instrument. A valid instrument means that the measurement tool used to obtain the data is valid. If the obtained data is valid, it can be said that the data has high validity.

In this research, the researcher uses the validity of item questions because the aim is to determine the validity of the instrument based on the validity of each item question. This ensures that the instrument can be effectively and efficiently used in the form of a learning test that measures cognitive aspects related to students' interest and learning outcomes. To test validity in this research, the product-moment correlation formula is used with the assistance of Microsoft Office Excel.

2.5.4 Reliability

Reliability is a measure used to assess the level of consistency of an instrument, meaning that if the instrument is used repeatedly to measure the same object, it will produce the same data. Reliability refers to the degree of dependability of something. Reliable means it can be trusted and relied upon. The reliability of an instrument is a prerequisite for testing the instrument's validity. Therefore, even though a valid instrument is generally reliable, testing the reliability of the instrument is necessary.

In this research, to test the reliability of the item questions, internal instrument reliability testing is employed. Internally, instrument reliability can be tested by analyzing the consistency of the items in the instrument using a specific technique. In this case, the researcher uses the internal consistency technique, where the testing is done by administering the instrument once, and then the obtained data is analyzed

using a specific technique. The results of the analysis can be used to predict the reliability of the instrument."

2.6 Research implementation

In this research, the research subjects are divided into two groups: the control group, which includes all students who are not influenced by the learning intervention, and the experimental group, which includes all students subjected to the learning intervention using the Learning Management System.

2.6.1 Implementation of teaching in the control group

The implementation of teaching in the control group is carried out conventionally, where the learning process is centered on the students, and a series of learning activities are applied, including introduction, core activities, and conclusion.

In this activity, there is a series of activities carried out by the teacher and students, namely exploration, elaboration, and confirmation. Meanwhile, in the closing activity, there are several activities carried out, namely evaluation activities, a summary, and assignments. The activities carried out in the control group are not influenced by supporting media as applied in the experimental group.

2.6.2 The implementation of learning in the experimental group

The implementation of learning in the experimental group involves the use of instructional media to support the delivery of materials, specifically employing the Learning Management System. The researcher initiated the study towards the end of the learning season, specifically at the conclusion of the second semester, focusing on web programming as the subject matter.

Similar to conventional practices, a series of activities took place in line with the teaching sequence outlined in the learning implementation for the control group, as explained earlier. Prior to the commencement of the lesson, the teacher explained the learning indicators and objectives. Motivation and appreciation were provided to gauge the participants' knowledge regarding the upcoming learning material. In both conventional and distance learning activities within the experimental group, a Virtual Learning Environment (VLE) system was applied, specifically utilizing the Learning Management System.

The instructional material delivered by the teacher has been designed in the form of virtual content or integrated into an online system. Thus, learning, whether in a conventional classroom or a virtual one, utilizes this instructional media. Students can easily review the material presented by the teacher anytime and anywhere, unrestricted by space and time. Both the content, assignments, and evaluation questions are provided online. As a result, students can learn not only from one source but also from other sources accessed

through the internet without limitations. In this learning approach, students can be creative and take the initiative to identify problems and find solutions. The role of the teacher is that of a mediator, facilitator, and consultant. Throughout the learning process, students are expected to actively participate independently and in groups, while the teacher acts as an analyzer and monitors the implementation of the learning activities.

2.7 Data analysis techniques

Data analysis is the process of systematically searching for and organizing data obtained from interviews, field notes, and other materials so that it can be easily understood, and its findings can be communicated to others. Analysis in any type of research is a way of thinking. It is related to systematic testing of something to determine its parts, the relationships among its parts, and their relationship to the whole. Analysis is about finding patterns.

Based on that, it can be concluded that data analysis techniques are a way of systematically searching for and organizing data obtained from interviews, field notes, documentation, and other materials that can be used as support, by organizing data into categories, breaking it down into units, conducting synthesis, arranging it into patterns, selecting what is important and what will be studied, and drawing conclusions so that it is easily understood by oneself or others. From the collected data, it is then analyzed to obtain the expected results. The data analysis used in this research is descriptive analysis, consisting of condition test analysis and hypothesis test analysis.

3 Result

Based on the results of the normality test for initial interest in learning data and pretest data for the control group and experimental group using SPSS with the One-Sample Kolmogorov-Smirnov Test method, the significance value [2-tailed] shows $\alpha > 0.05$. So, accept H_0 and reject H_1 , meaning that the data for the control group and the experimental group are normally distributed. Described in Table 1.

Table 1. Descriptive statistics for normality test of interest in learning and learning outcomes [pretest] data.

