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Research-Based Learning and Digital Literacy: A Mediation Analysis of Academic Motivation on Student Research Competencies

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ABSTRACT

Research skills are a crucial competency in higher education, yet a notable gap often exists between curriculum requirements and students' practical application abilities. This study aims to identify factors influencing students' research skills, specifically analyzing the role of research-based learning (RBL) and digital literacy in skill improvement. Furthermore, the study explores the mediating role of academic motivation in the relationship between RBL, digital literacy, and research skills. This study employed an explanatory survey method with a quantitative approach. Data were collected via a questionnaire distributed to 289 students from the Faculty of Teacher Training and Education, Kuningan University, during the 2024/2025 academic year. The instrument utilized was a structured questionnaire based on a measurement scale. Data analysis utilized mediation regression with SEM-PLS to test the relationships and influence between variables. The results indicated that RBL and digital literacy significantly and positively contributed directly to the enhancement of students' research skills. Furthermore, academic motivation was found to play a positive role as a mediating variable, increasing the influence of RBL and digital literacy on students' research skills. These findings offer practical implications for universities to strengthen RBL implementation (through research assignments and collaborative projects) and enhance digital literacy (through training on accessing sources and data analysis software). Additionally, higher education institutions are advised to foster a learning environment supporting academic motivation through recognition and constructive feedback. Future research may expand the variables by incorporating factors such as faculty support or academic culture for a more comprehensive understanding.

Keywords: *research skills; research-based learning; digital literacy; academic motivation*

ABSTRAK

Keterampilan meneliti merupakan kompetensi krusial di pendidikan tinggi, namun seringkali ditemukan kesenjangan (research gap) antara tuntutan kurikulum dan kemampuan praktik mahasiswa. Penelitian ini bertujuan mengidentifikasi faktor-faktor yang memengaruhi keterampilan meneliti mahasiswa, serta menganalisis peran research-based learning (RBL) dan literasi digital dalam peningkatan keterampilan tersebut. Secara spesifik, studi ini juga mengeksplorasi peran mediasi motivasi akademik terhadap hubungan antara RBL, literasi digital, dan keterampilan meneliti. Penelitian ini menggunakan metode survei eksplanatori dengan pendekatan kuantitatif. Data dikumpulkan melalui teknik kuesioner yang disebarkan kepada 289 mahasiswa FKIP Universitas Kuningan tahun akademik 2024/2025. Instrumen yang digunakan adalah kuesioner terstruktur dengan skala pengukuran. Analisis data dilakukan menggunakan regresi mediasi dengan bantuan SEM-PLS untuk menguji model hubungan dan pengaruh antarvariabel. Hasil penelitian menunjukkan bahwa research-based learning dan literasi digital secara signifikan dan positif

berkontribusi langsung dalam meningkatkan keterampilan meneliti mahasiswa. Selanjutnya motivasi akademik berperan positif sebagai variabel mediasi yang meningkatkan pengaruh RBL dan literasi digital terhadap keterampilan meneliti mahasiswa. Temuan ini memberikan implikasi praktis bagi perguruan tinggi untuk memperkuat implementasi RBL (melalui penugasan riset dan proyek kolaboratif) dan meningkatkan literasi digital (melalui pelatihan akses sumber dan perangkat lunak analisis data). Selain itu, perguruan tinggi disarankan membangun iklim belajar yang mendukung motivasi akademik melalui penghargaan dan umpan balik konstruktif. Implikasi penelitian berikutnya dapat memperluas variabel dengan memasukkan faktor dukungan dosen atau budaya akademik untuk gambaran yang lebih komprehensif.
Kata kunci: *keterampilan penelitian; pembelajaran berbasis penelitian; literasi digital; motivasi akademik*

A. INTRODUCTION

The phenomenon of low proficiency in processing and analyzing research data among university students has become a serious concern in the context of higher education today. Although access to information and technology has become increasingly widespread, many students still struggle to process data effectively and often make inaccurate interpretations. The ability to conduct in-depth and analytical research not only influences academic achievement but also determines students' readiness to enter a workforce that is becoming increasingly competitive and complex (Arráez-Aybar et al., 2024; V, 2019).

In the past few decades, there has been a paradigm shift in higher education. Education is no longer merely the transfer of knowledge from lecturers to students; rather, it emphasizes the development of students' ability to think independently, creatively, and critically(Maknun et al., 2020). The need for research skills and problem-solving abilities among undergraduate students, as a means to cope with new and rapid changes in various fields of knowledge, has attracted much attention (Ryan et al., 2014).Research skills have become crucial in the current information era, where students must be able to analyze data and apply knowledge in real-world contexts (Altakhaineh et al., 2025; Gronning et al., 2022). Amid the growing complexity of information, the ability to analyze and evaluate data is a key determinant of academic success (Al-Thani & Ahmad, 2025). Since the development of research skills and self-directed learning abilities is not a natural process for students, these must be deliberately taught and cultivated to help them learn to conduct research and inquiry in a more critical and innovative manner (Uerz et al., 2018; Yi et al., 2024).

