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p-ISSN 1979-7567
e-ISSN 2614-4328

Beyond Digital Adoption: How Financial Technology and Digital Literacy Shape MSME Financial Performance through Financial Literacy

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Article Info

Article history:

Received, 23-06-2026
Accepted, 16-07-2026
Published, 10-08-2026

Keywords:
Financial Technology, Digital Literacy, Financial Literacy, Financial Performance

ABSTRACT

The digital economy has encouraged Micro, Small, and Medium Enterprises (MSMEs) to adopt digital technologies to enhance business performance and competitiveness. This study examines the effects of Financial Technology (FinTech) and digital literacy on MSME financial performance, with financial literacy serving as a mediating variable. Data were collected from 100 MSME owners in Ponorogo Regency, Indonesia, using proportionate stratified random sampling The proposed model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM). The empirical results demonstrate that FinTech, digital literacy, and financial literacy each exert a positive and significant effect on financial performance. FinTech adoption and digital literacy also contribute significantly to improving financial literacy. Furthermore, financial literacy partially mediates the relationship between FinTech and financial performance but does not mediate the effect of digital literacy on financial performance. These findings suggest that digital transformation should be accompanied by stronger financial capabilities, enabling MSMEs to convert technological adoption into sustainable financial performance.

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1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play an important role in supporting economic growth, employment creation, and community welfare, particularly in developing countries (Bank, 2022). In Indonesia, MSMEs account for the overwhelming majority of business entities and have consistently demonstrated their strategic role in maintaining national economic resilience. Nevertheless, the ongoing digital transformation has fundamentally changed the business landscape, requiring MSMEs to adopt digital technologies in order to remain competitive and sustain their operations.

The rapid expansion of the digital economy has reshaped the way businesses interact with customers, promote products, and conduct financial transactions (Rahmadan et al., 2021). This transformation has encouraged MSMEs to increasingly utilize digital technologies to improve business performance and competitiveness. Responding to this trend, the Government of Ponorogo Regency has introduced various initiatives to strengthen MSME competitiveness, including financial management training, accounting assistance, and digital business development programs (Kominfo, 2023). These initiatives reflect the growing importance of digital transformation and financial capability in supporting MSME sustainability and growth.

Ponorogo Regency represents one of the regions where MSMEs continue to grow rapidly. Official statistics recorded approximately 39,650 MSMEs operating in the regency in 2022 (Kominfo, 2023). Despite this encouraging growth, many business owners continue to encounter challenges in maximizing the benefits of digital technologies, particularly in managing financial resources and evaluating business performance. Although digital marketing platforms and electronic payment systems are becoming increasingly accessible, many MSMEs still struggle to translate technological adoption into sustainable financial improvement (Fauzan et al., 2023). These initiatives highlight the importance of technological capability and financial knowledge in improving business performance.

Despite the increasing number of MSMEs and various government support programs, many MSMEs in Ponorogo continue to face challenges in adopting digital technologies and improving financial management practices. A considerable proportion of business owners still rely on conventional bookkeeping, have limited understanding of digital financial services, and experience difficulties in utilizing financial information for business decision-making (Fauzan et al., 2023). Consequently, although digital payment systems and online business platforms have become increasingly accessible, their adoption does not necessarily lead to improved financial performance. This suggests that technological adoption alone is insufficient to strengthen MSME competitiveness without adequate financial capability and financial knowledge (Kurniasari & Lestari (2024)**;** Sufiyanto & Ainun (2026)

One of the technological innovations that has attracted considerable attention is Financial Technology (FinTech). FinTech enables businesses to access digital payment systems, financing services, and other financial products more efficiently (Komunikasi, 2018). The adoption of digital payments, such as e-wallets and QRIS, offers convenience for both business owners and customers while improving transaction efficiency (Hijir, 2022). Previous studies found that FinTech adoption positively influences MSME performance through increased operational efficiency and financial accessibility (Safrianti et al., 2022; Fadilah et al., 2022). However, other studies reported insignificant effects of certain FinTech services on MSME performance (Leatemia et al., 2023), indicating inconsistent empirical findings.

