

Enhancing Human Capital Development in Remote Regions through Digital Literacy: The Mediating Effect of Entrepreneurial Mindset

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Abstract

Human capital development in remote regions is a crucial factor in fostering inclusive and sustainable economic ecosystems, particularly in the global era where competitiveness is increasingly determined by knowledge, skills, and innovation. However, communities in remote areas often face barriers such as limited access to education, digital infrastructure, and entrepreneurial opportunities, which hinder their active participation in broader economic networks. This study aims to analyze the effect of digital literacy on human capital development, with an entrepreneurial mindset as a mediating variable. The research objects are Papuan students at Universitas Cenderawasih who have taken entrepreneurship courses, as they are considered to possess fundamental knowledge of entrepreneurship and have gained practical experience through campus programs such as entrepreneurship bazaars. The study involved a population of 220 students, with a total sample of 142 respondents determined using Slovin's formula. A quantitative approach was employed, and data were collected through structured questionnaires and analyzed using SmartPLS to test both direct and indirect relationships in the proposed structural model. The results indicate that digital literacy has a significant positive impact on human capital development, while the entrepreneurial mindset serves as a mediating variable that strengthens this relationship. These findings highlight that enhancing an entrepreneurial mindset is a strategic pathway to maximize the impact of digital competencies on sustainable human capital development in remote regions. The study contributes to the literature on human capital development in emerging economies and provides practical insights for policymakers and educators in designing more targeted development programs for academic communities in remote areas.

Keywords: *Digital Literacy, Entrepreneurial Mindset, Human Capital Development, Remote Regions.*

INTRODUCTION

Human capital development is widely recognized as one of the most decisive elements in achieving sustainable economic progress (Colombelli et al., 2022; Muzanenhamo & Mkansi, 2023). In emerging economies such as Indonesia, disparities in human capital formation between urban and remote regions remain a persistent challenge. While major cities enjoy better access to educational institutions, internet connectivity, and innovation ecosystems, provinces located in remote areas, particularly Papua, continue to face systemic obstacles that limit their participation in the digital economy. According to the Central Bureau of Statistics (BPS, 2023), Papua recorded the highest poverty rate in Indonesia at 26.03%, far exceeding the national average of 9.36%. This statistic reflects the deep-rooted structural inequalities that hinder the capacity of young people in Papua to compete in the global era, where knowledge, skills, and innovation determine competitiveness.

The digital era has shifted the foundation of competitiveness from natural resources to knowledge-based assets. He et al. (2025) argue that an

entrepreneurial mindset and digital literacy form the backbone of participation in the digital context. However, communities in remote areas frequently encounter a dual challenge: limited access to digital technologies and a lack of adequate digital competencies. These challenges prevent individuals from converting educational attainment into productive economic activities. In line with this, Hagabea et al. (2023) emphasized that digital literacy should not only cover technical skills such as using devices and applications but also the cultivation of creativity, adaptability, and problem-solving. This broader approach is particularly relevant in regions like Papua, where digital gaps exacerbate existing inequalities in human capital development.

Another critical element is the role of the entrepreneurial mindset as a mediating factor. Entrepreneurial mindset, characterized by opportunity recognition, proactivity, and risk-taking, has been identified as a key determinant of individual capacity to transform knowledge into action. St-Jean et al. (2021) argue that even experienced entrepreneurs rely heavily on mindset as they re-engage in ventures, underscoring

its importance across diverse contexts. Wei and Wang (2019) further highlight that mindset, when coupled with social capital, moderates the effects of institutional constraints such as corruption, ultimately influencing performance. This suggests that an entrepreneurial mindset not only enhances individual agency but also mitigates structural challenges, making it particularly relevant for remote regions facing systemic barriers (Amiri, 2025; Hoti et al., 2024).

From a policy perspective, the Indonesian government has long recognized the importance of strengthening human capital as part of its national development agenda. Programs such as the Gerakan Nasional Literasi Digital (National Digital Literacy Movement) launched in 2021 reflect an effort to bridge the digital divide by improving the digital competencies of citizens. Nevertheless, UNESCO (2022) reported that Indonesia still faces significant gaps in digital inclusion, particularly in eastern regions like Papua, where internet penetration remains below 60%. Without addressing these disparities, young people in these regions will continue to be excluded from broader economic networks and opportunities.

