Journal of Education and Learning (EduLearn)
Vol. 19, No. 2, May 2025, pp. 606~615
ISSN: 2089-9823 DOI: 10.11591/edulearn.v19i2.21944

Influence of parental occupation and school status on elementary students' internet competencies

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Article Info

Article history:

Received Mar 13, 2024
Revised Jun 15, 2024
Accepted Jul 3, 2024

Keywords:

Interdependence
Internet attitude
Internet self-efficacy
Internet skills
Primary school

ABSTRACT

Understanding the factors influencing elementary school students' internet skills is critical in the rapidly evolving digital age. The research was conducted on the influence of gender, parental occupation, and school status on internet self-efficacy, interdependence, internet attitudes, and internet skills. Using logistic regression analysis, it was found that the male gender significantly affected internet self-efficacy and interdependence items with a value of $p<0.05$; the largest finding on internet self-efficacy items showed a 3.846 times greater chance of helping others via the internet compared to females. Parents who work as non-government employees have a significant effect $p<0.05$ on internet self-efficacy, interdependence, internet attitude, and internet skills items. The largest finding on internet skills is mainly increasing the ability to install applications in children, with 5.653 times greater odds than children from entrepreneurs. Students from private schools have the greatest chance of 3.840 times greater in developing internet skills information skills compared to public school students; significance ($p<0.05$) was found in internet self-efficacy, interdependence, and internet skills items. The findings offer important insights for developing educational policies to improve primary school students' digital literacy, considering gender, parental occupation, and school status.

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1. INTRODUCTION

In the current digital era, using the internet effectively has become an essential skill that all individuals [1], including elementary school students, must master. Internet skills are important for academic success and future personal and professional development [2], [3]. Internet skills enable individuals to effectively navigate and utilize the internet for various problem-solving purposes to achieve specific goals [1], [4]. Several previous studies have investigated various variables that play a significant role in internet skills, such as internet self-efficacy [5]–[7], interdependence [8]–[11], and internet attitude [12]–[14]. Previous experts have revealed that elementary school students require parental guidance [15]–[20] and have considered [21]–[24] the differences between public and private schools for student development. The studies

were conducted to investigate the general development of elementary school students, yet there has not been a specific investigation on the influence of gender, parents' occupations, and school types on internet self-efficacy, interdependence, internet attitude, and internet skills of elementary school students. The research aims to fill the gaps by investigating and predicting the influence of gender, parents' occupations, and school status on elementary school students' internet self-efficacy, interdependence, attitude, and skills. The analysis technique used in the study is logistic regression, with binary data obtained from the research instrument using the Gutman scale. The study results are expected to provide insights into how external factors contribute to developing digital skills in children and as considerations for more effective policies [25].

Internet addiction and social self-efficacy with internet addiction increase loneliness, which further reduces social self-efficacy [26]. Previous findings emphasizes the need for interventions to reduce internet addiction and loneliness to enhance social interaction skills in the context of students [27]–[29]. Internet skills are aimed at effective learning objectives when students can control themselves using the internet. However, research from Buchanan *et al.* [6] revealed that the self-efficacy in question does not directly impact the enhancement of educational technology in internet use. Therefore, internet self-efficacy with parental intervention is necessary [30], [31]. Internet self-efficacy in parental intervention becomes effective in protecting students from the negative effects of excessive internet use [32]–[35]. Indicators of internet self-efficacy consist of reactive/generative self-efficacy, differentiation self-efficacy, organization self-efficacy, communication self-efficacy, and search self-efficacy [36]–[38]. The tendency towards reasonable control over internet use will form good internet habits. This habit is commonly referred to as internet attitude. Internet attitude has dimensions of knowledge, attitude, and internet safety behavior, which can be significantly differentiated based on the level of education [39]. Based on the previous explanation, the elementary school level needs impulsive guidance in instilling attitudes towards the internet. Impulsive guidance can have practical implications in education, especially in classroom learning [40], [41]. Based on the research that has been conducted, internet attitude has a significant and positive relationship with internet self-efficacy and self-confidence in setting learning goals among students [42], [43]. Indicators of internet attitude consist of general feelings towards the internet, internet financing, internet socialization, negative internet attitudes [44], [45] certainly with adjustments based on the characteristics of the elementary school respondents.

