THE MEDIATING ROLE OF DIGITAL CREATIVITY IN THE RELATIONSHIP BETWEEN ATTITUDES TOWARD DIGITALIZATION AND EDUCATIONAL MANAGEMENT INFORMATION SYSTEMS

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ABSTRACT

In the era of digital transformation, the success of educational management systems increasingly depends not only on technology but also on users' attitudes and creativity. Despite growing research on technology adoption in education, few studies have examined how attitudes toward digitalization (ATD) and digital creativity (CTD) interact to influence the efficiency, effectiveness, and responsible implementation of Educational Management Information Systems (EMIS) in educational institutions. To address this gap, the present study investigated how CTD mediates the relationship between ATD and EMIS. A total of 347 respondents participated in the study by completing an online questionnaire. Structural Equation Modeling (SEM) was employed to test four hypotheses. The results revealed that ATD significantly enhanced EMIS performance both directly and indirectly through CTD. Furthermore, CTD emerged as a critical mediator, indicating that while a positive digital attitude provides the motivational foundation for technology adoption, creativity transforms this attitude into innovative, efficient, and contextually responsible EMIS applications. The study highlights how fostering positive attitudes and digital creativity among users can improve operational efficiency and promote responsible management practices in educational settings.

KEYWORDS

Attitude toward digitalization, digital creativity, educational management information systems, higher education, operational efficiency

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Highlights

- *Attitude toward digitalization has a significant positive effect on educational management information systems.*
- *Digital creativity positively predicts educational management information system outcomes.*
- *Attitude toward digitalization significantly predicts digital creativity.*
- *Digital creativity mediates the relationship between attitude toward digitalization and educational management information systems.*

INTRODUCTION

The development of information technology has brought significant changes to education, particularly in higher education. Digitalization has become a crucial element in managing educational systems more efficiently and transparently (Saner et al., 2020). One relevant innovation is the implementation of Educational Management Information Systems (EMIS) in universities, which are designed to support the administrative, academic, and operational management of educational institutions (Martins et al., 2019; Shah, 2014). Effective EMIS implementation can enhance operational efficiency and improve the quality of educational services (Al-Ababneh & Alrhaimi, 2020; El-Ebiary et al., 2018). However, successful EMIS implementation depends not only on the technology itself but also on users' attitudes toward digitalization and their level of digital creativity.

Attitudes toward digitalization play a vital role in driving the adoption of new technologies in education (Wang et al.,

2024). These attitudes reflect individuals' acceptance, readiness, and confidence in embracing digital transformation. Resistance to digitalization remains a major challenge, particularly in higher education settings (Blin & Munro, 2008), and a lack of readiness to adopt digital technology can hinder the effectiveness of EMIS. Nevertheless, the adoption and use of digital technology in educational systems provide opportunities to advance education worldwide (Kashada et al., 2018).

In addition to attitudes toward digitalization, digital creativity is another key factor. Digital creativity refers to an individual's ability to use digital technologies to generate innovative and useful solutions, foster creativity, and produce high-quality content (Shao et al., 2022). This capability not only supports technology-based learning but also strengthens the use of EMIS as a platform for more interactive and collaborative educational experiences. Importantly, digital creativity may mediate the influence of attitudes toward digitalization on EMIS performance, a relationship that has not been fully explored in higher education contexts. Individuals with positive attitudes toward digitalization are more likely to engage creatively with digital tools and generate innovative solutions that enhance EMIS effectiveness. Understanding this mediating role can clarify how attitudes translate into actual EMIS performance and provide practical insights for designing digital competency programs and strategies to improve system adoption in universities.

Despite advances in EMIS adoption, several Indonesian universities still face obstacles, including low digital creativity and resistance to digitalization. Junus et al. (2021) found that although educators possess basic technical skills and adapt quickly to Learning Management Systems, many rely on tactical rather than strategic solutions. Their ability to teach online classes effectively is often underutilized because they lack confidence in achieving learning objectives through these platforms. Similarly, Afrianty et al. (2022) found that digital orientation significantly affects individuals' digital capabilities, which in turn influence productivity. These findings highlight a gap between technological potential and the readiness of human resources to use it effectively.

