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Digital Culture and Media Literacy as Predictors of Digital Literacy for High School Students in Bekasi Regency

Husain Nurisman[1], Hanggono Arie Prabowo[2*]

[1]STIE Jakarta, Indonesia
[2]University of Indraprasta PGRI, Indonesia

Email[*]: hanggonoarieprabowo@gmail.com

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ABSTRACT

This study investigated the predictive relationship between digital culture and media literacy on digital literacy among high school students in Bekasi Regency, Indonesia. A quantitative approach employed a survey design with questionnaires and observational data from 67 students across two diverse high schools, selected using purposive and convenience sampling. Multiple linear regression analysis examined the influence of digital culture (X1) and media literacy (X2) on digital literacy (Y). Results revealed a moderately strong model fit ($R^2 = .453$). Digital culture (X1) significantly predicted digital literacy, while media literacy (X2) did not. Heterogeneity of variance was detected in the "Culture of digital" data, suggesting a need for robust regression techniques in future research. Mild multicollinearity was present but did not severely impact the model's validity. The study recommends further investigation of potential interactions between X1 and X2, consideration of data transformations, and addressing the heterogeneity of variance issue to enhance the model's predictive power. The findings underscore the importance of digital culture in fostering digital literacy skills among high school students.

INTRODUCTION

The dawn of the 21st century has witnessed an unprecedented surge in the development of information technology globally. This rapid advancement has fundamentally reshaped how individuals access, process, and interact with information. As Krisnaningsih et al. (2023) highlight, citing data from Hootsuite and We Are Social, a staggering 59% of the world's population had access to the internet as of January 2020. This widespread connectivity has created a digitally saturated environment influencing all aspects of life, including education. Consequently, digital literacy—the ability to find, evaluate, utilize, and create digital content effectively—has transitioned from a desirable skill to a crucial necessity for navigating the modern world. Muhajirin and Yusuf (2023) succinctly define digital literacy as the capacity to effectively search, understand, and employ information sourced from diverse digital platforms.

Within this increasingly digital landscape, the educational sector faces the significant challenge of equipping students with the necessary digital skills to thrive. This is particularly crucial for high school students, who are on the cusp of transitioning into higher education and the workforce. Their ability to critically evaluate information, utilize digital tools, and engage

responsibly in online environments directly impacts their academic success and future prospects. However, the existing literature reveals a concerning gap in understanding the multifaceted factors that shape students' digital literacy. While the importance of digital literacy is widely recognized, the precise interplay between various contributing factors remains inadequately explored.

This study aims to bridge this knowledge gap by focusing on the influence of digital culture and media literacy on digital literacy among high school students in Bekasi Regency. While numerous studies address individual aspects of digital literacy, the integrated impact of digital culture and media literacy has received comparatively less attention. The novelty of this research lies in its investigation of the combined influence of these two crucial factors on students' overall digital literacy development. This integrated approach recognizes that digital literacy is not merely a set of technical skills but a complex construct shaped by cultural norms, media consumption patterns, and critical thinking abilities.

The existing research provides a foundation for understanding the significance of this investigation. Purnawanto (2021) emphasizes the four key pillars of digital literacy: digital skills, digital culture, digital ethics, and digital safety. This framework underscores the interconnectedness of technical proficiency with cultural understanding, ethical considerations, and safety awareness. However, the study does not delve deeply into the relative importance of each pillar or how they interrelate to shape overall digital literacy.

Furthermore, Oetomo et al. (2023) highlight the significant concern of insufficient awareness among university students regarding data privacy and the confidentiality of personal information on social media. This vulnerability highlights the critical need for education and awareness-raising initiatives to equip students with the knowledge and skills to protect their personal data and navigate the online world safely. This underscores the need to focus on the safety aspects of digital literacy as part of the broader investigation into the role of digital culture and media literacy.

Isabella et al. (2023) highlight the increasing importance of digital skills in daily life, emphasizing that individuals actively seek to develop these skills. This observation reinforces the central role of digital literacy in contemporary society. While acknowledging the societal push toward enhanced digital skills, the study does not directly address the specific factors driving the acquisition or development of these skills. This study aims to contribute to this understanding by examining the influence of digital culture and media literacy.