The research culture in several Indonesian universities remains relatively low compared to other countries (Indah et al., 2022). According to the SCIMAGO Journal Rank, the total number of Indonesian scientific publications indexed in Scopus in 2013 was only around four thousand, which is far lower compared to other countries (Saturre et al., 2024). Research skills are among the core competencies that university students must possess, particularly to support research-based learning and the completion of final assignments such as theses (Hendriarto et al., 2021; Saturre et al., 2024). Numerous studies reveal that students often face difficulties completing their studies, partly due to limited academic writing skills, which consequently prolongs their study period (Hendriarto et al., 2021; W. Lin et al., 2025). Weak knowledge of research methodology, the role of academic

supervisors, and the limited involvement of students in lecturers' research projects contribute to these difficulties (Wannapiroon, 2014). As a result, students' participation in research publications during their studies remains minimal.

Facts and data from preliminary literature studies indicate that the average mastery of research skills among students—including designing, conducting, and reporting research—only ranges between 51.3%, 55.2%, and 42.8% (Keinänen & Kairisto-Mertanen, 2019; Wannapiroon, 2014). Basic aspects such as identifying random variables, designing data collection procedures, and determining the types of data needed show particularly low mastery, with some as low as 7.7%. Only about 43.8% of practicum supervisors provide sufficient training in research skills to their students. Based on these preliminary findings and the researchers' observations, it appears that students' research skills are influenced by complex interactions between pedagogical approaches, technical competencies, and psychological factors (Gyuris, 2018; Indah et al., 2022; Parfilova & Kalimullin, 2014; Udompong et al., 2014). More clearly, the results of the pre-study conducted with 30 students from several study programs are presented as follows:

Tabel 1. Pre-Study Results

Variabel	Indikator	Prosentase (%)
Research Skills	Designing research – I am able to formulate research problems clearly.	56.7%
	Data analysis – I can process and analyze research data correctly.	43.3%
	Interpreting results – I am able to interpret research data accurately.	46.7%
	Report writing – I write research reports according to scientific guidelines.	50.0%
	Use of methods – I understand research designs appropriate to the problem.	53.3%
Research-Based Learning (RBL)	Research projects – I am often involved in research activities during lectures.	46.7%
	Task integration – Coursework requires the application of research methods.	56.7%
	Lecturer guidance – Lecturers provide direction and feedback in research assignments.	60.0%
	Research reflection – I am accustomed to reflecting on research results to improve understanding.	53.3%
	Evidence-based learning – I am required to produce products/assignments based on data.	50.0%
Digital Literacy	Literature search – I am able to find scientific articles through digital sources (Google Scholar, databases).	50.0%
	Source evaluation – I can assess the credibility of information from the internet.	46.7%
	Use of analysis software – I am proficient in using software (SPSS/Excel) for data analysis.	36.7%

Variabel	Indikator	Prosentase (%)
	Digital ethics – I understand the ethics of using digital data/information.	56.7%
	Digital writing – I can use digital tools (Mendeley, Zotero) for referencing.	43.3%
Academic Motivation	Intrinsic motivation – I study because I am genuinely interested in research.	66.7%
	Extrinsic motivation – I am motivated to study because I want to graduate on time/achieve good grades.	73.3%
	Time management – I can manage my time to remain consistent in research.	63.3%
	Study consistency – I strive to remain focused and consistent even when research is difficult.	70.0%
	Research usefulness – I am motivated because research benefits society.	76.7%

Source: Processed data (2025)

The pre-study results show that students' research skills remain relatively low, particularly in technical aspects such as data analysis (43.3%) and the use of analysis software (36.7%). Although students are fairly capable of designing research (56.7%) and understanding research methods (53.3%), their ability to process and interpret research data remains inadequate. This indicates a gap between theoretical understanding and the practical skills required for research. This condition is consistent with (Chiu & Sanusi, 2024; Grande et al., 2022; Uerz et al., 2018) who stated that students tend to face difficulties in data processing stages due to a lack of hands-on practice and technical skills. Thus, strengthening technical skills through training in statistical software and practical data analysis is an urgent necessity.

In terms of research report writing, the pre-study results show an achievement level of 50.0%, indicating that students have not fully mastered scientific writing conventions. This difficulty results in academic papers that fall short of academic standards, potentially delaying study completion. This finding aligns with Al-Ghoweri & Al-Zboun (2021) who identified weak academic writing skills as a factor that hinders students in completing their final projects. The low percentage in result interpretation (46.7%) further indicates that students have yet to adequately connect empirical data with relevant theoretical frameworks. Interpretation skills are one of the primary indicators of research competence distinguishing novice from experienced researchers.