Besides FinTech, digital literacy has become an essential capability in the digital era. Digital literacy refers to the ability to access, evaluate, and utilize digital technologies effectively (Law et al., 2018). MSME owners with strong digital literacy can better utilize e-commerce, social media, and digital platforms to expand market reach and improve business performance. Previous studies have demonstrated that digital literacy positively affects MSME performance by strengthening digital capability and facilitating business

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innovation (Susanto et al., 2026). Nevertheless, the mechanism through which digital literacy contributes to financial performance remains insufficiently explored.

This study offers two main contributions. First, it develops an integrated research model by examining financial literacy as a mediating variable linking Financial Technology and digital literacy to MSME financial performance, an approach that has received limited attention in previous studies. Second, this study extends the existing literature by providing evidence from Ponorogo Regency, Indonesia, where MSMEs have experienced rapid growth alongside ongoing digital transformation. Although the region has actively promoted digitalization through various government initiatives, empirical studies examining how technological adoption and financial capability jointly influence MSME financial performance remain limited. Building on this gap, the present study investigates the effects of Financial Technology and digital literacy on MSME financial performance while examining the mediating role of financial literacy. The findings are expected to enrich the literature on digital transformation and MSME development, particularly in emerging regional economies, and offer practical insights for policymakers and practitioners in designing programs that strengthen both digital and financial capabilities among MSMEs.

Literature Review and Hypotheses Development

Resource-Based View (RBV)

This study is grounded in the Resource-Based View (RBV), which argues that organizational performance depends on the ability to acquire and utilize valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). In the context of MSMEs, Financial Technology (FinTech), digital literacy, and financial literacy represent strategic resources that enable business owners to improve operational efficiency, make better financial decisions, and achieve superior financial performance. Therefore, MSMEs that effectively utilize these resources are expected to gain competitive advantages in the digital economy.

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Financial Technology and MSME Financial Performance

Financial Technology (FinTech) refers to the application of digital technology in delivering financial services, including payment systems, financing, savings, and other financial transactions (Komunikasi, 2018). or MSMEs, FinTech offers more than transactional convenience. It enables entrepreneurs to process payments more efficiently, access financing more easily, and manage financial activities in a faster and more integrated manner. These advantages help reduce operational costs while supporting business productivity and financial performance. Previous studies have reported that FinTech positively influences MSME financial performance through improved financial accessibility and operational efficiency (Fadilah et al., (2022); Safrianti et al., (2022)). Therefore, the following hypothesis is proposed:

H1**:** Financial Technology has a positive effect on MSME financial performance.

Digital Literacy and MSME Financial Performance

Digital literacy refers to the ability to access, evaluate, and utilize digital technologies effectively in business activities (Bidasari et al., 2023). MSME owners with strong digital literacy are more capable of utilizing digital platforms for marketing, communication, and customer relationship management, thereby improving business performance. Previous studies found that digital literacy contributes positively to MSME performance (Amelia et al., (2022); Huda et al., (2023)). Thus, the following hypothesis is proposed:

H2**:** Digital literacy has a positive effect on MSME financial performance.

Financial Technology and Financial Literacy

The use of FinTech not only facilitates financial transactions but also encourages entrepreneurs to better understand financial products and financial management practices. Continuous interaction with digital financial services can improve users' financial knowledge and decision-making capabilities. Ramdhani et al., (2022) reported that technology utilization supports the improvement of financial literacy among MSME owners. Therefore, the following hypothesis is proposed:

H3**:** Financial Technology has a positive effect on financial literacy.

Digital Literacy and Financial Literacy

Digital literacy enables entrepreneurs to access financial information, online learning resources, and digital financial services more effectively. Consequently, individuals with higher digital literacy are more likely to improve their financial knowledge and financial management skills. Bidasari et al., (2023) found that digital literacy significantly contributes to financial literacy among MSMEs. Therefore, the following hypothesis is proposed:

H4**:** Digital literacy has a positive effect on financial literacy.

