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The Influence Of Digital Literacy and Learning Styles On The Critical Thinking Skills Of 10th Grade Students At Vocational High School 2 Tulungagung

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***Abstract*— In today's digital age, critical thinking skills are essential, especially for students. This study was conducted at SMKN 2 Tulungagung using a quantitative research method with a sample of 260 randomly selected 10th grade students. Data was obtained using a questionnaire. The data obtained will be analyzed using Simple Linear Regression and Multiple Linear Regression methods. Data analysis includes: 1) Normality test, 2) Linearity test, 3) Multicollinearity test, 4) Heteroskedasticity test. Hypothesis testing is conducted partially (t-test) and simultaneously (F-test). The results of the hypothesis testing show that there is a partial influence of digital literacy on students' critical thinking skills at SMKN 2 Tulungagung with a significance value of 0.000, which is less than 0.05, and there is a partial influence of learning style on students' critical thinking skills at SMKN 2 Tulungagung with a significance value of 0.034, which is less than 0.05. The hypothesis testing results also show that there is a simultaneous influence of digital literacy and learning style on students' critical thinking skills at SMKN 2 Tulungagung, with a significance value of 0.000, which is less than 0.05.**

Keywords*— *Digital Literacy, Learning Styles, Critical Thinking Skills

I. INTRODUCTION

Education is a crucial process in developing students' potential through the delivery of knowledge, skills, and understanding by educators [1]. In the digital era, digital literacy has become an essential skill for students to adapt and compete in a technology-driven world. The advancement of technology in education allows students to access information from various sources quickly and extensively.

Digital literacy not only involves the ability to access information but also includes the skills to comprehend, evaluate, and utilize it critically [2]. In this context, critical thinking becomes a key ability that enables students to process and analyze information rather than accepting it passively, thereby supporting better decision-making.

Access to abundant digital information presents both opportunities and challenges in the learning process. The integration of technology into education has been shown to enhance student motivation and critical thinking skills [3]. Digitally literate students are capable of independently seeking additional learning materials such as scholarly articles, practice questions, and online discussion forums.

In addition to digital literacy, learning styles play a significant role in shaping students' critical thinking abilities. Diverse learning styles such as visual, auditory, and kinesthetic affect how students process and retain information [4]. Therefore, educators must tailor their teaching methods to accommodate students' individual learning preferences.

Understanding students' learning styles enables teachers to create an effective learning environment that fosters critical thinking development. Students who learn according to their preferred style tend to better comprehend material and analyze information more deeply. This not only improves academic performance but also encourages logical and reflective thinking.

The integration of digital literacy with appropriate learning styles can create a conducive learning environment for enhancing students' critical thinking skills [5]. While digital literacy provides access to diverse information, learning styles help students effectively process that information. The synergy between the two fosters exploration, collaboration, and informed decision-making based on rational thought.

This study aims to determine the effect of digital literacy and learning styles on the critical thinking skills of 10th grade students at SMKN 2 Tulungagung.

II. LITERATURE REVIEW

A. Digital Literacy

Digital literacy is a term that refers to a set of understandings, awareness, knowledge, and skills that enable a person to think critically with information technology and adapt to the digital world according to their needs and environment.

According to [6], the term digital literacy originates from two words: 'literacy' and 'digital.' Literacy refers to the ability to write and read, while 'digital' refers to the format of text and reading materials on a computer. Thus, digital literacy can be defined as the ability to use a computer to write and read in digital format.

Thus, it can be concluded that digital literacy is a person's ability to understand, know, evaluate, communicate, read, and write using digital media. Benefits of digital literacy for students [7]:

1. Obtain and disseminate information quickly.
2. Assist in faster decision making.

3. Learn faster with abundant reference sources.
4. Save time, energy, and costs.
5. Facilitate the communication process.

B. Learning Styles

Learning style is an approach or method used by an individual to concentrate on the process and master new information that is difficult to understand through multiple perceptions [8]. Learning styles are students' tendencies to use specific learning strategies as part of their responsibility to choose learning methods that align with the demands of the class or school and the subject matter.