Pramudyo (223) offers valuable insight into the complexities of web literacy, emphasizing its overlap with information literacy, internet literacy, critical literacy, media literacy, and digital literacy. This highlights the interwoven nature of these different forms of literacy and suggests that fostering digital literacy necessitates a holistic approach. This study will acknowledge the interconnectedness of these aspects and aim to investigate the specific role of digital culture and media literacy within this larger context. By focusing on the specific context of high school students in Bekasi Regency, this research offers a localized perspective on the interplay between these crucial factors and digital literacy levels.

The research aims to contribute to a deeper understanding of digital literacy development among high school students by specifically exploring the predictive roles of digital culture and media literacy. This investigation is timely and vital given the pervasive influence of digital technologies in modern life and the critical need for education to equip students with the skills and understanding required to thrive in this digitally transformed world. The study's unique contribution lies in its comprehensive investigation of the combined effect of digital culture and media literacy as predictors of digital literacy among a specific population of high school students, offering valuable insights into effective strategies for enhancing digital literacy education.

METHOD

This quantitative study investigates the predictive relationship between digital culture (X1) and media literacy (X2) on digital literacy (Y) among high school students in Bekasi Regency. The research design employs a survey method utilizing questionnaires and observational data to gather information from a sample of 67 high school students. This sample was selected from two high schools strategically chosen within Bekasi Regency to ensure representativeness.

A purposive sampling technique was used to select the two high schools. The schools were chosen to reflect a diversity in student demographics and resources, aiming for a sample representative of the high school population in Bekasi Regency. Within each chosen school, a convenience sampling technique was utilized to select the 67 participants. This ensures an efficient data collection process, particularly suitable for a study focused on measuring the levels of different types of literacy among students. The selection of participants was further aided by ensuring that all students within the selected schools had access to digital devices and internet connectivity.

Data Collection Instruments: The study employs two primary data collection instruments:

1. Questionnaire. A structured questionnaire was developed to measure the three key variables: digital culture (X1), media literacy (X2), and digital literacy (Y). The questionnaire included items assessing various aspects of each variable. Items measuring digital culture assessed students' engagement with online communities, their use of social media, and their understanding of online etiquette. The media literacy items focused on students' ability to critically evaluate media messages, identify bias, and understand different media formats. Digital literacy items evaluated students' skills in information seeking, use of technology, creation of digital content, and responsible digital citizenship. A five-point Likert scale was utilized for all questionnaire items, ranging from “strongly disagree” to “strongly agree.” The reliability and validity of the questionnaire were tested prior to data collection.

2. Observation. Observational data was collected to complement the questionnaire data and provide a richer understanding of students' digital practices. Observations focused on students' usage of digital technologies in the classroom and school library settings. This observational data allowed for the verification of self-reported data from the questionnaire and provided qualitative contextual information.

Data Analysis. Data analysis was conducted using SPSS version 21. The following steps were undertaken:

1. Descriptive Statistics. Descriptive statistics were calculated to summarize the collected data, including measures of central tendency (mean, median, mode) and dispersion (standard deviation, range) for each variable.

2. Normality Test. The normality of data distribution was assessed using the Shapiro-Wilk test to determine the appropriateness of parametric statistical tests.

3. Homogeneity Test. The homogeneity of variances was tested using Levene's test to ascertain whether the variances of the variables were significantly different across groups.

4. Multiple Linear Regression. A multiple linear regression analysis was employed to examine the predictive effects of digital culture (X1) and media literacy (X2) on digital literacy (Y). This technique enables the assessment of the independent contributions of each predictor variable while controlling for the influence of the other. The regression model will provide the R-squared value, indicating the proportion of variance in digital literacy explained by the predictor variables. The standardized beta coefficients will also be calculated, reflecting the relative strength of the relationship between each predictor and digital literacy.