Financial Literacy and MSME Financial Performance

Financial literacy refers to the knowledge and ability to manage financial resources effectively, including budgeting, cash flow management, financing decisions, and investment planning (Ramdhani et al., 2022). MSME owners with higher financial literacy are better equipped to make sound financial decisions, resulting in improved financial performance. Previous studies consistently found a positive relationship between financial literacy and MSME performance (Amin & Pamungkas (2022); Afifah & Triyanto (2023)). Therefore, the following hypothesis is proposed:

H5: Financial literacy has a positive effect on MSME financial performance.

The Mediating Role of Financial Literacy

Financial literacy may explain how technological capabilities translate into improved financial performance. FinTech provides access to digital financial services, while digital literacy enables entrepreneurs to utilize these technologies effectively. However, the benefits of both capabilities are expected to be maximized when entrepreneurs possess adequate financial literacy. Previous studies have shown that financial literacy mediates the relationship between technological adoption and business performance (Lontchi et al., (2023); Damayanti & Baskara (2025)). Therefore, the following hypotheses are proposed:

H6: Financial literacy mediates the relationship between Financial Technology and MSME financial performance.

H7: Financial literacy mediates the relationship between digital literacy and MSME financial performance.

2. Methods

This study employed a quantitative approach to examine the relationships among Financial Technology (FinTech), digital literacy, financial literacy, and MSME financial performance in Ponorogo District, Indonesia. The population consisted of 4,105 MSMEs, including both registered and unregistered businesses operating in the trade, service, and production sectors. The unit of analysis was MSME owners or managers who were directly involved in business operations and financial decision-making. The sample size was determined using the Slovin formula with a 10% margin of error:

$$n = \frac{N}{1 + N.(d)^2} \quad \text{.......................................(1)}$$

$$n = \frac{4.105}{1 + 4.105.(0,1)^2} \quad \text{.......................................(2)}$$

$$= 97,6$$

where n represents the sample size, N is the population size, and e is the margin of error.

Based on the population of 4,105 MSMEs, the calculation resulted in a minimum sample size of 97.6 respondents, which was rounded up to 100 respondents. Respondents

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were selected using a probability sampling technique with a proportionate stratified random sampling approach to ensure representation across business sectors.

Table 1. Population and Sample Distribution of MSMEs by Urban Village

No.	Village	Population Size	Sample Size Calculation		Number of MSMEs
1.	Bangunsari	364	$\frac{364}{4.105}$	X 100	8
2.	Banyudono	331	$\frac{331}{4.105}$	X 100	7
3.	Beduri	172	$\frac{172}{4.105}$	X 100	5
4.	Brotonegaran	354	$\frac{354}{4.105}$	X 100	7
5.	Cokromenggalan	15	$\frac{15}{4.105}$	X 100	2
6.	Jingglong	100	$\frac{100}{4.105}$	X 100	4
7.	Kauman	51	$\frac{51}{4.105}$	X 100	3
8.	Keniten	0	$\frac{0}{4.105}$	X 100	1
9.	Kepatihan	308	$\frac{308}{4.105}$	X 100	7
10.	Mangkujayan	71	$\frac{71}{4.105}$	X 100	3
11.	Nologaten	269	$\frac{269}{4.105}$	X 100	6
12.	Paju	309	$\frac{309}{4.105}$	X 100	7
13.	Pakunden	280	$\frac{280}{4.105}$	X 100	6
14.	Pinggirsari	11	$\frac{11}{4.105}$	X 100	1
15.	Purbosuman	498	$\frac{498}{4.105}$	X 100	10
16.	Surodikraman	228	228	X 100	5

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			4.105		
17.	Tamanarum	8	$\frac{8}{4.105}$	X 100	1
18.	Tambakbayan	300	$\frac{300}{4.105}$	X 100	7
19.	Tonatan	436	$\frac{436}{4.105}$	X 100	10
	TOTAL	4.105	TOTAL		100