Despite growing recognition of this issue, empirical research remains limited in analyzing the mediating role of entrepreneurial mindset in linking digital literacy and human capital development within the specific context of remote Indonesian regions (Crosina et al., 2024). Previous studies have confirmed the independent roles of digital literacy (Li, 2021) and entrepreneurial mindset, but less attention has been given to the mechanism through which mindset mediates this relationship. Addressing this gap is crucial because it allows for a deeper understanding of how digital literacy can be optimized to foster inclusive development.

To guide this study, three key variables are conceptually defined. Digital literacy is understood as the ability to effectively, responsibly, and safely use digital technologies for learning, communication, and economic participation (Ng, 2021; Eshet-Alkalai & Chajut, 2020). Entrepreneurial mindset refers to a cognitive orientation that includes creativity, opportunity recognition, proactiveness, and risk-taking, which enable individuals to identify and exploit opportunities in uncertain contexts (Nabi et al., 2019). Finally, human capital development is defined as the continuous process of improving individuals' knowledge, skills, and capabilities to enhance

employability and competitiveness in the labor market (Nurkholis, 2018; Nambie et al., 2025). These conceptualizations form the basis of the proposed framework, where the entrepreneurial mindset mediates the relationship between digital literacy and human capital development in remote regions.

Against this backdrop, the present study seeks to investigate the impact of digital literacy on human capital development among students in Papua, with an entrepreneurial mindset serving as a mediating variable. The research focuses on students at Universitas Cenderawasih, representing young individuals who face the contextual limitations of a remote region. By employing quantitative analysis, the study aims to provide robust evidence on both the direct and indirect relationships among these variables.

The contribution of this study is twofold. Theoretically, it expands the literature on human capital development by integrating digital literacy and entrepreneurial mindset into a unified framework that addresses the specific challenges of remote regions. Practically, it offers actionable insights for policymakers, educators, and development agencies to design more effective interventions that not only provide knowledge and skills but also cultivate the mindset needed to translate digital competencies into meaningful socio-economic participation. Ultimately, enhancing the entrepreneurial mindset is expected to maximize the impact of digital competencies, thereby contributing to sustainable human capital development in Papua and other marginalized regions.

METHODS

This study adopted a quantitative research approach to analyze the influence of digital literacy on human capital development, with the entrepreneurial mindset serving as a mediating variable, as this design allows systematic testing of causal relationships across constructs using statistical models. The research took place at Cenderawasih University in Papua, a higher education institution representing students from remote regions where challenges such as limited access to education, digital infrastructure, and entrepreneurial opportunities often hinder economic participation.

The population of the study consisted of 220 fifth-semester students who had previously completed entrepreneurship courses and gained practical experience through entrepreneurship bazaars organized on campus, from which a total sample of 142

respondents was determined using Slovin's formula with a 5% margin of error. Purposive sampling was applied by selecting only those students who had engaged in entrepreneurship courses and practices and who agreed voluntarily to participate.

Data collection relied on a structured questionnaire developed based on validated dimensions from prior studies. The construct of digital literacy was measured through five indicators, namely the ability to use digital applications (Ng, 2021), digital awareness including the ability to distinguish valid from false information (Eshet-Alkalai & Chajut, 2020), digital social responsibility emphasizing safe and ethical use of technology, continuous professional development in digital skills (Redecker, 2019), and mastery of fundamental digital knowledge and problem-solving capacity (van Laar et al., 2020).

The entrepreneurial mindset was captured through indicators of entrepreneurial motivation reflecting long-term aspirations (Nabi et al., 2019), creativity and innovation in identifying opportunities (Ibáñez & Palomino, 2024), tolerance of risk as part of the entrepreneurial journey (Pham et al., 2024), proactive behavior in seeking solutions and opportunities (Paudel, 2025), and opportunity orientation that allows individuals to transform situations into ventures (Kushwah et al., 2024).