	N	Mean	Std. Deviation	Min	Max
Initial Interest of the Control Group	36	76.11	7.165	60.83	90.00
Initial Interest of the Experimental Group	35	76.1429	8.313	61.67	95.00
Pretest of the Control Group	36	58.141	10.76	33.33	76.67

Table 2. Test of homogeneity of variances.

	Levene Statistic	Df1	Df2	Sig
initial interest	293	1	69	590
pretest	100	1	69	753

Based on the results of the Homogeneity test with the help of SPSS using the Levene Statistic test, the interest in learning data obtained Levene Statistic 0.293 and sig. 0.590, while the learning outcomes data [pretest] obtained Levene Statistic 0.100 and sig. 0.753. With a value of $\alpha > 5\%$, it can be concluded that H_0 is accepted and H_1 is rejected. Thus, it can be concluded that the data on interest in learning and learning outcomes [pretest] for both groups, the experimental and control groups, have the same variance or are homogeneous. Described in Table 2.

Table 3. Comparison test of interest in learning and learning results averages.

	Group	N	Mean	Std. Deviation	Std. Error Mean
initial interest	Experimental group	35	76.1429	8.31391	1.40531
initial interest	Control group	36	76.1111	7.16584	1.19431
Final interest	Experimental group	35	80.0238	5.98366	1.01142
Final interest	Control group	36	77.0139	6.49901	1.08317
Pretest	Experimental group	35	56.3810	9.97944	1.68683
Pretest	Control group	36	58.1481	10.76279	1.79380
Post test	Experimental group	35	72.8571	9.77334	1.65200
Post test	Control group	36	60.9259	9.41499	1.56916

Comparison test of interest in learning and learning results averages shown in Table 3. While, the result test of difference in learning interest and learning outcomes shown in Table 4.

Table 4. Test of difference in learning interest and learning outcomes.

	Group	N	Mean	Std. Deviation	Std. Error Mean
initial interest	Experimental group	35	76.1429	8.31391	1.40531
initial interest	Control group	36	76.1111	7.16584	1.19431

	Group	N	Mean	Std. Deviation	Std. Error Mean
Final interest	Experimental group	35	80.0238	5.98366	1.01142
Final interest	Control group	36	77.0139	6.49901	1.08317
Pretest	Experimental group	35	56.3810	9.97944	1.68683
Pretest	Control group	36	58.1481	10.76279	1.79380
Post test	Experimental group	35	72.8571	9.77334	1.65200
Post test	Control group	36	60.9259	9.41499	1.56916

4 Conclusion

Based on the descriptive analysis of students' interest and learning outcomes in Creative Products and Entrepreneurship learning at SMK Negeri 1 Kwanyar and Audio and Video Processing Techniques learning at SMK Al Asy'ari, at the beginning of the study, it was found that the control group had an average interest in learning of 76.1111 and an average pretest score of 58.1481. Meanwhile, the experimental group had an average interest in learning of 76.1429 and an average pretest score of 56.3810. From this data, it can be concluded that the interest in learning in the control and experimental groups with a mean difference of 0.03175 at the beginning of the study can be considered similar. Whereas, the learning outcomes between the control and experimental groups are not significantly different, with a mean difference of 1.7671.

After understanding the initial conditions of both groups, different treatments were given to each group. The treatment involved implementing the Learning Management System in web programming learning for the experimental group. Meanwhile, the control group received conventional learning treatment. After the treatment period concluded, post-tests were administered to assess students' learning outcomes, and observation sheets were used to gauge students' interest in learning.

Based on the observation and post-test results after the treatment, the experimental group had an average interest in learning of 80.0238 and an average post-test score of 60.9259. From this data, it is evident that there was an improvement in both groups. In terms of interest in learning, there was an increase in the experimental group with a larger difference of 3.00992 compared to the control group. Additionally, the learning outcomes in the experimental group showed a significant improvement with a mean difference of 11.93122.

In conclusion, it can be inferred that the implementation of the Learning Management System has proven to be effective in enhancing the interest in learning and learning outcomes of students in the

Creative Products and Entrepreneurship subjects at SMK Negeri 1 Kwanyar and the Audio and Video Processing Techniques subject at SMK Al Asy'ari. Although this study showed a significant positive change only in the learning outcomes of the experimental group, the interest in learning in both groups changed at a less significant rate, regardless of the treatment. This is evident from the increased percentage of interest in learning in the experimental group. With the increased interest in learning, there is an indirect impact on the improvement of learning outcomes for students in the experimental group, with an increase in the average mean by 11.93122.

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