Learning styles are ways to absorb, organize, and transform information during the learning process. Learning styles vary, but their purpose is the same: to achieve learning objectives and attain the academic achievements expected of students.

Therefore, it can be concluded that learning styles are an important element in education because they influence how an individual acquires, processes, and masters knowledge optimally according to their personal characteristics and needs. Common learning styles include [9]:

1. Visual Learning Style

   Visual learning style is a learning style that uses the sense of sight. Students with a visual learning style tend to find it easier to remember what they see, such as body language or facial expressions of teachers, diagrams, pictures, or videos in learning, so that students can understand location or position, shape, numbers, and colors.

2. Auditory Learning Style

   Visual learning style is a learning style that uses the sense of sight. Students with a visual learning style tend to find it easier to remember what they see, such as body language or facial expressions of teachers, diagrams, pictures, or videos in learning, so that students can understand location or position, shape, numbers, and colors.

3. Kinesthetic Learning Style

   The kinesthetic learning style is a learning style that involves physical activities such as moving, touching, and experiencing things firsthand. The kinesthetic learning style makes it easier for students to remember by directly practicing rather than just listening or reading theory.

C. Critical Thinking Skills

Critical thinking means thinking logically and reflectively before making decisions about what to believe or do. Etymologically, critical thinking refers to the mental actions a person takes to consider a particular aspect.

Critical thinking is the ability to examine, analyze, interpret, and evaluate evidence, as well as the ability to think systematically and productively to make effective decisions [10]. Critical thinking can be defined as the ability to effectively and efficiently collect, evaluate, and process data.

Therefore, it can be concluded that critical thinking is a person's ability to analyze, ask questions, and provide explanations. With critical thinking, a person can change, adjust, or improve their way of thinking to make better decisions critically and objectively.

Factors influencing critical thinking skills:

There are several factors that influence students' critical thinking skills, namely physiological factors (physical condition, learning independence, and interaction) and psychological factors (intellectual development, motivation, and anxiety). According to [11] research highlights several factors that influence critical thinking skills, including teacher reinforcement, repetition of lesson material, providing students with opportunities for question-and-answer sessions, motivating students to be more active and confident, and providing evaluations at the end of each lesson.

III. RESEARCH METHODOLOGY

This study uses a quantitative method, which is a systematic approach to examining phenomena or situations through the collection of data that can be measured statistically, mathematically, or computationally [12]. Data is collected using specific instruments and analyzed quantitatively with the main objective of testing previously formulated hypotheses.

The type of research used is non-experimental quantitative research, which aims to determine the extent of the relationship between one variable and another without direct manipulation [13]. This approach is carried out through surveys in real environments, using standard instruments, with results in the form of numerical data that are analyzed statistically to describe the characteristics, opinions, or attitudes of a particular population or sample [14].

A. Population and Sample

According to [15], a population is a generalization area that includes objects or subjects with a certain number and characteristics that have been determined by researchers for analysis and conclusion. Based on this opinion, it can be said that a population is a collection of objects or subjects with specific characteristics determined by the researcher for analysis and conducted when the researcher examines all elements within the research area. In this study, the population used was all 10th grade students at SMK Negeri 2 Tulungagung, consisting of 20 classes with a total of 740 students.

A sample is a number of individuals selected from a population that represents the entire population. A good sample is representative of the population. The reasons for sampling are to save costs, time, and energy, as well as to ensure accuracy and weight of results [16]. To obtain the sample, the researcher used Yamane's formula with a 5% error rate and obtained a result of 260 students. Thus, from 20 classes, 13 students were selected from each class as the research sample.

Sampling is a technique chosen by researchers to determine the sample to be used in research, which systematically selects a relatively smaller number of items or

individuals (subset) from an existing population [17]. In this study, the researchers used simple random sampling, which is part of probability sampling, where every item in the population has an equal chance of being included in the sample.