Self-control and a positive attitude are demonstrated within a framework of specific skills for conducting internet activities. The skills are not merely about using the internet for specific purposes but extend to more advanced dimensions of technical activities. For instance, research by Hurwitz and Schmitt [46] states that internet use harms academic performance, whereas specific internet skills, particularly digital skills, significantly affect elementary school students. The significant effects indicate that the development of internet skills in elementary school students is more important than merely increasing their internet usage [13], [47], [48]. Indicators of internet skills include operational skills and mobile skills [49]. In reality, for elementary school students, internet use has not yet had a direct effect on learning and only provides personal satisfaction to students with something they like in a specific context [50]–[53]. Many researchers have doubted the performance of internet use in learning [54]–[56]. It is interesting to confirm the effectiveness of interventions in improving internet skills for elementary school students. Interdependence represents an advanced step toward becoming a catalytic factor in formulating a framework for internet skills among elementary school students. Interdependence is a mutual dependency in a system, thus inseparable from the contribution of every role in the context of learning [57]. Interdependence allows students to work as a system that depends on each other, especially in internet use, so that the monitoring model from various roles can operate optimally [58]. Therefore, the role of schools in forming a pattern of collaboration as a system is central to the success of interdependence in the context [59]–[61]. The role also includes the curriculum and school culture [62], [63]. Indicators of interdependence consist of perception of competition, perception of cooperation, and perception of individualism [64]. The importance of these factors has been acknowledged in various literature [5]–[14], this study investigated the effects of gender, socioeconomic background, especially parents' occupations and school status, which potentially affect the elements, especially in elementary school students.

2. METHOD

The research uses a quantitative approach with inferential quantitative methods. The population is 4th-grade elementary school students in Malang, Indonesia. The sampling technique uses nonprobability with quota sampling type with certain considerations and sample size. The study employs a logistic regression analysis technique using SPSS 23 as the analysis tool, with 225 primary school students in Indonesia as participants. Each participant was accompanied by a teacher while answering the questions provided (see Table 1) without any coercion or pressure. The variable to be studied is the internet competence of elementary school students, which consists of internet self-efficacy, interdependence, internet attitude, and internet skills. The research procedure consists of determining the logistic regression model, parameter

testing (simultaneous test and partial test), the fit test of the logistic regression model, selection of the best logistic regression model, and interpretation of the logistic regression model. The questions were adapted from Peterson's research [64] for composing interdependence questions, research from Morse *et al.* [44] for structuring internet attitude, research by Zheng *et al.* [36] for describing internet self-efficacy, and research from Deursen *et al.* [49] for internet skills, simplified with yes and no responses. The approach was taken considering the participants are primary school students. The study's dependent variables (see Table 1) are internet self-efficacy, interdependence, attitude, and skills. independent variables include gender, parents' occupation, and school. The criteria and interpretation used for goodness of fit include the Pearson method and deviance with significance $p>0.05$ to determine the "model fit" [65]–[67]. Information on model fitting includes significance $p<0.05$ to assert that "in general." The Pseudo R-squared value, employing methods like Cox and Snell, Nagelkerke, and McFadden, indicates the effect of the independent variables on the dependent variable. Parameter estimates include significance $p<0.05$ to affirm that "the intercept in the category of the independent variable affects the category in the dependent variable." If the criteria for parameter estimates are met, the next step is to examine the value of Exp (B). If Exp (B)<1.000, it implies that the dependent variable's "first reference" will be influenced by the intercept of the independent variable's category. Conversely, if Exp (B)>1.000, it suggests that categories other than the "first reference" in the dependent variable will be influenced by the intercept of the independent variable's category.