Source: Ponorogo Regency Department of Trade, Cooperatives, and Microenterprises (2021)

Primary data were collected through a structured questionnaire distributed directly to MSME owners. All measurement items were assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Financial Technology (FinTech) was measured using indicators adapted from the Technology Acceptance Model (TAM), including perceived usefulness, perceived ease of use, and perceived risk (Darmawan (2022); Fauzan et al., (2023). Digital literacy was measured based on the indicators developed by Bidasari et al., (2023), namely the ability to use digital media, frequency of digital media utilization, and enthusiasm and productivity in using digital technologies. Financial literacy was measured using indicators proposed by (Tan & Syahwildan, 2022), including financial planning and budgeting, separation of personal and business finances, understanding of savings and interest rates, risk protection, inflation, and basic accounting skills. MSME financial performance was measured using indicators developed by Hariani & Handayani (2019), including sales growth, capital growth, employee growth, market expansion, and profitability.

The collected data were processed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. The analysis was conducted in two stages. First, the measurement model was examined to ensure the validity and reliability of the constructs by evaluating outer loadings, Average Variance Extracted (AVE), Cronbach's Alpha, and Composite Reliability. Second, the structural model was analyzed to determine the explanatory power of the proposed model through the coefficient of determination (R^2) and to examine the significance of the hypothesized relationships using the bootstrapping procedure. Following the recommendation of Hair et al., (2016), hypotheses were considered statistically significant when the t-statistic exceeded 1.96 and the p-value was below 0.05.

3. Results

Measurement Model Assessment

The measurement model was evaluated to assess the validity and reliability of the constructs. Convergent validity was examined using Average Variance Extracted (AVE), while reliability was assessed using Cronbach's Alpha and Composite Reliability values. As presented in Table 1, all constructs achieved AVE values above the recommended threshold of 0.50, indicating adequate convergent validity. In addition, Cronbach's Alpha and Composite Reliability values exceeded 0.70 for all constructs, confirming satisfactory internal consistency and reliability.

Tabel 2. Construct reliability and validity

	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
Financial Technology	0.792	0.793	0.857	0.545
Financial Performance	0.791	0.794	0.865	0.617
Digital Literacy	0.861	0.865	0.906	0.706
Financial Literacy	0.855	0.858	0.902	0.697

Source: *Output* SmartPLS 4 *algorithm*, 2025

Furthermore, the outer loading values of all indicators ranged from 0.706 to 0.890, exceeding the recommended threshold of 0.70. Therefore, all indicators were retained for

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subsequent analysis, indicating that the measurement model adequately represented the latent constructs.

Table 3. Outer Loading Result

No	Indicator	Outer Loading	Result
1	X1.1	0.741	Valid
2	X1.2	0.777	Valid
3	X1.3	0.733	Valid
4	X1.4	0.717	Valid
5	X1.5	0.722	Valid
6	X2.1	0.796	Valid
7	X2.2	0.838	Valid
8	X2.3	0.890	Valid
9	X2.4	0.835	Valid
10	Y1.1	0.834	Valid
11	Y1.2	0.788	Valid
12	Y1.5	0.851	Valid
13	Y1.6	0.864	Valid
14	Y2.1	0.770	Valid
15	Y2.2	0.826	Valid
16	Y2.4	0.706	Valid
17	Y2.5	0.834	Valid

Source: Source: *Output* SmartPLS 4 *algorithm*, 2025

Structural Model Assessment

The structural model was evaluated using the coefficient of determination (R^2). The results indicate that Financial Technology, Digital Literacy, and Financial Literacy jointly explained 68.5% of the variance in MSME Financial Performance ($R^2 = 0.685$). This suggests that the model possesses substantial explanatory power. Meanwhile, Financial Technology and Digital Literacy explained 41.3% of the variance in Financial Literacy ($R^2 = 0.413$), indicating a moderate level of explanatory power.