Meanwhile, the research-based learning (RBL) variable is at a moderate level. Lecturer guidance (60.0%) emerged as the strongest factor, followed by task integration requiring the application of research methods (56.7%). This highlights the importance of lecturers in providing direction, feedback, and designing research-oriented learning. These findings support Healey (2005), who emphasized that integrating research into the learning process enhances conceptual understanding and research skills. Jaya & Sucipto (2023);

Pow, (2012)also underlined that direct research experiences through the RBL approach improve methodological skills and the quality of students' research reports. However, the indicator of research reflection (53.3%) suggests that students are not yet accustomed to critically evaluating their own research outcomes, thus requiring reinforcement of reflective aspects in the learning process.

Interestingly, the pre-study results indicate that students' academic motivation is relatively high, with the highest achievements in research usefulness (76.7%) and extrinsic motivation (73.3%). This implies that despite limited technical skills, students are strongly driven to engage in research activities, both intrinsically and extrinsically. Agoes Salim et al., 2024; Zhang, 2025) explained that academic motivation, whether intrinsic or extrinsic, is a determining factor for students' engagement in research. However, a significant gap exists between high motivation and low technical skills (Amin et al., 2025; Lyu & Salam, 2025). Therefore, pedagogical strategies that combine research-based learning, digital literacy enhancement, and intensive lecturer guidance are necessary so that high motivation can be transformed into tangible improvements in students' research skills.

The novelty of the research lies in highlighting the paradoxical situation where students exhibit high academic motivation both intrinsic and extrinsic yet possess limited technical research skills (Kordsalarzehi et al., 2025). This study builds on existing literature that recognizes motivation as necessary but not sufficient for research competence (Gómez-Apaza et al., 2025). It advances knowledge by emphasizing the critical need for pedagogical strategies that integrate research-based learning with digital literacy enhancement and intensive lecturer guidance (Hacioğlu & Gülhan, 2021; Hayat et al., 2020). This combination aims to bridge the gap so that high motivation can effectively translate into improved research skills. The research also underscores the practical implication that motivation alone cannot guarantee successful research engagement without complementary methodological and technical support systems.

Based on the above background, it is evident that students' research skills are influenced by a combination of pedagogical, technical, and psychological factors. Research-Based Learning (RBL) and digital literacy serve as essential foundations for providing research-based learning experiences as well as technical skills for data processing and the use of digital resources. However, academic motivation plays a critical mediating role as it determines students' engagement in the research process. Therefore, to comprehensively understand the interrelationships among these variables, this study focuses on testing the direct effects of RBL and digital literacy on students' research skills, as well as the mediating role of academic motivation in strengthening these relationships. The research questions are as follows: How does Research-Based Learning (RBL) affect students' research skills? How does Digital Literacy affect students' research skills? How does RBL affect students' academic motivation? How does Digital Literacy affect students' academic motivation? How does academic motivation affect students' research skills? Does academic motivation mediate the effects of RBL and Digital Literacy on students' research skills?

B. RESEARCH METHOD

This study employed a quantitative approach with a survey method, as it aimed to test both the direct and indirect effects among variables using a questionnaire instrument. The type of research conducted was explanatory research with mediation regression analysis. Specifically, the study examined the influence of Research-Based Learning (RBL) and digital literacy on students' research skills, with academic motivation serving as a mediating variable.

The research population comprised all students enrolled in the Faculty of Teacher Training and Education (FKIP) at Kuningan University, totaling 1,013 students. The sample size was determined using the Slovin formula with a margin of error of 5%. Based on the calculation, a sample of 289 students was obtained. The sample was then proportionally distributed according to the number of students in each study program. The population and sample distribution are presented in the following table:

Table 2. Distribution of Population and Research Sample

Study Program	Population (N)	Sample (n)
Indonesian Language and Literature Education (PBSI)	152	43
English Language Education (PBI)	126	36
Economic Education	49	14
Mathematics Education	52	15
Biology Education	46	13
Elementary School Teacher Education (PGSD)	588	168
Total	**1,013**	**289**

The data analysis technique used in this study was Structural Equation Modeling based on Partial Least Squares (SEM-PLS) with the assistance of SmartPLS software. This method was chosen because it can simultaneously analyze causal relationships among variables while also evaluating the validity and reliability of the research instruments. SEM-PLS is also considered more flexible in handling medium-sized samples and data that do not fully follow a normal distribution.

The SEM-PLS analysis process was carried out in two main stages: the measurement model (outer model) analysis and the structural model (inner model) analysis. In the measurement model stage, validity tests were conducted by examining outer loadings (> 0.70), average variance extracted (AVE > 0.50), and heterotrait-monotrait ratio (HTMT < 0.90). Reliability tests were conducted using Cronbach's Alpha and Composite Reliability, with a minimum acceptance threshold of 0.70.

Next, in the structural model stage, the analysis assessed the coefficient of determination (R^2) to measure the extent to which the independent variables explained the variance in the dependent variable, f^2 to measure the effect size of each construct, and Q^2 (predictive relevance) to evaluate the model's predictive capability. The significance of the structural paths was tested using the bootstrapping method with 5,000 resamples at a

5% significance level.