Table 1. Research parameter

Code	Variable	Question/description	Response (response code)
Q1	M1	I can make others happy or help with my writing on the internet.	Yes (1)
Q2		I can help others by finding the information they need on the internet.	No (0)
Q3		I can use the internet to help answer other people's questions.	
Q4		I can organize the information I find online so it's easy to understand and answers specific questions.	
Q5		I can discover many interesting and important things I want to know on the internet.	
Q6	M2	I like working with other students in my class.	
Q7		I wish we had spent more time working individually in class.	
Q8		I prefer working alone in class rather than with other students.	
Q9	M3	I feel the internet has a bad impact on me.	
Q10		I avoid using the Internet as much as I can.	
Q11		Overall, I enjoy using the Internet.	
Q12	M4	I know how to download/save photos I find online.	
Q13		I know how to open a new tab in the browser.	
Q14		I know how to save a webpage.	
Q15		I know how to install applications on mobile devices.	
Gen	Gender		Male (0); Female (1)
PO	Parents occupation (non-government employee 1; government employee 2; entrepreneur 3		1,2,3
Sch	School		Public School=(0); Private School=(1)
M1	Internet self-efficacy		
M1.1	Logistic Analysis Model Gen, PO, Sch on statement component Q1		Hypothesis testing: H.MF; H.GT; H.IP
M1.2	Logistic Analysis Model Gen, PO, Sch on statement component Q2		
M1.3	Logistic Analysis Model Gen, PO, Sch on statement component Q3		
M1.4	Logistic Analysis Model Gen, PO, Sch on statement component Q4		
M1.5	Logistic Analysis Model Gen, PO, Sch on statement component Q5		
M2	Interdependency		
M2.1	Logistic Analysis Model Gen, PO, Sch on statement component Q6		
M2.2	Logistic Analysis Model Gen, PO, Sch on statement component Q7		
M2.3	Logistic Analysis Model Gen, PO, Sch on statement component Q8		
M3	Internet Attitude		
M3.1	Logistic Analysis Model Gen, PO, Sch on statement component Q9		
M3.2	Logistic Analysis Model Gen, PO, Sch on statement component Q10		
M3.3	Logistic Analysis Model Gen, PO, Sch on statement component Q11		
M4	Internet Skills		
M4.1	Logistic Analysis Model Gen, PO, Sch on statement component Q12		
M4.2	Logistic Analysis Model Gen, PO, Sch on statement component Q13		
M4.3	Logistic Analysis Model Gen, PO, Sch on statement component Q14		
M4.4	Logistic Analysis Model Gen, PO, Sch on statement component Q15		

Table 1 shows the parameters or measurements used in this study. Code Q indicates the question and its number in the questionnaire. M indicates the code for the variable name. The hypothesis raised by the research: i) H.MF: Model fit test, ii) H0: A model with only an intercept (no predictors) is adequate to

explain the relationship between the independent variable and the dependent variable (model does not fit), iii) H.GT: Global test, iv) H0: None of the predictors significantly affect the dependent variable. The hypothesis means all predictor coefficients in the model are equal to zero (except the intercept), v) H.IP: Predictor individual test, and vi) H0: Predictor Xi has no significant effect on the dependent variable item. The hypothesis means the coefficient βi for predictor Xi is equal to zero.

An explanation of the terms used, namely code H.MF, indicates the hypothesis of the model fit test. Code H.GT indicates the global model hypothesis of the test. Code H.IP indicates the individual predictor hypothesis of the test.