Human capital development was assessed through five dimensions consisting of the perceived relevance of formal education to employability (Nurkholis, 2018), acquisition of skills through training and workshops (Paudel, 2025), experiential learning such as internships and entrepreneurial projects (Handayati et al., 2020), competence and expertise as applied capabilities (Nambie et al., 2025), and creativity and innovation as drivers of growth (Derre, 2024).

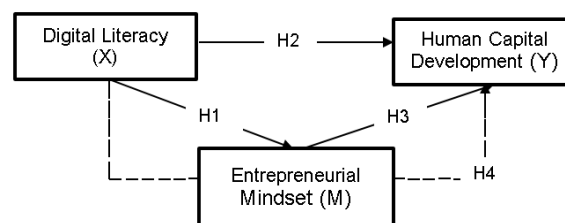
Each indicator was operationalized into two statements measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). To ensure reliability and clarity, the instrument was pretested on 20 students before full deployment. Questionnaires were then distributed both online through Google Forms and offline in classroom sessions, and respondents were informed of the research objectives, assured of confidentiality, and reminded that participation was voluntary with the right to withdraw at any time. Data analysis was conducted using Partial Least Squares Structural

Equation Modeling (PLS-SEM) with SmartPLS version 4, beginning with the evaluation of the measurement model to confirm convergent and discriminant validity as well as construct reliability, followed by the structural model analysis to test hypothesized relationships.

RESULTS AND DISCUSSION

The conceptual framework of this study is designed to explain the relationships between digital literacy, entrepreneurial mindset, and human capital development. In this model, an entrepreneurial mindset is proposed as a mediating variable that links digital literacy to human capital development, while digital literacy is expected to exert both direct and indirect effects.

Figure 1. Research Framework



As shown in Figure 1, the framework demonstrates four hypothesized paths connecting the study variables. This model provides the foundation for testing the structural relationships through PLS-SEM analysis, enabling the validation of both direct and mediating effects. Based on the theoretical foundation and prior empirical evidence, the following hypotheses are formulated: (H1) Digital literacy positively affects entrepreneurial mindset. (H2) Digital literacy positively affects human capital development. (H3) Entrepreneurial mindset positively affects human capital development. (H4) Entrepreneurial mindset mediates the relationship between digital literacy and human capital development.

Construct Reliability and Validity

The reliability and validity of the measurement model were evaluated using Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE). These indices are crucial to ensure that the constructs measured are internally consistent and valid in representing the theoretical dimensions of human capital development, entrepreneurial mindset, and financial inclusion (Hair et al., 2019).

Table 1. Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Digital Literacy (X)	0,894	0,897	0,913	0,515
Entrepreneurial Mindset (M)	0,924	0,926	0,936	0,596
Human Capital Development (Y)	0,922	0,928	0,934	0,589

Source: Processed Data (2025)

The measurement outcomes demonstrate that all three constructs surpass the commonly accepted reliability benchmarks, with Cronbach's Alpha and Composite Reliability values above 0.70. This confirms that the items used to measure each construct are internally consistent. Among the three, the entrepreneurial mindset displays the strongest reliability (Cronbach's Alpha = 0.924; CR = 0.936), showing that indicators such as motivation, creativity, proactiveness, risk tolerance, and opportunity orientation are highly dependable.

Regarding convergent validity, the AVE scores for all constructs exceed the minimum threshold of 0.50 suggested by Fornell and Larcker (1981). Entrepreneurial mindset records the highest AVE at 0.596, followed closely by human capital development

at 0.589, while digital literacy achieves an acceptable value of 0.515. These results imply that, on average, more than half of the variance in the observed items is explained by their underlying latent variables, thereby satisfying the requirement for convergent validity. Overall, the findings verify that digital literacy, entrepreneurial mindset, and human capital development are measured with sufficient reliability and validity, ensuring that the constructs are robust and suitable for further structural model analysis.