C. RESULTS AND DISCUSSION

Results

Before testing the structural model to answer the research hypotheses, the initial step was to ensure that the instruments used met the criteria for validity and reliability. This test was essential to confirm that the questionnaire items were truly capable of measuring the latent constructs under study, so that the analysis results could be scientifically justified. At this stage, convergent validity was tested using outer loadings and average variance extracted (AVE), while reliability was tested using Cronbach's Alpha and Composite Reliability. Only indicators that met the feasibility standards were retained in the research model for subsequent analysis.

Table 3. Outer Loadings (Indicator Validity Test)

Variable	Indicator	Outer Loading	Remark
Research Skills (Y)	RS1 – Designing research	0,812	Valid (>0,70)
	RS2 – Data analysis	0,784	Valid
	RS3 – Result interpretation	0,803	Valid
	RS4 – Report writing	0,825	Valid
	RS5 – Use of methods	0,798	Valid
Research-Based Learning (X1)	RBL1 – Research project	0,805	Valid
	RBL2 – Task integration	0,781	Valid
	RBL3 – Lecturer guidance	0,829	Valid
	RBL4 – Research reflection	0,773	Valid
	RBL5 – Evidence-based learning	0,802	Valid
Digital Literacy (X2)	DL1 – Literature search	0,810	Valid
	DL2 – Source evaluation	0,768	Valid
	DL3 – Analysis software	0,745	Valid
	DL4 – Digital ethics	0,790	Valid
	DL5 – Digital writing	0,804	Valid
Academic Motivation (M)	AM1 – Intrinsic motivation	0,825	Valid
	AM2 – Extrinsic motivation	0,834	Valid
	AM3 – Time management	0,801	Valid
	AM4 – Study consistency	0,812	Valid
	AM5 – Research usefulness	0,847	Valid

All indicators were valid because the outer loadings were above 0.70. Accordingly, the reliability analysis using Cronbach's Alpha and Composite Reliability and construct validity using AVE confirmed that the research instruments were accurate, stable, and reliable for use in the structural model testing stage.

Table 4. Construct Reliability & Validity

Variable	Cronbach's Alpha	Composite Reliability (CR)	AVE	Ket.
Research Skills (Y)	0,873	0,902	0,648	Reliable & valid

Variable	Cronbach's Alpha	Composite Reliability (CR)	AVE	Ket.
Research-Based Learning (X1)	0,861	0,895	0,632	Reliable & valid
Digital Literacy (X2)	0,842	0,884	0,609	Reliable & valid
Academic Motivation (M)	0,888	0,917	0,687	Reliable & valid

Once validity and reliability were confirmed, the analysis proceeded to hypothesis testing using the structural model in SEM-PLS. At this stage, both direct and indirect relationships among latent variables were tested according to the research framework. The estimated path coefficients (β), t-statistics, and p-values obtained from the bootstrapping method are shown below.

Table 5. Bootstrapping Results of Structural Paths

Hypothesis Path	Path Coefficient (β)	t-statistic	p-value	Remark
X1 (RBL) → Y (Research Skills)	0.08	1.12	0.263	*Not significant*
X2 (Digital Literacy) → Y (Research Skills)	0.05	0.97	0.331	*Not significant*
X1 (RBL) → M (Academic Motivation)	0.41	6.27	0.000	*Significant*
X2 (Digital Literacy) → M (Academic Motivation)	0.37	5.84	0.000	*Significant*
M (Academic Motivation) → Y (Research Skills)	0.52	7.91	0.000	*Significant*

The direct paths from RBL and digital literacy to research skills were not significant, but the indirect paths through academic motivation were significant. This indicates a full mediation effect.

H1: Effect of RBL on Research Skills

The results show that RBL does not directly affect research skills. Although students engage in research-based activities, their research skills do not automatically improve without psychological support factors.

H2: Effect of Digital Literacy on Research Skills

Digital literacy was found not to have a direct effect on students' research skills. This aligns with (Pangrazio et al., 2020; Reddy et al., 2020) who emphasized that digital literacy is only a basic competence and does not guarantee improved academic skills without psychological support. Alfia et al., (2020) similarly stressed that digital literacy influences academic performance indirectly through motivation and self-efficacy. Thus, mastery of digital tools is not enough; students still require strong motivation to apply them in meaningful research.

H3: Effect of RBL on Academic Motivation

RBL significantly and positively influenced academic motivation. Student involvement in research fosters curiosity, intrinsic interest, and motivation. This is consistent with Agoes Salim et al., (2024)who found that direct engagement in research projects boosts satisfaction and motivation.

H4: Effect of Digital Literacy on Academic Motivation

Digital literacy also had a positive and significant effect on academic motivation. Students who master digital technologies feel more confident and prepared to face academic challenges, thereby enhancing intrinsic motivation (Bergdahl et al., 2020; Mulyati, 2023; Mulyati et al., 2025; Zhang, 2025).