Previous studies have shown that attitudes toward digitalization and digital creativity influence technology adoption and performance outcomes. For example, Eaglestone et al. (2007) indicated that integrating information systems and creativity supports creative work activities. Likewise, Muller and Ulrich (2013) emphasized that creativity can be enhanced by considering information system components and work environments. Technology use has also been shown to improve administrative efficiency and overall educational quality, thereby strengthening positive perceptions of digital information management systems (Haleem et al., 2022; Timotheou et al., 2023).

Although several studies have examined attitudes toward digitalization and digital creativity separately in relation to EMIS, few have integrated all three variables to investigate how CTD mediates the relationship between ATD and EMIS performance. Addressing this gap is crucial for understanding how positive ATD translates into effective EMIS use and for identifying the mechanisms that enhance system adoption in higher education. Therefore, this study aims to analyze the influence of attitudes toward digitalization on EMIS, with digital creativity as a mediating factor, in higher education institutions. Practically, the findings are expected to guide universities in developing effective EMIS strategies and digital competency programs for staff. Theoretically, the study contributes to a conceptual model that integrates attitudes and digital creativity, providing a deeper understanding of the human and technological factors that drive successful EMIS adoption.

THEORETICAL FRAMEWORK

Attitudes toward digitalization and educational management information systems

Attitudes toward digitalization refer to individuals' perceptions, beliefs, confidence, and willingness to engage with and adopt digital technologies (Vasilescu et al., 2020). A positive attitude toward the adoption of digital technologies can enhance the efficiency and effectiveness of academic data management, administrative tasks, and communication among students, teachers, and parents. Vlachopoulos et al. (2023) showed that digitalization can affect educational management, including curriculum development. To implement institutional management systems accurately and effectively in schools, institutional actors, particularly teachers, must have a positive and confident attitude toward using these systems, as such attitudes can motivate them to integrate digital management tools into their routine work (Wei et al., 2016).

Similarly, a positive attitude toward digital technology is a critical factor that can differentiate educational management systems (Mwangi–Ng'ayo et al., 2023). Globally, other supporting variables for educational management systems, such as access to education, infrastructure, and the quality of education, must also be addressed to ensure equitable access to education, reduce dropout rates, improve teaching quality, and enhance learning environments worldwide (OECD, 2012). Sánchez-Franco et al. (2009) also support the importance of attitudes toward ICT and digitalization. Hakkarainen et al. (2000) investigated students' attitudes toward the importance of ICT in their studies and future lives and found that female students, particularly younger ones, tended to have more positive attitudes toward digitalization. This indicates that people with positive attitudes toward digitalization are generally more adaptable and better able to use various features of educational management systems to support learning goals. In contrast, negative attitudes or resistance to technology can prevent information management systems from reaching their full potential in improving educational quality. Therefore, attitudes toward digitalization play a significant role in the success of educational management information systems.

Digital creativity and educational management information systems

Digital creativity and educational management information systems share a synergistic relationship that can enhance the quality of education. Digital creativity refers to an individual's

ability to generate diverse and innovative ideas using digital technology (M. R. Lee & Chen, 2015). While digital skills support the development of digital creativity, creativity extends beyond technical proficiency to include originality, experimentation, and problem-solving using digital technologies (M.-H. Nguyen et al., 2023). This capacity plays a crucial role in implementing and optimizing EMIS, helping institutions build adaptive and responsive management systems.

Digital creativity plays a positive role in educational management systems. A study by Massaro et al. (2012) on the role of creativity in management control systems found that, in the early stages of the creative process, digital creativity enables the use of technology-based diagnostic and boundary tools to identify, analyze, and map problems more efficiently. Digital technologies can provide data, visualization, and simulations that accelerate the resolution of structured problems. Meanwhile, during the design phase, the dynamic tension between interactive and diagnostic systems is often considered the most effective approach. In addition, a literature review by Di Vaio et al. (2021) on digital innovation in knowledge management systems found that digital innovation contributes significantly to management systems. Specifically, the study explored the relationship between innovation and sustainability, revealing that digital transformation tools contribute to the creation of long-term value. Likewise, digital creativity has been recognized as one of the keys to successful management (Lee-Partridge et al., 2000; Seidel et al., 2010). Therefore, digital creativity has a positive impact on management systems.