Discriminant Validity

The assessment of discriminant validity was performed using both the Fornell–Larcker Criterion and the Heterotrait–Monotrait Ratio (HTMT), which are recommended procedures in variance-based SEM (Hair et al., 2019; Henseler et al, 2015).

Table 2. Fornell-Larcker Criterion

	Digital Literacy (X)	Entrepreneurial Mindset (M)	Human Capital Development (Y)
Digital Literacy (X)	0,717		
Entrepreneurial Mindset (M)	0,802	0,772	
Human Capital Development (Y)	0,595	0,642	0,767

Source: Processed Data (2025)

The results in Table 2 display the discriminant validity test using the Fornell–Larcker criterion. The diagonal values represent the square roots of the AVE for each construct, and all are greater than the correlation coefficients with other variables in the model. For instance, the square root of AVE for Digital Literacy (0.717) is higher than its correlations with Entrepreneurial Mindset (0.802) and Human Capital Development (0.595). Likewise, the square root of AVE for Entrepreneurial Mindset (0.772) exceeds its

correlation with Human Capital Development (0.642). Finally, the value for Human Capital Development (0.767) is also greater than its correlations with both Digital Literacy and Entrepreneurial Mindset. These results indicate that each construct has stronger relationships with its own indicators compared to other constructs, thus fulfilling the Fornell–Larcker criterion and confirming discriminant validity within the measurement model.

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	Digital Literacy (X)	Entrepreneurial Mindset (M)	Human Capital Development (Y)
Digital Literacy (X)			
Entrepreneurial Mindset (M)	0,879		
Human Capital Development (Y)	0,644	0,686	

Source: Processed Data (2025)

Table 3 illustrates the HTMT outcomes for the proposed model. All ratio values are below the conservative cutoff point of 0.85, with digital literacy–entrepreneurial mindset recorded at 0.879, digital literacy, human capital development at 0.644, and entrepreneurial mindset–human capital development at 0.686. Although the association between digital literacy and entrepreneurial mindset approaches the upper limit, it remains within the acceptable boundary of 0.90 as recommended by Henseler et al. (2015). This confirms

that each construct is empirically distinguishable and that discriminant validity is adequately established.

Before testing the structural paths, a collinearity diagnostic was carried out to ensure unbiased regression estimations. According to Hair et al. (2019), the variance inflation factor (VIF) should ideally remain below 3 to indicate the absence of multicollinearity. In this study, all indicators demonstrated VIF values within the acceptable range, thereby confirming that multicollinearity does not pose a concern for the structural model.

Table 4. Inner VIF Values

	Digital Literacy (X)	Entrepreneurial Mindset (M)	Human Capital Development (Y)
Digital Literacy (X)		1,000	2,808
Entrepreneurial Mindset (M)			2,808
Human Capital Development (Y)			

Source: Processed Data (2025)

The inner VIF assessment presented in Table 4 shows that all variables are free from multicollinearity issues, with values below the critical threshold of 5. Digital Literacy recorded a VIF value of 1.000, Entrepreneurial Mindset had 2.808, and Human Capital Development also reached 2.808. These results confirm that the structural model does not suffer from multicollinearity problems and is suitable for further analysis (Chin et al., 2008).

To evaluate the structural model, a bootstrapping technique with 5,000 subsamples was employed to test the significance of path coefficients and indicators. Following Hair et al. (2019), the model's explanatory power was examined using the coefficient of determination (R^2), effect size (f^2), and path coefficients. According to established benchmarks, R^2 values of 0.75, 0.50, and 0.25 reflect strong, moderate, and weak predictive accuracy. In this study, the R^2 value for Entrepreneurial Mindset was 0.644, while Human Capital Development obtained 0.430, both of which fall within the moderate category. This indicates that the exogenous constructs are able to explain a substantial portion of the variance in the endogenous variables.