H5: Effect of Academic Motivation on Research Skills

Academic motivation significantly enhanced students' research skills. This finding supports that intrinsic motivation plays a vital role in encouraging student engagement in complex academic tasks such as research (Zhang, 2025). Similarly, Kordsalarzehi et al., (2025) found that high academic motivation fosters independent learning, critical thinking, and research competence.

H6: Mediation Role of Academic Motivation

Academic motivation fully mediated the effects of RBL and digital literacy on research skills Agoes Salim et al., (2024). Direct paths from RBL and digital literacy to research skills were not significant, while indirect paths via motivation were highly significant.

Discussion

The results of this study as a whole confirm that the improvement of students' research skills is not only determined by instructional factors (Research-Based Learning/RBL) or technical factors (Digital Literacy), but is mainly and fully mediated by Academic Motivation. In other words, the findings show that students can only optimally internalize research skills when they have strong motivational drives, both intrinsic and extrinsic.

Theoretically, this model supports the view of Self-Determination Theory Karaoglan Yilmaz et al., (2025)which emphasizes that motivation is the bridge between the learning environment and the achievement of academic competencies. RBL and digital literacy provide a rich and relevant learning environment, but without strong motivation, students tend to stop at the stage of passive participation. Only when motivation increases for example, because research tasks are considered meaningful, lecturer support is effective, or digital experiences provide self-confidence can research skills develop (Asad & Anwar, 2025; Imjai et al., 2025).

From a pedagogical perspective, research-based learning plays an important role in shaping students' research skills by providing direct experience in designing, conducting, and reporting research (Hendripides & Hikmah, 2018; Tu et al., 2025). This approach improves the quality of research by enabling students to effectively handle research tasks in a social context. Thus, structured research-based learning can enhance research skills by providing relevant practical experiences (Indah et al., 2022; Kalolo, 2019). Furthermore,

digital literacy has become a crucial technical competence in modern research, especially in data collection, statistical analysis, and the management of scientific information sources. Students' readiness in using information technology facilities and computer laboratories contributes significantly to their ability to design and analyze research (Archambault et al., 2010; Audrin & Audrin, 2022; Kale, 2018). Proficiency in digital literacy enables students to effectively access, evaluate, and process research data, thus improving the quality of the research they produce.

In addition, academic motivation acts as a crucial mediator linking pedagogical approaches and technical skills to students' research abilities. When students are highly motivated driven by a desire to gain knowledge, experience personal satisfaction, and appreciate the relevance of research to others they tend to engage more actively and consistently in building their research skills. Personal factors like time management, mood, and sense of responsibility also shape overall research competence (Reyes et al., 2017; Uerz et al., 2018).These three components research-based learning, digital literacy, and academic motivation interact in complex ways. While research-based learning and digital literacy build essential technical foundations and practical experience, academic motivation plays the role of strengthening and sustaining student engagement throughout the research process (Dwyer et al., 2014; Y. R. Lin & Hung, 2025; Reyes et al., 2017). Without sufficient motivation, technical skills and pedagogical strategies alone cannot fully enhance research skills. Concentrating on these interconnected factors can better prepare students to face increasingly competitive academic environments and improve the quality of higher education.

Empirically, the discovery of motivation as a full mediator in this relationship carries important implications. Whereas many earlier studies reported direct effects of research-based learning or digital literacy on academic skills, this study indicates that, especially for Indonesian education students, motivation is a fundamental prerequisite for these factors to work effectively (Bezanilla et al., 2019; Imjai et al., 2025). This finding adds nuance to the literature by positioning motivation not merely as an additional factor but as a core element in the development of students' research competencies.

Practically, the implications of this study suggest the need for curriculum and learning program designs that not only strengthen methodological aspects (RBL) or technical aspects (digital literacy), but also systematically build students' academic motivation. Strategies that can be used include: a) assigning research projects relevant to real life, b) providing continuous guidance and feedback from lecturers, c) integrating digital technology with approaches that foster self-efficacy, and d) strengthening the social dimension and societal benefits of research.

With such approaches, educational institutions will not only produce students who are able to master research procedures, but also those who have sustainable motivation to develop their research skills. Overall, this study makes both theoretical and practical contributions: theoretically, it enriches the model of relationships between RBL, digital literacy, academic motivation, and research skills through evidence of full mediation;

practically, it offers new directions in learning design that place motivation as the key factor in improving students' research skills. These findings can serve as an important foundation for universities, especially teacher education programs, in formulating more effective, adaptive, and student-centered research learning strategies in the digital era.

D. CONCLUSION

The conclusion of this study reveals that involvement in research-based learning (RBL) and mastery of digital literacy do not necessarily directly improve students' research skills. RBL alone is not sufficient to build research skills if it is not accompanied by other supporting factors, especially academic motivation. Similarly, digital literacy, although students are able to use digital technology, only serves as a basic competency that does not automatically guarantee an improvement in research skills. Without strong motivation, proficiency in digital literacy does not enable students to use this technology meaningfully in the context of research.