B. Data Collection Techniques

Data collection techniques in research can be done through interviews, questionnaires, or observation. The data collection technique used by researchers in this study is a questionnaire.

A questionnaire is a data collection method that involves providing a series of written statements and questions to respondents to answer. Questionnaires are categorized into two types: open-ended and closed-ended. In this study, closed-ended questionnaires are considered more efficient. Closed-ended questionnaires provide predefined answers, allowing respondents to answer quickly. Questionnaires can be completed either in person or online, and the collected data will be processed and presented in numerical form.

Tabel 3. 1 Research Instrument Indicators

Variable	Indicators	Types of Instruments
Digital Literacy (X1)	1. Functional Skills 2. Creativity 3. Critical Thinking and Evaluation 4. Cultural and Social Understanding 5. Collaboration 6. The Ability to Find and Select Information 7. Effective Communication	Questionnaire
Learning Styles (X2)	1. Visual Learning Style 2. Auditory Learning Style 3. Kinesthetic Learning Style	Questionnaire
Critical Thinking Skills (Y)	1. Interpretation) 2. Analysis 3. Evaluation 4. Inference	Questionnaire

To support data measurement, researchers used a Likert scale that provided answer options ranging from very positive to very negative, with 4 alternative answers.

Tabel 3. 2 Likert Scale

SCALE	STATEMENT SCORE	
	POSITIVE	NEGATIVE
Strongly agree	4	1
Agree	3	2
Disagree	2	3
Strongly Disagree	1	4

C. Instrument Validity and Reliability

Validity testing is employed to assess the extent to which a test (or measuring instrument) accurately performs its intended measurement function. A test is considered valid if it effectively measures the intended construct with precision. In the present study, the validity assessment was conducted using the IBM SPSS for Windows software version 26. A total of 30 students, selected from outside the primary sample but still within the target population, were involved as respondents. The instrument consisted of 28 items measuring the digital literacy variable, 12 items related to learning styles, and 16 items addressing critical thinking skills. The validity test was carried out at a significance level of 5% ($\alpha < 0,05$), which served as the threshold for statistical decision-making.

Reliability testing was conducted to evaluate the internal consistency of the research instrument used for data collection. A variable is deemed reliable if the corresponding Cronbach's Alpha > 0,60 indicating that the set of items consistently measures the underlying construct..”

D. Data Analysis Hypothesis Testing

In this study, the classical assumption tests include the normality test, linearity test, multicollinearity test, and heteroscedasticity test. Furthermore, hypothesis testing was conducted using two approaches: the partial test (t-test) and the simultaneous test (F-test).

IV. RESEARCH RESULTS

A. Presentation of Research Results Data

This study aimed to examine the effect of digital literacy and learning styles on the critical thinking skills of tenth-grade students at SMK Negeri 2 Tulungagung. The population consisted of 740 students, with a sample of 260 students selected using simple random sampling and the Slovin formula at a 5% margin of error. The research was conducted from May 15 to June 15, 2025. Data were collected using a questionnaire to measure digital literacy, learning styles, and critical thinking skills.

To ensure the quality of the research instrument, a validity and reliability test was conducted by distributing the questionnaire via Google Forms to 30 students from within the population but outside the sample—specifically, 15 students from Class X Teknik Kendaraan Ringan 2 and 15 from Class X Teknik Ototronik 2. Once the instrument was confirmed to be valid and reliable, the actual data collection was carried out on the sample, followed by prerequisite tests and hypothesis testing.

B. Hypothesis Testing Data Analysis

1) Classical Assumption Test

The normality test based on SPSS testing obtained a significance value of 0,200 > 0,05, indicating that the data is normally distributed. Based on the results of the multicollinearity test, the correlation values between the independent variables X1 and X2 have a VIF output value of 1,131 < 10 and a Tolerance value of 0,884 > 0.1, indicating that there is no multicollinearity among the independent variables. Based on the results of the heteroscedasticity test, variable X1 obtained a

significance value of 0,344 > 0,05 and variable X2 obtained a significance value of 0,449 > 0,05, so it can be concluded that there is no heteroscedasticity in the independent variables in this study. Based on the results of the linearity test, variable X1 obtained a significance value of 0,000 < 0,05 and variable X2 obtained a significance value of 0,000 < 0,05, so there is a linear relationship between the independent variables and the dependent variable (Y).