Attitudes toward digitalization and digital creativity

Positive attitudes toward digitalization are a key factor influencing digital creativity. Individuals who feel comfortable and confident using digital tools are more likely to engage in technological experimentation, a critical component of the creative process (Margaryan et al., 2011). Such attitudes foster a desire to learn and improve digital skills, thereby facilitating the generation of innovative ideas. Access to appropriate technology, combined with a positive attitude, creates a synergy that further enhances digital creativity (Van Deursen et al., 2021). Digital creativity has become increasingly important in the modern era because it supports innovation and sustainability across various sectors, from education to industry. Digitalization enables creative problem-solving through tools such as AI, big data, and collaborative platforms (Panori et al., 2021). However, the ability to take advantage of these opportunities depends on the extent to which individuals develop supportive attitudes toward technology. In this sense, attitudes toward digitalization function not only as indicators of readiness for technology adoption but also as catalysts for innovative uses of technology.

The positive impact of attitudes toward digitalization on digital creativity can be further understood through the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which explain how individuals' perceived usefulness, perceived ease of use, and performance expectancy shape their engagement with technology (Alyoussef, 2022; Ayaz & Yanartaş, 2020; Venkatesh et al., 2003). Empirical studies in higher education, such as research on flipped classrooms, show that students' positive attitudes toward digital tools and expectations of performance improvements increase their willingness to adopt and effectively use technology, which in turn enhances their creative engagement and problem-solving abilities (Al-Emran & Teo, 2020; Alyoussef, 2022). Similarly, Lee and Erdogan (2007) found that attitudes toward technology significantly predicted students' creative potential, highlighting that positive perceptions and readiness to use technology are critical for fostering creativity. This theoretical and empirical evidence suggests that ATD is not only a readiness factor but also a driver of digital creativity, providing a strong foundation for understanding how individuals transform positive attitudes into innovative applications of digital technologies.

Mediating role of digital creativity

Digital creativity serves as a key mediator between attitudes toward digitalization and the successful implementation of EMIS. Individuals with positive attitudes toward digitalization are more likely to experiment with and adopt digital tools in novel ways, thereby enhancing their creative engagement (Safavi & Ghazinoory, 2024; Vasilescu et al., 2020). Drawing on TAM and UTAUT principles, positive attitudes increase users' performance expectations and confidence in technology use, which in turn fosters creative problem-solving and innovation when interacting with digital systems (Vankúš, 2024). Within EMIS, digital creativity enables users to develop innovative solutions that address administrative and educational challenges effectively, ensuring that technology adoption is not only functional but also adaptive and forward-looking.

Furthermore, digital creativity functions as a bridge between the potential of digital technology and the specific needs of the education sector. While attitudes toward digitalization influence willingness to engage with technology, users' digital creativity translates this willingness into actionable and innovative practices (Janse Van Rensburg et al., 2022; Shao et al., 2022). In the context of educational management systems, digital creativity empowers users to identify and address challenges through unique, technology-driven approaches, thereby strengthening the overall effectiveness and sustainability of EMIS. This mediating role not only clarifies the mechanism behind successful technology integration but also highlights the importance of fostering both positive digital attitudes and creative competencies through institutional policies, training programs, and supportive digital ecosystems.

Hypotheses

Our model is presented in Figure 1. We hypothesize that (H1) ATD is positively related to EMIS; (H2) CTD positively contributes to EMIS; (H3) ATD positively predicts CTD; and (H4) CTD mediates the relationship between ATD and EMIS.