Furthermore, academic motivation emerges as a key variable that connects these two factors with research skills. Direct experience in RBL and mastery of digital literacy significantly increase students' intrinsic motivation, which then acts as the main driver in the development of research skills. Academic motivation is not only an additional supporting factor, but also a full mediator that enables the transformation of pedagogical (RBL) and technical (digital literacy) inputs into tangible research skill outputs. This emphasizes the importance of learning strategies that not only focus on technical aspects or activities, but also strengthen motivation to encourage the optimization of students' potential in research.

E. REFERENCES

Agoes Salim, R. M., Felicia, M. S., & Setiamurti, A. (2024). The Missing Link: Academic Motivation as a Mediator in the Relationship between Mindfulness and Critical Thinking Skills in Indonesian First-Year Undergraduates. *The Open Psychology Journal*, *17*(1). https://doi.org/10.2174/0118743501342275241204113406

Alfia, N., Sumardi, S., & Kristina, D. (2020). Survival Skills in Digital Era: An Integration of Digital Literacy into EFL Classroom. *Indonesian Journal of EFL and Linguistics*, *5*(2), 435. https://doi.org/10.21462/IJEFL.V5I2.307

Al-Ghoweri, Dr. J. A., & Al-Zboun, Dr. M. S. (2021). The Extent of the Impact of Blended Learning on Developing Habits of Mind from the Standpoint of Students of Learning and Scientific Research Skills Course at the University of Jordan. *International Journal of Higher Education*, *10*(4), 196. https://doi.org/10.5430/IJHE.V10N4P196

Altakhaineh, A. R. M., Qallab, I., Sabbah, A. S., & Dlu, A. G. A. (2025). Obstacles to the acquisition of research skills by Jordanian undergraduates from the perspective of academic staff and students. *Social Sciences & Humanities Open*, *12*, 101719. https://doi.org/10.1016/J.SSAHO.2025.101719

Al-Thani, N. J., & Ahmad, Z. (2025). Learning through "Research Cognitive Theory": A new framework for developing 21st century research skills in secondary school students. *Heliyon*, *11*(2). https://doi.org/10.1016/j.heliyon.2025.e41950

Amin, S. M., Atta, M. H. R., Abd Elmoaty, A. E. E., Ismail, H. A., Kotp, M. H., Basyouny, H. A. A., Aly, M. A., & El-Sayed, A. A. I. (2025). Bridging virtual and real learning: the role of digital literacy and metaverse perspectives in enhancing academic motivation in nursing education. *BMC Nursing*, *24*(1). https://doi.org/10.1186/s12912-025-03681-x

Archambault, L., Wetzel, K., Foulger, T. S., & Kim Williams, M. (2010). Professional Development 2.0: Transforming Teacher Education Pedagogy with 21st Century Tools. *Journal of Digital Learning in Teacher Education*, *27*(1), 4–11. https://doi.org/10.1080/21532974.2010.10784651

Arráez-Aybar, L. A., Arias-Diaz, J., Paredes, S. D., Zuluaga-Arias, P., Chevalier, M., Salobrar-Garcia, E., Collado, L., Hurtado, O., & Fernández-Mateos, P. (2024). Self-perception of the acquisition of transferable competencies by the participants in a research congress for undergraduate students: A cross-sectional study. *Heliyon*, *10*(6). https://doi.org/10.1016/j.heliyon.2024.e27283

Asad, M. M., & Anwar, K. (2025). Influence of artificial intelligence on students' career competencies and career resources: a global perspective. *International Journal of Information and Learning Technology*, *42*(4), 366–391. https://doi.org/10.1108/IJILT-05-2024-0091

Audrin, C., & Audrin, B. (2022). Key factors in digital literacy in learning and education: a systematic literature review using text mining. *Education and Information Technologies*, *27*(6), 7395–7419. https://doi.org/10.1007/S10639-021-10832-5

Bergdahl, N., Nouri, J., & Fors, U. (2020). Disengagement, engagement and digital skills in technology-enhanced learning. *Education and Information Technologies*, *25*(2), 957–983. https://doi.org/10.1007/S10639-019-09998-W

Bezanilla, M. J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. *Thinking Skills and Creativity*, *33*, 100584. https://doi.org/10.1016/J.TSC.2019.100584

Chiu, T. K. F., & Sanusi, I. T. (2024). Define, foster, and assess student and teacher AI literacy and competency for all: Current status and future research direction. In *Computers and Education Open* (Vol. 7). Elsevier Ltd. https://doi.org/10.1016/j.caeo.2024.100182

Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity*, *12*, 43–52. https://doi.org/10.1016/J.TSC.2013.12.004

Gómez-Apaza, R. D., Levano-Rodriguez, D., Huanca-Galindo, M., & Casildo-Bedon, N. E. (2025). Self-Efficacy and Academic Commitment as Predictors Of Digital Skills In Peruvian University Students. *Journal of Technology and Science Education*, *15*(2), 516–528. https://doi.org/10.3926/jotse.3193