2) Hypothesis Testing

The partial test (t) of the digital literacy variable (X1) obtained a significance value of 0,.000 < 0,05, so it can be concluded that variable X1 has a significant effect on critical thinking ability (Y). $H0_1$ is rejected and Ha_1 is accepted. The learning style variable (X2) obtained a significance value of 0,034 > 0,05, so it can be concluded that the learning style variable (X2) has a significant effect on critical thinking ability (Y). $H0_2$ is rejected and Ha_2 is accepted.

Simultaneous Test (F) The results of the F test indicate that variables X1 and X2 obtained an F value of 125,268 with a significance value of 0,000 < 0,05. Therefore, it can be concluded that variables X1 and X2 significantly influence critical thinking ability (Y). $H0_3$ is rejected, and Ha_3 is accepted.

C. Discussion of Research Results

1) Based on the simple linear test analysis (t-test) conducted using IBM SPSS Statistics 26 for Windows data processing software, it can be concluded that $H0_1$ is rejected and Ha_1 is accepted, with the analysis results showing that the significance value for the digital literacy variable (X_1) is 0,000, which is smaller than the set significance level (α) of 0,05. Therefore, it can be concluded that there is a significant influence of digital literacy on the critical thinking skills of 10th grade students at SMK Negeri 2 Tulungagung. This study is also supported by research conducted by Wuring (2023) with the title "The Influence of Digital Literacy on Students' Critical Thinking Skills in Informatics Subjects at Vocational Schools in -Sintang City," showing a significance value of 0,000, which is smaller than the significance level (α = 0,05), meaning that there is a significant influence of digital literacy on critical thinking skills in the simple linear regression test.

2) Based on the analysis of the simple linear test (t-test) conducted using IBM SPSS Statistics 26 for Windows data analysis software, it can be concluded that $H0_2$ is rejected and Ha_2 is accepted, with the analysis results showing that the significance level for the learning style variable (X_2) is 0,034, which is smaller than the set significance level (α) of 0,05. Therefore, it can be concluded that there is a significant influence of learning style on the the critical thinking skills of 10th grade students at SMK Negeri 2 Tulungagung. This study is also supported by research conducted by Asran et al. (2019) entitled "The Influence of Learning Models and Learning Styles on Critical Thinking Skills." The learning style variable shows that the significance value of 0,000 is smaller than the set significance level (α) of 0,05, and it can be stated that learning style influences critical thinking skills.

3) Based on the analysis of the multiple linear regression test (F-test) conducted using IBM SPSS Statistics for Windows data analysis software, it can be concluded that $H0_3$ is rejected and Ha_3 is accepted, with the analysis results showing that the significance level for the digital literacy (X_1) and learning style (X_2) variables is 0,000, which is smaller than the predetermined significance level (α) of 0,05. Therefore, it can be concluded that digital literacy and learning style influence the critical thinking ability of 10th grade students at SMK Negeri 2 Tulungagung. The results of this study are supported by previous research conducted by Rochmatika & Yana (2022) entitled "The influence of digital literacy and learning style on the critical thinking skills of students at SMA 1 Tukdana" with the results of linear regression analysis showing that digital literacy and learning style influence the critical thinking skills of students at SMA 1 Tukdana.

CONCLUSION

From the results of the research and discussion described above, the following conclusions can be drawn:

1) There is a significant partial effect of digital literacy on the critical thinking skills of 10th grade students at SMK Negeri 2 Tulungagung.

2) There is a significant partial influence of learning style on the critical thinking skills of 10th grade students at SMK Negeri 2 Tulungagung.

3) There is a significant simultaneous influence of digital literacy and learning style on the critical thinking skills of 10th grade students at SMK Negeri 2 Tulungagung.

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