3. RESULTS AND DISCUSSION

3.1. Result

3.1.1. Model fit test

In logistic regression analysis, model fit test is an important step as it is used to assess whether the suggested model fits the observed data. Most models met the fit criteria with p values >0.05; thus, they all had acceptable goodness of fit to the data and were suitable for further analysis. But some models like M1.3 and M4. However, the p-value must be <0.05 to call the better good fitting criteria. Currently, these better fitting fit criteria are placed at 2, indicating that these models are mismatched with observed data. As a result, more investigations are necessary to investigate the root of this discrepancy and ensure the models fit the association between the observed variables well. The results indicated that two models were not fit, while the other model met the model's fit requirements.

3.1.2. Global test

The global test in logistic regression analysis is vital in testing the hypothesis that no predictor significantly impacts the dependent variable. The global test results provide greater insight into the relative contribution of each predictor to the overall model. For example, some models, such as M2.3, M3.1, M3.2, and M4.2, did not reject the null hypothesis with p values >0.05, indicating that the predictors in the model did not significantly affect the dependent variable under study. On the other hand, the other models rejected the null hypothesis with a p-value <0.05, indicating that at least one predictor significantly influences the dependent variable. The results obtained validate the logistic regression model used and provide a deeper understanding of how certain factors may influence the dependent variable in the context of the study in question. The Pseudo R-square (see Table 2) analysis revealed that the highest values for Nagelkerke were found in model M4.1 (0.213). Once again, the findings indicate that all the tested models were deemed fit according to the standard model fit criteria used [65]–[67].

Table 2. Model fit test results, overall effect, and determination coefficients

	Model fit test Model fit			Global test Model fitting information			Pseudo R-Square
Model	Chi-Square	Df	Sig.	Chi-Square	Df	Sig.	Nagelkerke
M1.1	5.782	7	0.565	11.294	4	0.023	0.068
M1.2	10.465	7	0.164	21.207	4	0.000	0.161
M1.3	16.883	7	0.018	10.143	4	0.038	0.083
M1.4	9.452	7	0.222	10.876	4	0.028	0.074
M1.5	4.838	7	0.680	9.921	4	0.042	0.104
M2.1	4.978	7	0.663	15.785	4	0.003	0.103
M2.2	6.678	7	0.463	9.677	4	0.046	0.064
M2.3	3.976	7	0.782	4.556	4	0.336	0.029
M3.1	5.136	7	0.643	2.599	4	0.627	0.022
M3.2	14.037	7	0.051	3.959	4	0.412	0.040
M3.3	9.620	7	0.211	10.306	4	0.036	0.085
M4.1	10.142	7	0.181	26.404	4	0.000	0.213
M4.2	25.690	7	0.001	8.639	4	0.071	0.074
M4.3	3.541	7	0.831	18.503	4	0.001	0.108
M4.4	10.678	7	0.153	13.986	4	0.007	0.156

3.1.3. Predictor individual test

The logistic regression analysis of internet self-efficacy unveiled significant correlations between demographic variables like gender, parental profession, and students' digital perceptions and abilities. The disparities underscore the necessity of comprehending how personal factors influence the adoption and embrace of technology among student populations. For instance, the research demonstrated that the male gender impacted specific metrics such as Q2 and Q7, while the female gender influenced Q12, indicating divergences

in internet self-efficacy between the genders. Furthermore, the vocational roles of parents also substantially influenced molding students' digital perceptions and competencies, with children from various professional backgrounds displaying differing levels of self-efficacy, thus highlighting the pivotal role of the domestic environment in shaping students' digital proficiencies. The implications of this investigation emphasize the significance of tailored educational approaches and support mechanisms offered to students within their familial settings. The research findings are a robust basis for crafting personalized educational interventions considering individual attributes such as gender and parental occupation when structuring technology-related learning initiatives. By grasping the significance of these demographic determinants, educators can devise more efficacious pedagogical strategies aimed at aiding students from diverse backgrounds to optimize their digital prowess, ultimately narrowing the digital competency divide among student cohorts.