RESULT AND DISCUSSION

Test of Homogeneity of Variances of Culture of digital

		Levene Statistic	df1	df2	Sig.
	Based on Mean	3.725	16	35	.001
	Based on Median	.844	16	35	.631
	Based on Median and with adjusted df	.844	16	8.975	.633
	Based on trimmed mean	3.096	16	35	.003

Test of Homogeneity of Variances of Literacy Media

		Levene Statistic	df1	df2	Sig.
Y	Based on Mean	.681	12	46	.760
	Based on Median	.180	12	46	.999
	Based on Median and with adjusted df	.180	12	29.118	.998
	Based on trimmed mean	.615	12	46	.819

This section examines whether the variances of the dependent variable ("Culture of digital" and "Literacy Media") are equal across different groups or conditions within the dataset. Levene's test is used for this purpose.

- **Culture of Digital:** The Levene's test results for "Culture of digital" reveal statistically significant heterogeneity of variances ($p < .05$ or smaller) depending on the method used (mean, median, or trimmed mean). This indicates that the variances are not equal across groups. The p-values indicate the probability of observing these results if the variances were truly equal (null hypothesis).

- **Literacy Media:** In contrast, the Levene's test for "Literacy Media" shows non-significant heterogeneity of variances ($p > .05$) across all methods (mean, median, and trimmed mean). This suggests that the variances are likely equal across the groups for Literacy Media.
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Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	X1	X2
1	1	2.988	1.000	.00	.00	.00
	2	.009	18.663	.01	.68	.43
	3	.004	28.876	.99	.31	.56

a. Dependent Variable: Y

This section assesses the correlation between predictor variables in a regression model. The table shows that:

- **Eigenvalues and Condition Indices:** The eigenvalues indicate the variance explained by each principal component. A condition index is the ratio of the largest to the smallest eigenvalue. High condition indices (generally above 30) suggest high multicollinearity, meaning strong correlations exist between the predictor variables (X1 and X2). In this case, the condition index of 28.876 is relatively close to the threshold. While not extremely high, it indicates some degree of multicollinearity that should be considered.
- **Variance Proportions:** This section displays the proportion of variance in each predictor variable explained by the principal components. It shows the distribution of variance among the variables. The variance proportions generally align with the condition indices, confirming some degree of multicollinearity between predictors.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.673[a]	.453	.435	5.96763

a. Predictors: (Constant), X2, X1

This table provides an overview of the model's fit.

- R: The multiple correlation coefficient ($R = .673$) indicates a moderately strong relationship between the predictors (X1, X2) and the dependent variable (Y).
- R Square: The coefficient of determination ($R^2 = .453$) shows that approximately 45.3% of the variance in Y is explained by the model including X1 and X2.

- Adjusted R Square: The adjusted R^2 (.435) is slightly lower than R^2, accounting for the number of predictors in the model. It's a more conservative estimate of the model's explanatory power.
- Std. Error of the Estimate: The standard error of the estimate (5.96763) represents the average amount of error in predicting Y using the model. A smaller standard error indicates better prediction accuracy.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1743.053	2	871.526	24.472	.000[b]
	Residual	2101.141	59	35.613		
	Total	3844.194	61			

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

This table tests the overall significance of the regression model.

- Regression: The regression sum of squares (1743.053) represents the variance in Y explained by the model.
- Residual: The residual sum of squares (2101.141) represents the unexplained variance in Y.
- F: The F-statistic (24.472) tests the null hypothesis that all regression coefficients are zero. The highly significant p-value (.000) strongly rejects this null hypothesis, indicating that the model is statistically significant; at least one predictor significantly predicts Y.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	22.708	10.300		2.205	.031		
	X1	.637	.096	.646	6.660	.000	.985	1.015
	X2	.128	.098	.127	1.307	.196	.985	1.015

a. Dependent Variable: Y

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This table presents the regression coefficients for each predictor and the constant.

- (Constant): The intercept (22.708) is the predicted value of Y when X1 and X2 are zero.
- X1 and X2: The regression coefficients (β) for X1 (.637) and X2 (.128) represent the change in Y associated with a one-unit increase in X1 and X2, respectively, holding other variables constant.
- Standardized Coefficients (Beta): These coefficients provide a measure of the relative importance of each predictor. X1 (.646) has a stronger effect on Y than X2 (.127).
- t and Sig.: The t-tests assess the significance of each predictor's coefficient. X1 ($p = .000$) is highly significant, while X2 ($p = .196$) is not statistically significant at conventional levels ($p > .05$). X2's effect might be due to chance or multicollinearity.
- Collinearity Statistics: The tolerance and variance inflation factor (VIF) values indicate the degree of multicollinearity among the predictors. Tolerance values close to 1 and VIF values close to 1 indicate little multicollinearity, and this is the case here.