Grande, R. A. N., Berdida, D. J. E., Villagracia, H. N., Ablao, J. N., & Garcia, P. R. B. (2022). Multi-university assessment of Biggs's constructive alignment as an index of nursing research competencies among Saudi students. *Teaching and Learning in Nursing*, *17*(1), 68–76. https://doi.org/10.1016/J.TELN.2021.09.004

Grønning, K., Karlsholm, G., & André, B. (2022). Undergraduate Nursing Students' Experiences of Conducting Clinical Research Projects in Their Bachelor Theses – a Qualitative Study. *SAGE Open Nursing*, *8*. https://doi.org/10.1177/23779608221094537

Gyuris, E. (2018). Evaluating the effectiveness of postgraduate research skills training and its alignment with the Research Skill Development framework. In *Research Skill Development spanning Higher Education: Curricula, critiques and connections Article* (Vol. 15, Issue 4). https://ro.uow.edu.au/jutlp

Hacioğlu, Y., & Gülhan, F. (2021). The Effects of STEM Education on the 7th Grade Students' Critical Thinking Skills and STEM Perceptions. *Journal of Education in Science, Environment and Health*. https://doi.org/10.21891/jeseh.771331

Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: A structural equation model. *BMC Medical Education*, *20*(1). https://doi.org/10.1186/s12909-020-01995-9

Hendriarto, P., Mursidi, A., Kalbuana, N., Aini, N., & Aslan, A. (2021). Understanding the Implications of Research Skills Development Framework for Indonesian Academic Outcomes Improvement. *Jurnal Iqra": Kajian Ilmu Pendidikan*, *6*(2), 51–60. https://doi.org/10.25217/ji.v6i2.1405

Hendripides, S., & Hikmah, N. (2018). Development of Innovative Teaching Materials through Scientific Approach. In *Journal of Educational Sciences* (Vol. 2, Issue 2).

Imjai, N., Chansamran, S., Sungthong, S., Usman, B., & Aujirapongpan, S. (2025). Developing employability digital competencies of Thai Gen Z business students: The role and matter of digital learning environments and digital adaptation skills. *The International Journal of Management Education*, *23*(3), 101219.
https://doi.org/10.1016/J.IJME.2025.101219

Indah, R. N., Toyyibah, Budhiningrum, A. S., & Afifi, N. (2022). The Research Competence, Critical Thinking Skills and Digital Literacy of Indonesian EFL Students. *Journal of Language Teaching and Research*, *13*(2), 315–324.
https://doi.org/10.17507/JLTR.1302.11

Jaya, F., & Sucipto, S. (2023). Digital Literacy, Academic Self-Efficacy, and Student Engagement: Its Impact on Student Academic Performance in Hybrid Learning. *Journal of Innovation in Educational and Cultural Research*, *4*(3), 458–470. https://doi.org/10.46843/jiecr.v4i3.719

Kale, U. (2018). Technology valued? Observation and review activities to enhance future teachers' utility value toward technology integration. *Computers and Education*, *117*, 160–174. https://doi.org/10.1016/j.compedu.2017.10.007

Kalolo, J. F. (2019). Digital revolution and its impact on education systems in developing countries. *Education and Information Technologies*, *24*(1), 345–358. https://doi.org/10.1007/S10639-018-9778-3

Karaoglan Yilmaz, F. G., Yilmaz, R., Ustun, A. B., & Uzun, H. (2025). Exploring the role of cognitive flexibility, digital competencies, and self-regulation skills on students' generative artificial intelligence anxiety. *Computers in Human Behavior: Artificial Humans*, *5*, 100187. https://doi.org/10.1016/j.chbah.2025.100187

Keinänen, M. M., & Kairisto-Mertanen, L. (2019). Researching learning environments and students' innovation competences. *Education + Training*, *61*(1), 17–30. https://doi.org/10.1108/ET-03-2018-0064

Kordsalarzehi, F., Salehipour, S., Hamedani, M. A., Jahromi, R. Z., Arbabisarjou, A., & Ghaljeh, M. (2025). The impact of academic skills training on academic self-efficacy and motivation in nursing and midwifery students: A quasi-experimental study.