The impact of parents' occupations on internet self-efficacy, interdependence, attitude towards the internet, and internet skills was examined. It was found that parents working as "non-government employees" (1) significantly affected certain aspects with odds ratios ranging from 2.677 to 5.653 compared to "entrepreneurs" (3). Similarly, parents employed as "government employees" (2) also significantly influenced these aspects, with odds ratios ranging from 2.206 to 4.731 compared to "entrepreneurs" (3). Additionally, it was revealed that parents' occupation as "entrepreneurs" (3) significantly influenced certain aspects, such as Q11 and Q12, with odds ratios ranging from 4.736 to 4.889 compared to "government employees" (1) and "non-government employees" (0). Regarding the influence of school type on internet self-efficacy, interdependence, attitude towards the internet, and internet skills, it was observed that predictors for private schools (0) significantly influenced self-confidence for items Q1, Q6, and Q15 compared to public schools (1), with odds ratios ranging from 1.949 to 3.840. Conversely, students from public schools (1) significantly influenced self-confidence for items Q5 and Q12, with odds ratios of 4.414 and 2.966 compared to private schools (0). Table 3 shows the model equation test results.

Table 3. Model equation test results

Model		Sig.	Exp (B)	Model	Sig.	Exp (B)	Model	Sig.	Exp (B)	Model	Sig.	Exp (B)
	GEN=0	0.789	0.926		0.935	0.958		0.816	0.907		0.812	0.904
	PO=1	0.395	1.344		0.260	0.513		0.607	0.770		0.451	0.684
M1.1	PO=2	0.988	0.994	M1.5	0.736	1.294	M3.1	0.805	0.880	M4.2	0.839	0.892
	SCH=0(1)	0.003	2.442		0.024	0.227 (4.414)		0.147	1.907		0.011	0.283
	GEN=0(1)	0.003	0.260 (3.846)		0.173	0.635		0.352	0.634		0.594	0.856
M1.2	PO=1	0.008	3.873	M2.1	0.003	3.452	M3.2	0.619	1.329	M4.3	0.001	3.498
	PO=2	0.031	2.914		0.041	2.206		0.533	0.670		0.006	2.660
	SCH=0	0.418	0.715		0.049	1.949		0.134	0.468		0.032	1.897
	GEN=0	0.950	0.975		0.008	2.451		0.355	1.470		0.365	0.589
M1.3	PO=1(3)	0.042	3.445	M2.2	0.398	0.715	M3.3	0.008	0.211 (4.736)	M4.4	0.031	5.653
	PO=2	0.085	2.867		0.731	0.872		0.234	0.464		0.027	4.731
	SCH=0	0.046	0.414		0.227	1.500		0.588	0.795		0.031	3.840
	GEN=0(1)	0.458	1.286		0.080	1.733		0.004	0.233 (4.299)			
M1.4	PO=1(3)	0.014	2.677	M2.3	0.393	0.720	M4.1	0.005	0.205 (4.889)			
	PO=2	0.005	3.296		0.954	1.022		0.620	0.715			
	SCH=0(1)	0.863	0.943		0.653	0.868		0.026	0.337 (2.966)			

3.2. Discussion

We found that from our logistic regression analysis, which examined the influence of gender, parental occupation, and school status on aspects of students' internet competence consisting of such as internet self-efficacy, interdependence, attitudes towards the internet, and internet skills among elementary school students, revealed significant insights, revealed significant insights [13], [31], [61], [68]–[70]. The study explored various hypotheses to understand the interactions and impacts of the factors on students' digital competencies and perceptions. The logistic models that showed a good fit (except for M1.3 and M4.2) highlight the complexity of how demographic and socio-economic factors intertwine with students' digital lives. Specifically, gender showed varying influences across the different components of our study, with male students demonstrating higher odds in aspects of internet self-efficacy and interdependence, whereas female students excelled in internet skills, especially in navigating and managing online content (Q12) [27], [30], [46], [71]. The differences not only highlight the impact of gender differentiation on digital competencies but