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Table 4. Results of R-Square and Adjusted R-Square

	R-square	**R-square adjusted**
Financial Performance	0.685	0.675
Financial Literacy	0.413	0.401

Source: *Output* SmartPLS 4 *algorithm*, 2025

Hypothesis Testing

Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS 4. The results are presented in Table 4. Financial Technology was found to have a positive and significant effect on MSME Financial Performance ($\beta = 0.359$, $t = 3.214$, $p = 0.001$), supporting H1. Digital Literacy also positively influenced MSME Financial Performance ($\beta = 0.307$, $t = 2.813$, $p = 0.005$), supporting H2. The results further revealed that Financial Technology positively affected Financial Literacy ($\beta = 0.414$, $t = 3.209$, $p = 0.001$), supporting H3. Similarly, Digital Literacy had a positive and significant effect on Financial Literacy ($\beta = 0.315$, $t = 2.649$, $p = 0.008$), supporting H4. Financial Literacy was also positively associated with MSME Financial Performance ($\beta = 0.319$, $t = 2.346$, $p = 0.019$), thereby supporting H5.

Table 5. Results of Hypothesis Testing

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
Financial Technology -> Financial Performance	0.359	0.374	0.112	3.214	0.001
Financial Technology -> Financial Literacy	0.414	0.418	0.129	3.209	0.001

Digital Literacy -> Financial Performance	0.307	0.301	0.109	2.813	0.005
Digital Literacy -> Financial Literacy	0.315	0.314	0.119	2.649	0.008
Financial Literacy -> Financial Performance	0.319	0.314	0.136	2.346	0.019

Sumber: *Output* SmartPLS 4 *bootstrapping*, 2025

To examine the mediating role of Financial Literacy, indirect effect analysis was performed. The findings indicate that Financial Literacy significantly mediated the relationship between Financial Technology and MSME Financial Performance (β = 0.132, t = 2.166, p = 0.030), supporting H6. However, Financial Literacy did not mediate the relationship between Digital Literacy and MSME Financial Performance (β = 0.100, t = 1.519, p = 0.129). Therefore, H7 was not supported.

Table 6. Total indirect effects

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
Financial Technology -> Financial Performance	0.132	0.125	0.061	2.166	0.030
Digital Literacy -> Financial Performance	0.100	0.103	0.066	1.519	0.129

Sumber: *Output* SmartPLS 4 *bootstrapping*, 2025

Overall, six of the seven proposed hypotheses were supported. The findings confirm the importance of Financial Technology, Digital Literacy, and Financial Literacy in improving MSME Financial Performance. However, the mediating role of Financial Literacy was only evident in the relationship between Financial Technology and Financial Performance, but not in the relationship between Digital Literacy and Financial Performance.

4. Discussion

The findings demonstrate that Financial Technology (FinTech), digital literacy, and financial literacy play important roles in enhancing MSME financial performance. Consistent with the Resource-Based View (RBV), technological capabilities and financial knowledge can be considered strategic resources that enable businesses to improve operational efficiency and achieve superior performance. The positive effect of FinTech on financial performance suggests that digital financial services help MSMEs simplify transactions, improve cash flow management, and expand access to financing. These findings support previous studies by Fadilah et al., (2022) and Safrianti et al., (2022), which reported that FinTech adoption contributes to better business performance through increased efficiency and financial accessibility.

The results also indicate that digital literacy positively affects MSME financial performance. MSME owners with stronger digital skills are more capable of utilizing social media, e-commerce platforms, and digital communication tools to expand market reach and improve customer engagement. As a result, digital literacy contributes directly to sales growth and business sustainability. This finding is consistent with Kumar et al., (2025), who identified digital literacy as one of the critical success factors driving MSME performance, and Novela et al., (2024), who demonstrated that digital literacy enhances business performance by improving market access, operational efficiency, innovation, and customer communication.