Further examination of the effect size (f^2) revealed notable variations in the relative contribution of each construct (Hair et al., 2019). Digital Literacy exerted a very large influence on Entrepreneurial Mindset, with $f^2 = 1.808$, signifying its central role in strengthening entrepreneurial orientation among students. On the other hand, the effect of Digital Literacy on Human Capital Development was relatively small ($f^2 = 0.032$), indicating that the direct impact is limited. Similarly, the influence of Entrepreneurial Mindset on Human Capital Development was modest, with $f^2 = 0.133$, which falls within the small-to-moderate category. These findings suggest that while Digital Literacy substantially enhances Entrepreneurial Mindset, its contribution to Human Capital Development is realized more effectively when mediated by mindset formation (see Table 5 and Table 6).

Table 5. R Square

	R Square	R Square Adjusted
Entrepreneurial Mindset (M)	0,644	0,642
Human Capital Development (Y)	0,430	0,425

Source: Processed Data (2025)

Table 6. f Square

	Digital Literacy (X)	Entrepreneurial Mindset (M)	Human Capital Development (Y)
Digital Literacy (X)		1,808	0,032
Entrepreneurial Mindset (M)			0,133
Human Capital Development (Y)			

Source: Processed Data (2025)

Overall, the results emphasize that improving digital literacy skills is a powerful driver of mindset transformation, which subsequently plays a mediating role in boosting human capital outcomes in remote academic contexts. The hypothesis testing results, using

a one-tailed approach, are summarized in Table 7. One-tailed testing is recommended when path coefficients are expected to follow a specific direction, either positive or negative (Kock, 2014).

Table 7. Path Coefficients

	Original Sample (O)	T Statistics (O/STDEV)	P Values
Digital Literacy (X) -> Entrepreneurial Mindset (M)	0,802	23,768	0,000
Digital Literacy (X) -> Human Capital Development (Y)	0,226	2,054	0,040
Entrepreneurial Mindset (M) -> Human Capital Development (Y)	0,461	4,619	0,000
Digital Literacy (X) -> Entrepreneurial Mindset (M)	0,802	23,768	0,000

Source: Processed Data (2025)

The structural model analysis demonstrates that digital literacy exerts a strong and statistically significant positive effect on entrepreneurial mindset ($\beta = 0.802$, $t = 23.768$, $p < 0.001$). This finding indicates that higher levels of digital competency are closely associated with stronger entrepreneurial orientations among students, thereby providing strong empirical support for the first hypothesis. In addition, digital literacy also shows a direct positive influence on human capital development ($\beta = 0.226$, $t = 2.054$, $p = 0.040$). Although the effect size is relatively modest compared to its influence on entrepreneurial mindset, the relationship remains statistically significant, confirming that digital skills play an essential role in improving individual capacity and human capital outcomes.

Furthermore, an entrepreneurial mindset has a significant and positive effect on human capital development ($\beta = 0.461$, $t = 4.619$, $p < 0.001$). This result emphasizes that students who demonstrate higher levels of creativity, risk tolerance, and opportunity recognition are more likely to develop stronger human

capital attributes, including practical skills, confidence, and employability.

Taken together, the results highlight the mediating role of entrepreneurial mindset in linking digital literacy to human capital development. Specifically, digital literacy not only contributes directly to human capital formation but also indirectly enhances it by strengthening students' entrepreneurial mindset. This mediating pathway suggests that fostering entrepreneurial orientation is a critical mechanism through which digital skills can be transformed into sustainable human capital outcomes, particularly in the context of remote regions such as Papua.

The Influence of Digital Literacy on Entrepreneurial Mindset

The hypothesis testing results demonstrate that digital literacy has a strong and significant positive effect on entrepreneurial mindset. This indicates that students who possess higher levels of digital literacy, ranging from the ability to use applications, evaluate online information critically, manage digital responsibility, pursue professional development, and solve technical problems, tend to cultivate a stronger

entrepreneurial orientation. These findings are consistent with the view that in the digital age, entrepreneurial competence cannot be separated from technological fluency. Ng (2021) emphasized that digital literacy encompasses not only technical knowledge but also adaptability and problem-solving, while Eshet-Alkalai and Chajut (2020) showed that information awareness directly shapes decision-making in online environments. The implication is that mastery of digital tools provides young entrepreneurs with a foundation for innovation, risk evaluation, and opportunity recognition, which are core elements of an entrepreneurial mindset (Ibáñez & Palomino, 2024; Kushwah et al, 2024). This outcome aligns with previous studies in Indonesia, where digital literacy significantly enhanced entrepreneurial skills among vocational and university students (Husnah et al, 2025; Handayati et al, 2020). Thus, digital competence emerges as a central driver that not only facilitates access to information but also nurtures creativity, innovation, and proactive entrepreneurial behavior.