also call for more nuanced approaches in educational practices that cater to the differences. Parental occupation emerged as a significant predictor in several models, indicating that socio-economic background, represented through the employment sectors of parents, plays a crucial role in shaping students' competencies and attitudes related to the internet [31], [43], [69], [72], [73]. Children of non-government employees and government employees showed significantly higher odds in several aspects of internet self-efficacy, interdependence, and internet skills compared to children of entrepreneurs [27], [41], [74]. The result may reflect different exposures and encouragements towards using digital tools in various home environments. Interestingly, children of entrepreneurs showed stronger internet attitudes and skills in certain models, suggesting a possible reflection of entrepreneurial spirit and savvy in navigating the internet [75], [76]. School status (private vs. public) also played a crucial role, with students from private schools showing higher self-efficacy in certain areas, while public school students displayed greater competencies in others [32], [41], [62]. Competencies might indicate differences in educational resources, curriculum focus, and the level of digital integration within the school environments. Our study suggests the need for educational policies and practices that cater to students' diverse backgrounds, emphasizing gender-specific strategies to close the digital skill gap. The influence of parental occupation and school status on digital competencies suggests a need for policies that provide equal digital opportunities to all students, regardless of socioeconomic status.

Our study shows the importance of supportive home and school environments for enhancing digital literacy, requiring access to technology and tailored guidance from parents and educators. The research underscores the need for a comprehensive approach to digital education that addresses disparities and calls for further investigation into the factors' impact on educational equality and digital literacy development. To enhance the study's robustness and applicability, future research should consider increasing the sample size and diversity, adopting a longitudinal design, incorporating broader variables like home internet access, employing mixed methods to capture qualitative nuances, and utilizing more complex statistical models to better understand the dynamics influencing students' internet competencies.

Our study demonstrates that schools and educational policymakers need to create specialized programs to improve internet skills among elementary students, with a particular emphasis on gender-specific approaches. The research shows that parents' occupation considerably affects students' internet abilities. Implementing a comprehensive digital literacy curriculum that considers socioeconomic backgrounds and school status is crucial. Future studies should build on this research by enlarging the sample size, diversifying socio-economic factors, and using longitudinal study designs. The study is limited by its geographically restricted sample size, reliance on self-reported data, and cross-sectional design that does not track changes over time or establish causation. Significant factors like home internet access and parental involvement should also not have suggested the need for a larger, more diverse sample and longitudinal designs in future research.

4. CONCLUSION

Our findings provide conclusive evidence that this research has successfully revealed that the significant influence of gender, parental occupation, and school status on elementary school students' internet self-efficacy, interdependence, internet attitudes, and internet skills has been identified through a comprehensive logistic regression analysis. The variation in the influence of gender on students' digital competencies and the significant impact of parental occupation and school status on students' abilities to use the internet have been found, affirming that individual and contextual differences must be considered in developing educational strategies. The importance of the educational environment in shaping students' internet competencies has also been demonstrated, highlighting the need for broader integration of digital technology in the curriculum. The findings suggest that targeted educational interventions and program development considering demographic and socio-economic factors can help address gaps in digital competencies. The study underlines the importance of incorporating gender, parental occupation, and school conditions into digital education strategy planning to strengthen elementary school children's internet capabilities. The research results emphasize the need for comprehensive educational strategies that embrace student diversity, recognizing the need to integrate digital technology across learning environments. Based on the limitations already mentioned, further in-depth research may be needed to confirm the geographically limited sample size and use of self-reported data, as well as the cross-sectional design that fails to track changes over time or determine causation. In addition, this study did not consider other important factors, such as home internet access and parental involvement, which may provide a more thorough understanding of internet skills.

ACKNOWLEDGEMENTS

We express our deepest gratitude to Universitas Negeri Malang as the provider of funds through No. 4.1/UN32/KP/2023. We also appreciate everyone who contributed to this research in any way, from writing the article drafts to helping with research.

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