The model shows a moderately strong relationship between the predictors and the dependent variable Y. Predictor X1 significantly contributes to the prediction of Y, whereas the contribution of X2 is not statistically significant. The model fits the data adequately, but the insignificance of X2 should be carefully considered. Further analysis might explore interactions between X1 and X2, or transformations might improve the model fit.

Discussion

The research on digital literacy reveals a complex interplay of factors influencing its impact. While a moderately strong correlation exists between certain predictor variables (represented by X1 and X2 in the statistical model) and the dependent variable (Y, likely a measure of digital literacy proficiency or its effects), the relationship isn't uniformly explained. The statistically significant positive effect of X1 highlights its crucial role in shaping digital literacy outcomes, echoing the findings of studies that emphasize specific skills and training in enhancing digital capabilities (e.g., Krishnaningsih et al., 2023; Muhajirin & Yusuf, 2023; Oetomo et al., 2023). This could encompass aspects like understanding ethical use of technology (Krishnaningsih et al., 2023), utilizing global frameworks for digital literacy (Muhajirin & Yusuf, 2023), or mastering specific digital tools (Oetomo et al., 2023).

Conversely, the insignificant effect of X2 suggests that this variable, while potentially included due to theoretical expectations, doesn't practically contribute to the model's predictive power. This calls for a careful reconsideration of X2's operationalization and its actual relationship with digital literacy, aligning with suggestions for improved model fit through variable refinement or transformation. The inconsistent results may arise from different conceptions of digital literacy itself, ranging from the web literacy skills emphasized by Pramudyo (2023) to the broader character building discussed by Isabella et al. (2023), or the specific contexts of digital literacy – ranging from children (Mustofa & Budiwati, 2019) to teachers and parents (Purnawanto, 2021) and rural communities (Rahayu et al., 2023).

Furthermore, the violation of the homogeneity of variance assumption underscores a crucial limitation. The disparity in variance across groups within the "Culture of digital" data suggests the need for alternative analyses, such as robust regression techniques, to address this limitation and ensure reliable conclusions (Fitriyani & Nugroho, 2022; Rahmadi & Hayati, 2020). This heterogeneity could potentially be linked to the socio-economic variations, access to

technology and different levels of digital engagement often highlighted in research on digital literacy (Isabella et al., 2023). Overall, this nuanced understanding requires careful consideration of contextual factors when interpreting the relationships and effects of digital literacy.

CONCLUSION

This study examined the relationship between two predictors (X1, X2) and a dependent variable (Y), incorporating assessments of homogeneity of variance and collinearity. The regression model demonstrated a moderately strong relationship (R^2 = .453), with X1 exhibiting a statistically significant positive effect on Y. However, X2's effect was not significant, suggesting its contribution to predicting Y is questionable. The analysis revealed a violation of the homogeneity of variance assumption for one dataset ("Culture of digital"), which may impact the reliability of the results related to that specific variable. The analysis also indicated mild multicollinearity, although not severe enough to invalidate the model. It is recommended that further investigations be carried out. Examining potential interactions between X1 and X2 or applying data transformations could refine the model. Addressing the heterogeneity of variances detected in the "Culture of digital" data is crucial. Future analyses should also explore the possibility of including additional relevant predictors to better explain the variation in Y, possibly resolving the insignificance of X2. Additionally, robust regression methods might be considered, given the violation of the homogeneity assumption.he effectiveness of multimedia in increasing student interest in mathematics cannot be overlooked. By harnessing various multimedia tools, educators can transform the mathematics learning experience, making it more engaging and effective. This study aims to explore the effectiveness of multimedia usage in enhancing the interest of junior high school students in mathematics, providing insights into innovative practices that can be employed in teaching mathematics today.

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