

# Effects of Internet Literacy on Cognitive Capabilities of Middle School Students

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**Abstract:** Internet services for education are technological facilities as basic needs to obtain information quickly and accurately, but not all literacy abilities of students are the same, so more identification is needed to reveal the impact of internet services for students. The purpose of this article is to explain the influence of internet services on the cognitive abilities of middle school students related to information literacy competencies. The method used is a quantitative method with data from secondary school students totaling 64 students analyzed using discriminant analysis, which reveals the causality of the variable internet service with information literacy competencies. The results show a significant influence of internet usage on certain variables on the cognitive abilities of middle school students, especially on information literacy abilities. The implication of this study is the disclosure of supporting variables from internet services in the world of education that support the 21st-century learning pattern characterized by promoting flexibility and efficiency.

**Keyword:** Internet of Literacy, Cognitive capabilities, middle school

## 1. Introduction

Information literacy through internet assistance is commonly known as technology adoption [1]. The process of information literacy by the developing generation with the advancement of smartphones [2], [3] has a positive impact on the ability to manage an information fact, so there is a need for a curriculum that supports information literacy-based learning [4]. The current state of technological advancements allows learning to adopt report [5] from the internet for example material from a blog to be used as a literate learning resource. Indonesia is a developing country on the continent of Asia [6] with the advancement of internet services covering all regions in Indonesia, in the citation of the research report [7] it is mentioned that internet-assisted social connections can increase user interaction [8]. Today's social life has indirectly depended on internet services owned by a country.

Information literacy [9] is a fundamental concept that can be used in a learning class. Through information literacy, a material can be justified as well as its credibility. The development of information literacy is the presence of digital literacy [10] by following the pattern of technological progress. Digital literacy in higher education [10] has had a positive impact on quality development in the world of education.

According to the development of adolescent psychology, middle school students are the highest potential as the target of smartphone mobilization [11]. Smartphones, in general, have been provided with internet services, so that easy access to digital information has penetrated teenagers and adults [12]. Middle school students are identified as the age of adolescents who have advanced using internet services. This condition is often referred to as digital citizens, even in reports that digital citizens [4] have the highest participation in using internet services worldwide.

The use of internet services in schools is every day in the world of education [13]. Teachers in the classroom have taught that information can be obtained through the virtual world so that many teaching materials come from the internet [14], [15]. The teacher's ability to manage learning material [14] is evidenced by information literacy competencies [16] as well, so it is crucial for the world of education to equip students and teachers with information literacy.

The research report [17] states that there is a negative relationship between internet services and the social abilities of young people to older people. This research has examined the social conditions in the community specifically, but in the development of technology, it is also necessary to study in the world of education. The next opinion [18] states that collaborative learning has been successful through the use of Java-based communication applications through the development of virtual laboratories. This collaborative process reveals the fact that virtual communication can replace direct experience [11] so that as a comparison, it is necessary to conduct in-depth studies related to student understanding. Students' knowledge is related to students' cognitive attitudes and abilities [11] from the high internet service to information literacy skills of middle school students.

The novelty of this article is the answer from other studies that have never revealed the influence of internet services in the world of education. The world of education is the most significant aspect that feels the impact of the development of digital technology. The purpose of this article is to reveal the influence of internet services on students' cognitive abilities related to information literacy. The benefits of this study can be used as a reference for research that focuses on the theme of information literacy, especially on the application in the field of education.

## **2. Method**

The method used in this study is quantitative with an ex post facto approach [19], namely promoting the causality relationship of the variables under study. With this approach, you only need to see the effect on the dependent variable. The requirement is for secondary education students as research subjects to utilize internet services for learning needs. Descriptive analysis in this study was used to describe the variable utilization of internet services by middle school students. While discriminant analysis is used to test the causal relationship (causality) of a phenomenon with unique characteristics is the dependent variable of the category type and the independent variable of type ratio/interval.

### 3. Results and discussion

Revealing the purpose of the study needs to know the distribution of respondents, the respondent's field data.

Table 1: Characteristics of Respondents Conscious Gender

Gender	Frequency (person)	Percentage (%)
Male	23	36%
Female	41	64%
Amount	64	100%

Table 1 is the distribution of research respondents with 64 respondents with a standard comparison consisting of middle school students in Central Java. The time of internet usage in a day is presented in table 2

Table 2: Characteristics of Respondents Based on Average Internet Usage in a Day

Device	Frequency (people)	Percentage (%)
6 hours	25	39%
9 hours	27	42%
12 hours	10	16 %
> 12 hours	2	3%
Total	64	100%

Based on the normality test obtained results that respondents are typically distributed, with the table 3.

Table 3: SPSSOutput *Test of Normality*

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistics	df	Sig.
World Wide Web	,106	64	,072	,967	64	,086
Courses / Online Training	,107	64	,064	,974	64	,205
Emails	,102	64	,095	,973	64	,182
Social Media	,091	64	,200*	,983	64	,519
Instant Messaging	,106	64	,074	,977	64	,279

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistics	df	Sig.
Video / Blog	,084	64	,200*	,968	64	,094

Table 3 is known that all the variables in the table *Kolmogorov-Smirnov* > 0.05 then  $H_0$  is accepted. This data means that the independent variables are normally distributed. So the independent variables to meet the assumptions and can be used for discriminant analysis Homogeneity test showed that.