Another important finding is the significant influence of FinTech and digital literacy on financial literacy. The adoption of digital financial services encourages MSME owners to better understand financial products, transaction management, and financial planning. Similarly, digital literacy facilitates access to financial information, digital financial services, and learning resources, which ultimately improves financial knowledge and financial decision-making capabilities. These findings suggest that technological adoption not only

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improves business operations but also strengthens the financial capabilities of entrepreneurs. This finding is consistent with Normawati et al., (2024), who found that digital financial literacy enhances digital finance adoption and ultimately improves MSME performance, as well as Damayanti & Baskara (2025), who demonstrated that financial literacy plays a crucial role in translating FinTech adoption into improved MSME financial performance.

Furthermore, financial literacy was found to have a positive effect on MSME financial performance. MSME owners with higher levels of financial literacy are better able to manage cash flow, prepare budgets, evaluate financing alternatives, and control financial risks. Consequently, they are more likely to achieve sustainable business growth and stronger financial outcomes. This result confirms previous findings reported by Amin & Pamungkas (2022), Afifah & Triyanto (2023), Fadilah et al., (2022) which identified financial literacy as a key determinant of MSME success.

Regarding the mediation analysis, financial literacy significantly mediated the relationship between FinTech and financial performance. This finding indicates that the benefits of FinTech are not solely derived from technology adoption itself but also from the improvement of financial knowledge generated through the use of digital financial services. MSME owners who effectively utilize FinTech tend to develop a better understanding of financial management practices, which subsequently enhances business performance. This result supports the findings of Lontchi et al., (2023) and Damayanti & Baskara (2025).

However, financial literacy was not found to mediate the relationship between digital literacy and financial performance. This result suggests that digital literacy contributes directly to business performance without necessarily improving financial outcomes through financial literacy. MSME owners may use digital technologies primarily for marketing, communication, customer engagement, and market expansion rather than for strengthening financial management practices. Consequently, the positive impact of digital literacy on financial performance occurs directly through increased business activities and customer reach. This finding indicates that digital competence and financial competence are related but distinct capabilities, and improvements in one capability do not automatically lead to improvements in the other. This result is consistent with Normawati et al., (2024), who argued that digital capabilities primarily enhance the utilization of digital business opportunities, whereas improvements in financial performance require stronger financial capability. Similarly, Morgan et al., (2024) emphasized that digital transformation alone does not automatically improve firm performance unless it is supported by complementary organizational capabilities, including financial and managerial competencies.

Overall, the findings highlight the importance of integrating technological adoption with financial capability development. While FinTech and digital literacy enhance MSME performance, financial literacy remains a critical factor in ensuring that technological resources are utilized effectively. Therefore, policymakers and business development institutions should not only encourage digital transformation but also strengthen financial literacy programs to maximize the benefits of digital technologies for MSME sustainability and growth.

5. Conclusion

Overall, the results demonstrate that both technological capability and financial capability are essential for improving the financial performance of MSMEs. FinTech adoption, digital literacy, and financial literacy each have a positive contribution to financial performance, while FinTech and digital literacy also strengthen entrepreneurs' financial literacy. An important finding of this study is that financial literacy acts as a significant mechanism through which FinTech improves financial performance. In contrast, the relationship between digital literacy and financial performance occurs directly rather than through financial literacy, indicating that digital competence primarily supports business growth by enhancing market access, customer interaction, and operational efficiency.

These findings extend the discussion on digital transformation among MSMEs by emphasizing that investments in digital technology should be accompanied by efforts to strengthen financial capability. For practitioners and policymakers, promoting digital innovation alone may not be sufficient. Continuous financial literacy programs, together with broader access to digital financial services, are needed to help MSMEs fully realize the benefits of technological adoption and achieve sustainable financial performance.

Several limitations should be acknowledged. The study focused exclusively on MSMEs in Ponorogo Regency, which may limit the applicability of the findings to regions with different economic and technological characteristics. In addition, the cross-sectional research design captures conditions at a single point in time and therefore cannot explain changes in MSME behavior as digital adoption evolves. Future research may include broader geographical coverage, larger and more diverse samples, and longitudinal research designs to provide a deeper understanding of how digital capability and financial capability interact in shaping MSME performance over time.

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