The Influence of Digital Literacy on Human Capital Development

The results also show that digital literacy exerts a direct and significant influence on human capital development. This relationship highlights that access to and mastery of digital tools can enhance individual capacities in education, skills, and employability. According to Eshet-Alkalai and Chajut (2020), digital literacy evolves over time and contributes to lifelong learning, which is central to strengthening human capital. UNESCO (2022) further stresses that digital competencies allow learners to access knowledge, participate in global networks, and bridge educational disparities. In the Indonesian context, the lack of equitable digital access remains a barrier, particularly in eastern provinces such as Papua (BPS, 2023). However, when digital skills are effectively nurtured, they can enhance employability, improve innovation capacity, and accelerate socio-economic inclusion (Nambie et al., 2025; Derre, 2024). Thus, digital literacy is not only a technological necessity but also a foundation for sustainable human capital growth.

The Influence of Entrepreneurial Mindset on Human Capital Development

The third finding indicates that an entrepreneurial mindset significantly contributes to human capital development. Individuals with an entrepreneurial orientation, characterized by risk tolerance, proactivity,

and opportunity recognition, are more capable of transforming education and training into productive outcomes. Nabi et al. (2019) note that entrepreneurial motivation helps shape long-term aspirations that align with skill acquisition and professional growth. Likewise, Ibáñez and Palomino (2024) highlight that creativity and innovation are critical mechanisms linking mindset to human capital enhancement. St-Jean et al. (2021) emphasize that even experienced entrepreneurs rely on their mindset as a catalyst for re-engaging in ventures, underscoring its role as an enduring element of human capital. Supporting this, Wei and Wang (2019) reveal that an entrepreneurial mindset can moderate the effects of structural constraints, enabling individuals to maximize their knowledge and social capital for better performance. In this sense, mindset not only enhances personal agency but also amplifies the returns of educational and training investments on human capital.

The Mediating Role of Entrepreneurial Mindset between Digital Literacy and Human Capital Development

Finally, the results confirm that an entrepreneurial mindset mediates the relationship between digital literacy and human capital development. This suggests that while digital literacy equips individuals with technical knowledge and information management skills, its full impact on human capital is realized only when complemented by entrepreneurial attitudes such as creativity, innovation, and proactive behavior. Handayati et al. (2020) demonstrate that experiential entrepreneurship education helps students translate digital competencies into practice-oriented outcomes, thereby reinforcing their human capital. Moreover, Noh et al. (2024) argue that without cultivating a mindset, digital literacy, and entrepreneurial education often remain abstract and fail to generate a tangible impact on employability. This mediating effect aligns with the broader literature on strategic entrepreneurship, which views mindset as a key mechanism that transforms knowledge and skills into productive capacity (Boseke & Meiryani, 2025). Therefore, an entrepreneurial mindset serves as the bridge that allows digital literacy to fully contribute to the development of human capital in remote and resource-constrained contexts.

CONCLUSION

This study concludes that digital literacy and entrepreneurship training play a significant role in

strengthening human capital development among students in Papua, with an entrepreneurial mindset acting as a key mediator. While digital literacy directly improves knowledge and skills, its impact becomes more substantial when combined with entrepreneurial attitudes such as creativity, proactiveness, and opportunity recognition. These findings highlight that mindset is the bridge that transforms digital competencies into employability and innovation, particularly in remote regions facing structural barriers. The results contribute to theory by integrating digital literacy, entrepreneurial mindset, and human capital into one framework, and provide practical insights for policymakers and educators to design programs that not only enhance technical abilities but also cultivate entrepreneurial thinking to support inclusive and sustainable development.

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