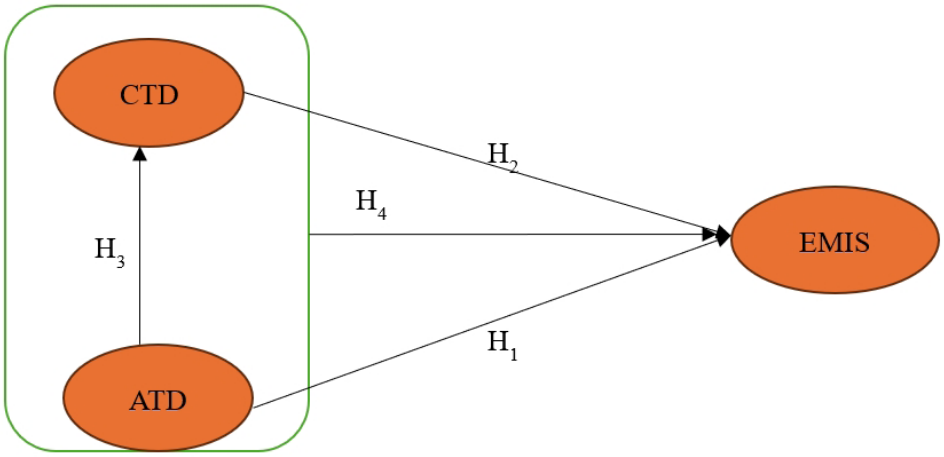

Figure 1: Conceptual model of the relationship between digital creativity (CTD), attitude toward digitalization (ATD), and educational management information systems (EMIS) (Source: own calculation)

MATERIALS AND METHODS

Participants

This study involved 347 respondents from higher education institutions in Indonesia, with 36% identifying as female and 64% as male, representing both public and private universities. The respondents had a mean age of 39.30 years (*SD* = 7.75; *SE* = 0.42). A cross-sectional research design was employed (Daniels, 2011). Participants were selected using a simple random sampling technique from a list of eligible respondents affiliated with higher education institutions, including academic staff, administrative personnel, and educational practitioners who met the study's inclusion criteria (T. D. Nguyen et al., 2021). Data were collected using an online questionnaire distributed to the randomly selected participants. Ethical approval was obtained from the Research Ethics Committee of Universitas Islam Negeri Raden Intan Lampung (No. 3/2025), and informed consent was secured from all participants before data collection. The demographic characteristics of the respondents are summarized in Table 1.

Demographics		Frequency	Percentage (%)
Gender	Female	122	36.0
	Male	222	64.0
Type university	Public	286	82.4
	Private	61	17.6
Residence	City	309	89.0
	Suburb	38	11.0
Education level	Bachelor's degree	2	0.60
	Master's degree	269	77.5
	Doctor degree	76	21.9
Work experience (year)	1-5	108	31.1
	6-10	78	22.5
	11-15	47	13.5
	16-20	53	15.3
	21-25	39	11.2
	26-30	4	1.20
	31-35	11	3.20
	36-40	6	1.70
	>40	1	0.30

Table 1: Demographic characteristics of the research sample (Source: own calculation)

Instruments

Attitude Toward Digitalization. To evaluate Attitude Toward Digitalization, we adopted a scale from Janschitz and Penker (2022). Sample items include the following five statements: "If the Internet and digital devices were gone tomorrow, it would have a negative impact on my daily life," "I often use the Internet longer than I intended to," "I am always interested in the latest trends in the digital environment (e.g., new equipment, new software, new apps)," "A life without the Internet would be unimaginable for me," and "When I need information, I search the Internet first." the original scale has been validated, with a Cronbach's alpha of 0.63, and the model fit indices are as follows: $\chi^2 = 58.5$, $df = 5$, *RMSEA* = 0.049 [0.038; 0.061], *CFI* = 0.98, and *SRMR* = 0.022.

Respondents were asked to respond using a 7-point Likert scale, ranging from 1 = strongly disagree to 7 = strongly agree. For the purposes of this study, the questionnaire was revalidated within the sample context to assess its validity and reliability.

Digital Creativity. This scale was adapted from Van Laar et al. (2019) and consists of six items. Sample items include "At work, how often do you give a creative turn to existing processes using the Internet?" and "At work, do you use the Internet to generate innovative ideas for your field?" the original scale demonstrated good reliability, with a Cronbach's alpha of 0.89. Participants responded using a 7-point Likert scale, ranging from 1 = never to 7 = always. For the purposes of this study, the questionnaire was revalidated within the sample context to determine its validity and reliability.