Journal of Education and Health Promotion, *14*(1). https://doi.org/10.4103/jehp.jehp_1135_23

Lin, W., Zhang, P., Li, S., Li, Y., Fang, Z., Wang, Y., & Zhang, H. (2025). Category Characteristics and Influencing Factors of Research Competence Among Chinese Specialty Nurses: A Latent Profile Analysis. *Journal of Advanced Nursing*, *81*(9), 5914–5924. https://doi.org/10.1111/JAN.16735

Lin, Y. R., & Hung, C. Y. (2025). The synergistic effects in an AI-supported online scientific argumentation learning environment. *Computers & Education*, *229*, 105251. https://doi.org/10.1016/J.COMPEDU.2025.105251

Lyu, W., & Salam, Z. A. (2025). AI-powered personalized learning: Enhancing self-efficacy, motivation, and digital literacy in adult education through expectancy-value theory. *Learning and Motivation*, *90*, 102129. https://doi.org/10.1016/J.LMOT.2025.102129

Maknun, D., Gloria, R. Y., & Muzakki, J. A. (2020). Keterampilan meneliti yang dimiliki mahasiswa prodi pendidikan biologi se-wilayah III Cirebon. *Jurnal Inovasi Pendidikan IPA*, *6*(1). https://doi.org/10.21831/jipi.v6i1.28251

Mulyati, S. (2023). Pengaruh Komptensi Literasi Digital Dan Self Regulated Learning Terhadap Motivasi Belajar Mahasiswa. *Jurnal Education And Development*, *11*(3), 210–216. https://doi.org/10.37081/ed.v11i3.5052

Mulyati, S., Nurjanah, S., & Agustianingsih, D. (2025). Analisis Pembelajaran Multimodal Dan Learning Skill Pengaruhnya Terhadap Kompetensi Literasi Digital Mahasiswa. *Equilibrium: Jurnal Penelitian Pendidikan Dan Ekonomi*, *22*(02), 2. https://journal.uniku.ac.id/index.php/Equilibrium

Pangrazio, L., Godhe, A. L., & Ledesma, A. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-Learning and Digital Media*, *17*(6), 442–459. https://doi.org/10.1177/2042753020946291

Parfilova, Gulfia. G., & Kalimullin, A. M. (2014). Research of Russian Students' Ecological Competency. *Procedia Social and Behavioral Sciences*, *131*, 35–39. https://doi.org/10.1016/j.sbspro.2014.04.075

Pow, J. (2012). Developing Digital Literacy through Collaborative Inquiry Learning in the Web 2.0 Environment – An Exploration of Implementing Strategy. In *Journal of Information Technology Education: Research* (Vol. 11).

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy: A review of literature. *International Journal of Technoethics*, *11*(2), 65–94. https://doi.org/10.4018/IJT.20200701.OA1

Reyes, V. C., Reading, C., Doyle, H., & Gregory, S. (2017). Integrating ICT into teacher education programs from a TPACK perspective: Exploring perceptions of university lecturers. *Computers and Education*, *115*, 1–19. https://doi.org/10.1016/j.compedu.2017.07.009

Ryan, M., Saunders, C., Rainsford, E., & Thompson, E. (2014). Improving Research Methods Teaching and Learning in Politics and International Relations: A "Reality Show" Approach. *Politics*, *34*(1), 85–97. https://doi.org/10.1111/1467-9256.12020

Saturre, J. P., Anthony, T., Paculanang, L., & Orong, M. Y. (2024). The Impact of Digital Literacy on the Research Skills of College Students: A Quantitative Study. *International Journal of Scientific Research and Engineering Development*, *7*(6), 981–988. www.ijsred.com

Tu, Y. F., Hwang, G. J., & Hu, D. (2025). Effects on the learning achievement, approaches to learning, and multi-stage reflection quality of students with different levels of digital self-efficacy in a data literacy course: An ARCS-based self-reflective online learning model. *Computers & Education*, *238*, 105397. https://doi.org/10.1016/J.COMPEDU.2025.105397

Udompong, L., Traiwichitkhun, D., & Wongwanich, S. (2014). Causal Model of Research Competency Via Scientific Literacy of Teacher and Student. *Procedia - Social and Behavioral Sciences*, *116*, 1581–1586. https://doi.org/10.1016/j.sbspro.2014.01.438

Uerz, D., Volman, M., & Kral, M. (2018). Teacher educators' competences in fostering student teachers' proficiency in teaching and learning with technology: An overview of relevant research literature. *Teaching and Teacher Education*, *70*, 12–23. https://doi.org/10.1016/J.TATE.2017.11.005

V, K. E. (2019). The use of digital technologies in the teaching of mathematical disciplines to generate student interest in research activities. *Economics, Business and Management Research*, *105*, 649–652.

Wannapiroon, P. (2014). Development of Research-based Blended Learning Model to Enhance Graduate Students' Research Competency and Critical Thinking Skills. *Procedia-Social and Behavioral Sciences*, *136*, 486–490. https://doi.org/10.1016/j.sbspro.2014.05.361

Yi, J., Kim, H., Yoon, J. Y., & Kim, E. (2024). Evaluating the effects of action learning on the research competency of undergraduate nursing students: A mixed-methods study. *Nurse Education Today*, *140*, 106260. https://doi.org/10.1016/J.NEDT.2024.106260

Zhang, Y. (2025). Impact of digital literacy on college students' English proficiency: The mediating role of learning motivation and the moderating effect of technological self-efficacy. *Acta Psychologica*, *259*, 105452. https://doi.org/10.1016/J.ACTPSY.2025.105452