Table 4: Output SPSS *Test of homogeneity of variance*

Variable	Significance (Based on Mean)
<i>World Wide Web</i>	0.544
<i>Courses / Training Online</i>	0.993
<i>Email</i>	0.420
<i>Social Media</i>	0.921
<i>Instant Messaging</i>	0.357
<i>Video / Blog</i>	0.434

So that according to table 4 that all independent variables have the value of Sig. > 0.05 then  $H_0$  is accepted. This data means that the two categories of variance, namely the category of low-value students and the category of high-value students are the same.

In this study, the primary method used to create a discriminant function is the *Step-Wise Estimation*, where variables are entered one by one into the discriminant model.

Table 5: SPSS Output *Group Statistics*

Category (0/1)		Mean	Std.Deviation	Valid N (listwise)	
				Unweighted	Weighted
Low	World Wide Web	16,71	2,163	31	31,000
	Online Courses / Training	9,84	2,382	31	31,000
	Email	8,48	2,420	31	31,000
	Social Media	15,71	2,795	31	31,000
	Instant Messaging	14,32	2,495	31	31,000
	Video / Blog	14,65	3,179	31	31,000

Category (0/1)		Mean	Std.Deviation	Valid N (listwise)	
				Unweighted	Weighted
High	World Wide Web	17.64	2,396	33	33,000
	Course / Training Online	10.36	2,219	33	33,000
	Email	9.09	2,255	33	33,000
	Social Media	17.61	2,893	33	33,000
	Instant Messaging	14.70	2,054	33	33,000
	Video / Blog	17.15	3,633	33	33,000
Total	World Wide Web	17.19	2,315	64	64,000
	Course / Online Training	10,11	2,296	64	64,000
	Email	8.80	2,338	64	64,000
	Social Media	16.69	2,981	64	64,000
	Instant Messaging	14, 52	2,268	64	64,000
	Video / Blog	15.94	3,620	64	64,000

Table 5 shows the results of output *Group Statistic* by student category of low value and high-value student category. In the table, it can be seen that 31 respondents entered the low-value category and 33 respondents who entered the high-value category. If the views of all the variables filled numbers 31 and 33 all, and in this case that no data is lost (*missing*). The value *means it* indicates that the greater the value the *mean* more positive (good) the respondent's assessment of the internet service variable.

1. In the service variable *World Wide Web/ WWW*, the *mean* low category (16.71) is lower than the value of the *mean* high category (17.64). So respondents who enter the high-value category have more positive attitudes towards *World Wide Web/ WWW* services compared to respondents who entered the low-value category.
2. On service variables *Course / Training Online*, the value of *mean* the low category (9.84) is lower than the value for *mean* the high category (10.36). So respondents who enter the high-value category have more positive attitudes towards service *Courses / Training are Online* compared with respondents who enter the low-value category.
3. In the service variable *Email*, the *mean* low category (8.48) is lower than the value of the *mean* high category (9.09). So respondents who enter the high-value category have more positive attitudes towards services *email* compared to respondents who are in the low-value category.

4. On service variables Social Media, the value of *mean* the low category (15.71) is lower than the value of the *mean* high category (17.61). So respondents who are in the high-value category have more positive attitudes towards Social Media services compared to respondents who entered the low-value category.
5. In the service variable *Instant Messaging*, the *mean* low category (14.32) is lower than the value for *mean* the high category (14.70). So respondents who enter the high-value category have more positive attitudes towards services *Instant Messaging* compared to respondents who are in the low-value category.
6. On service variables Video / Blog, the value of *mean* the low category (14.65) is lower than the value of the *mean* high category (17.15). So respondents who are in the high-value category have more positive attitudes towards Video / Blog services compared to respondents who entered the low-value category.

Identification of independent variables aims to determine whether of the six independent variables differ significantly to test the difference in a category to another category, namely the type of low-value students and the class of high-value students in Graphic Design competencies so that it is suitable for discriminant analysis.

Table 5: SPSS Output *Test of Quality of Group Means*

	Wilks' Lambda	F	df1	df2	Sig.
World Wide Web	,959	2,626	1	62	,110
Online Courses / Training	,987	,833	1	62	,365
Emails	,983	1,079	1	62	,303
Social Media	,897	7,096	1	62	,010
Instant Messaging	,993	,432	1	62	,514
Videos / Blog	,878	8,583	1	62	,005

Based on table 5 of the six variables analyzed, there are only two variables that have the Sig. <0.05 which can be used to identify differences between categories. So the variables that are feasible and can be used for discriminant analysis are Social Media variables ( $X_4$ ) and Video / Blog ( $X_6$ ).

Table 6: Characteristics of Respondents Based on Devices Used to Access the Internet

Devices	Frequency (people)	Percentage (%)
<i>Smartphone</i>	60	94%
Laptop	4	6%
PC ( <i>Personal Computer</i> )	-	-

Devices	Frequency (people)	Percentage (%)
Total	64	100%

Internet services affect cognitive skills in information literacy of middle school students; this is corroborated by [5], which states that blogging activities help students to understand the material more easily. It was also conveyed [20] that the approach to Internet-based information media has great potential for improving learning outcomes [11]. The use of devices smartphones has a positive effect [21] on the relationship between teachers and students in learning.

The results of field data show that the characteristics of *mobile* and *digital* are not only through the technology they interact, but *mobile* is a condition in the job. The results showed that 94% of the devices used by respondents to access the internet were *the rest of the laptops and PCs* in the 6th table. The figures showed that most middle school students had their own devices for internet access needs. The results of the study also showed that the average respondent accessing the internet was 9 hours a day.

#### 4. Conclusions

From the presentation of data from the effects of research and discussion, it was concluded that there was an influence of internet service on the cognitive abilities of middle school students related to information literacy competencies.

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