Educational Management Information System. This scale was adapted from Martins et al. (2019) and consists of six subscales with a total of 28 items. Sample items include: System Quality: "Using my university EMIS is easy to learn," "Help functions are available and sufficient for using my university EMIS." Information Quality: "The information provided about the curricular units taught is complete," "The information provided about the curricular units taught is always up-to-date." Service Quality: "Email and other forms of online help are available in case of problems with using the system," "Teachers/EMIS support staff are helpful for using the system." Use: "While using my university EMIS, I use available features to organize my content," "While using my university EMIS, I collaborate with my peers or teachers." User Satisfaction: "I like working with my university EMIS," "My university's EMIS makes work more interesting." Net Benefits: "My university EMIS encourages me to develop a positive attitude toward lifelong learning," "My university EMIS helps me to make connections between formal (i.e., structured learning within the school or faculty) and informal (i.e., unstructured learning occurring in everyday life) learning experiences." the original scale has been validated, showing discriminant validity with Heterotrait-Monotrait (HTMT) ratios ranging from 0.512 to 0.824. Cronbach's alpha values ranged from 0.854 to 0.910, and composite reliability (CR) values ranged from 0.906 to 0.939. In this study, respondents used a 7-point Likert scale, ranging from 1 = strongly disagree to 7 = strongly agree. For research purposes, the questionnaire was validated in the context of the sample to determine its validity and reliability.

Data analysis

In this study, data analysis was conducted using several software tools, including the Statistical Package for the Social Sciences (SPSS) version 29, Smart PLS 4, and R. SPSS was used to conduct descriptive statistical analysis and correlation tests. The validity and reliability of the items were examined using Smart PLS 4 through Confirmatory Factor Analysis (CFA), along with an evaluation of model fit (Jomnonkwao and Ratanavaraha, 2016). Model fit indices, including chi-square, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Goodness of Fit Index (GFI), and Standardized Root Mean Square Residual (SRMR), were analyzed using accepted threshold values (Hair et al., 2021; Kline, 2015). For example, a CFI value greater than 0.90 indicates an adequate model, and an RMSEA value below 0.08 is considered satisfactory. Reliability was also assessed using Cronbach's alpha and composite reliability, with values above 0.70 indicating acceptable reliability (Habók & Magyar, 2018; Suherman & Vidákovich, 2024a, 2025). Discriminant validity was examined using the Heterotrait-Monotrait ratio (HTMT), with an acceptable threshold of 0.85 (Kline, 2015). Structural Equation Modeling (SEM) was used to test the research hypotheses. Additional data visualization was carried out in R using specialized plots (e.g., ggplot) to present the descriptive statistical results.

RESULTS

Reliability and validity of the data

The reliability and validity of the measurement model were evaluated using outer loadings, Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE), as summarized in Table 2. One item from the ATD construct (ATD1) and seven items from the EMIS construct (EIQ4, EIQ5, ENB5, EQS4, EQS5, EUS4, and EUS5) were removed due to factor loadings below the acceptable threshold of 0.40. The remaining items demonstrated outer loadings above 0.60, indicating acceptable indicator reliability. All constructs exhibited Cronbach's alpha and composite reliability values above 0.70, supporting internal consistency, while AVE values for each latent variable exceeded 0.50, suggesting satisfactory convergent validity (Hair et al., 2021; Henseler et al., 2015). Specifically, attitude toward digitalization had a Cronbach's alpha of 0.801 and AVE of 0.505, digital creativity showed values of 0.877 and 0.545, and EMIS achieved values of 0.962 and 0.550, respectively. Overall, these results demonstrate that the measurement model has acceptable reliability and validity, providing a strong foundation for further structural equation modeling.

Discriminant validity

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT), as recommended by Hair et al. (2021). As shown in Table 3, all HTMT values were below the conservative threshold of 0.85, indicating satisfactory discriminant validity among the constructs. The HTMT values ranged from 0.737 (between attitude toward digitalization and digital creativity) to 0.817 (between digital creativity and EMIS). These results suggest that each construct is empirically distinct and captures a unique aspect of the model.

Descriptive statistics

Table 4 displays the descriptive statistics of the three core variables. The mean (*M*) scores for all variables ranged from 4.07 to 4.28 on a 5-point Likert scale, indicating generally favorable responses from participants. The visualization is shown in Figure 2. The standard deviation (*SD*)

Laten Variables	Item Code	Outer loads	Cronbach's alpha	Composite Reliability	AVE
Attitude towards digitalization			0.801	0.799	0.505
	ATD2	0.701			
	ATD3	0.765			
	ATD4	0.611			
	ATD5	0.756			
Digital creativity			0.877	0.878	0.545
	CTD1	0.762			
	CTD2	0.795			
	CTD3	0.724			
	CTD4	0.724			
	CTD5	0.716			
	CTD6	0.703			
Educational management information system			0.962	0.962	0.550
	EIQ1	0.699			
	EIQ2	0.734			
	EIQ3	0.747			
	ENB1	0.710			
	ENB2	0.785			
	ENB3	0.724			
	ENB4	0.745			
	EQS1	0.736			
	EQS2	0.752			
	EQS3	0.735			
	ESQ1	0.757			
	ESQ2	0.742			
	ESQ3	0.741			
	ESQ4	0.725			
	ESU1	0.734			
	ESU2	0.734			
	ESU3	0.733			
	ESU4	0.789			
	EUS1	0.753			
	EUS2	0.718			
	EUS3	0.769			

Table 2: Factor loadings and convergent validity among variables (Source: own calculation)

	ATD	CTD	EMIS
Attitude towards digitalization	-		
Digital creativity	0.737	-	
Educational management information system	0.793	0.817	-

Table 3: Discriminant validity: Heterotrait-Monotrait Ratio (HTMT) (Source: own calculation)

values ranged from 0.75 to 0.94, indicating moderate data dispersion. Regarding data normality, Kline (2015) suggested that skewness values should not exceed |3| and that kurtosis should remain below |10|. The skewness values (ranging from -0.91 to -0.59) and kurtosis values (0.01 to 0.45) in this study were well within these acceptable limits, confirming that the data were approximately normally distributed. To assess multicollinearity, Variance Inflation Factor (VIF) scores were examined for all indicators. The VIF values ranged between 1.45 and 2.93, well below the critical threshold of 5, indicating that multicollinearity is not a concern and that the independent variables used in the model do not exhibit redundant linear relationships.

Together, the descriptive statistics, normality checks, and multicollinearity checks confirm that the data are suitable for SEM analysis. The approximately normal distributions and acceptable VIF scores provide confidence that the structural relationships among latent variables can be reliably estimated, supporting the validity of the subsequent path analysis and mediation testing.

Variables	*M*	*SD*	Skewness	Kurtosis
Attitude towards digitalization	4.07	0.94	-0.79	0.06
Digital creativity	4.28	0.78	-0.91	0.45
Educational management information system	4.23	0.75	-0.59	0.01

Table 4: Descriptive statistics and data normality (Source: own calculation)

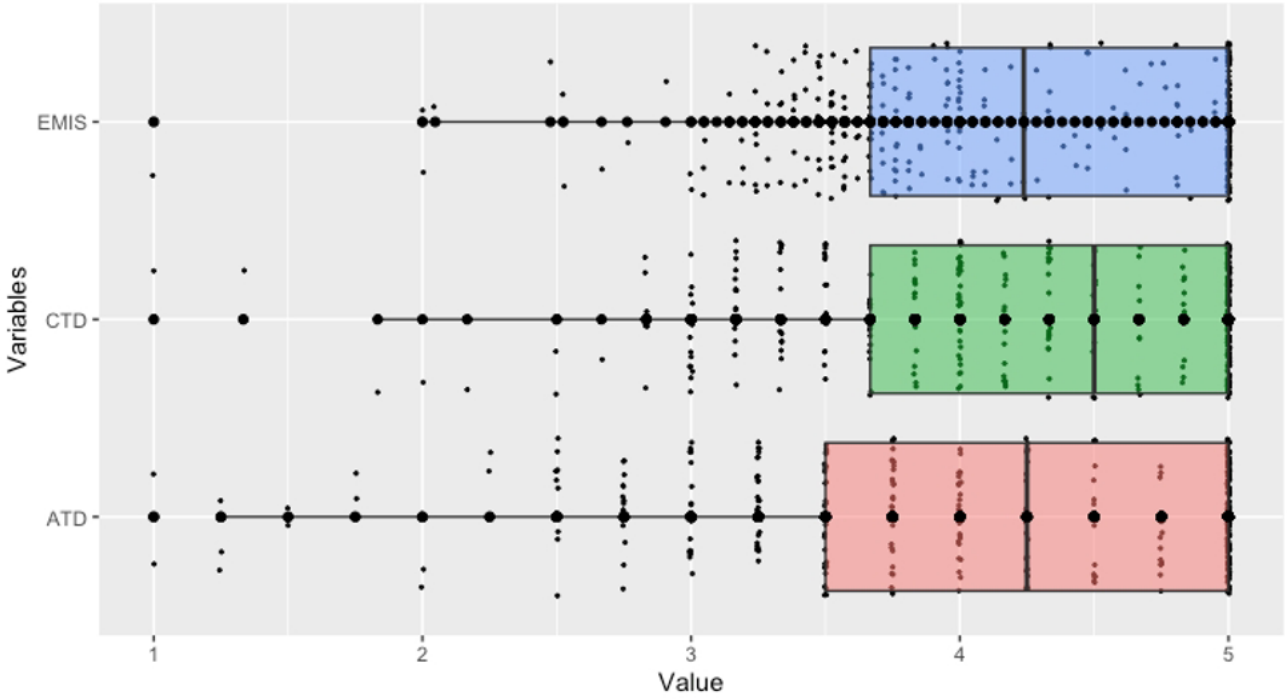

Figure 2: Ggplot descriptive statistics of variables (Source: own calculation)

Evaluation of structural equation modeling

SEM was used to test the study hypotheses (Fig. 3). The model fit indices were as follows: χ^2 (df = 31) = 1084.383, $p < 0.001$, *CFI* = 0.90, *TLI* = 0.91, *RMSEA* = 0.06, and *SRMR* = 0.03. According to established criteria (Hu & Bentler, 1999), acceptable values are *CFI* and *TLI* above 0.90 and *RMSEA* and *SRMR* below 0.08. The values obtained met these thresholds, indicating that the model demonstrated satisfactory fit. The coefficient of determination showed that CTD and ATD together explained 65.3% of the variance in EMIS (R^2 = 0.653), while ATD accounted for 38.7% of the variance in CTD (R^2 = 0.387).

Path analysis results indicated significant relationships among the variables. Attitudes toward digitalization had a direct positive effect on EMIS (coefficient = 0.378, $p < 0.001$), suggesting that individuals with more positive attitudes toward digital technology are more likely to use and support EMIS effectively in higher education. Digital creativity was positively related to EMIS (coefficient = 0.517, $p < 0.001$), indicating that higher creative engagement with digital tools leads to better utilization and innovation within EMIS. In addition, attitudes toward digitalization were directly associated with digital creativity (coefficient = 0.622, $p < 0.001$), showing that positive digital attitudes significantly foster the creative use of technology.

To examine the mediating role of digital creativity between attitudes toward digitalization and EMIS, a bootstrap procedure with 5000 resamples was conducted. The results indicated a significant indirect effect (coefficient = 0.321, $p < 0.001$), meaning that approximately one-third of the total effect of attitudes toward digitalization on EMIS operates through digital creativity. In practical terms, this suggests that fostering positive attitudes toward digitalization not only directly improves EMIS adoption and performance but also indirectly enhances EMIS outcomes by promoting users' creative engagement with technology. Table 5 presents the total direct and indirect effects, highlighting that digital creativity acts as a meaningful mechanism that translates positive digital attitudes into more effective and innovative EMIS use.

The results indicate that attitudes toward digitalization exert a significant direct effect on both digital creativity and EMIS performance. Digital creativity also has a strong positive association with EMIS and functions as a significant mediator between ATD and EMIS, accounting for approximately one-third of the total effect. The measurement model demonstrated acceptable reliability and validity, and the structural model fit indices confirmed a good fit, with substantial variance explained for the key constructs. Overall, these findings underscore the importance of both positive digital attitudes and creative engagement with technology in driving effective EMIS adoption and utilization in higher education.

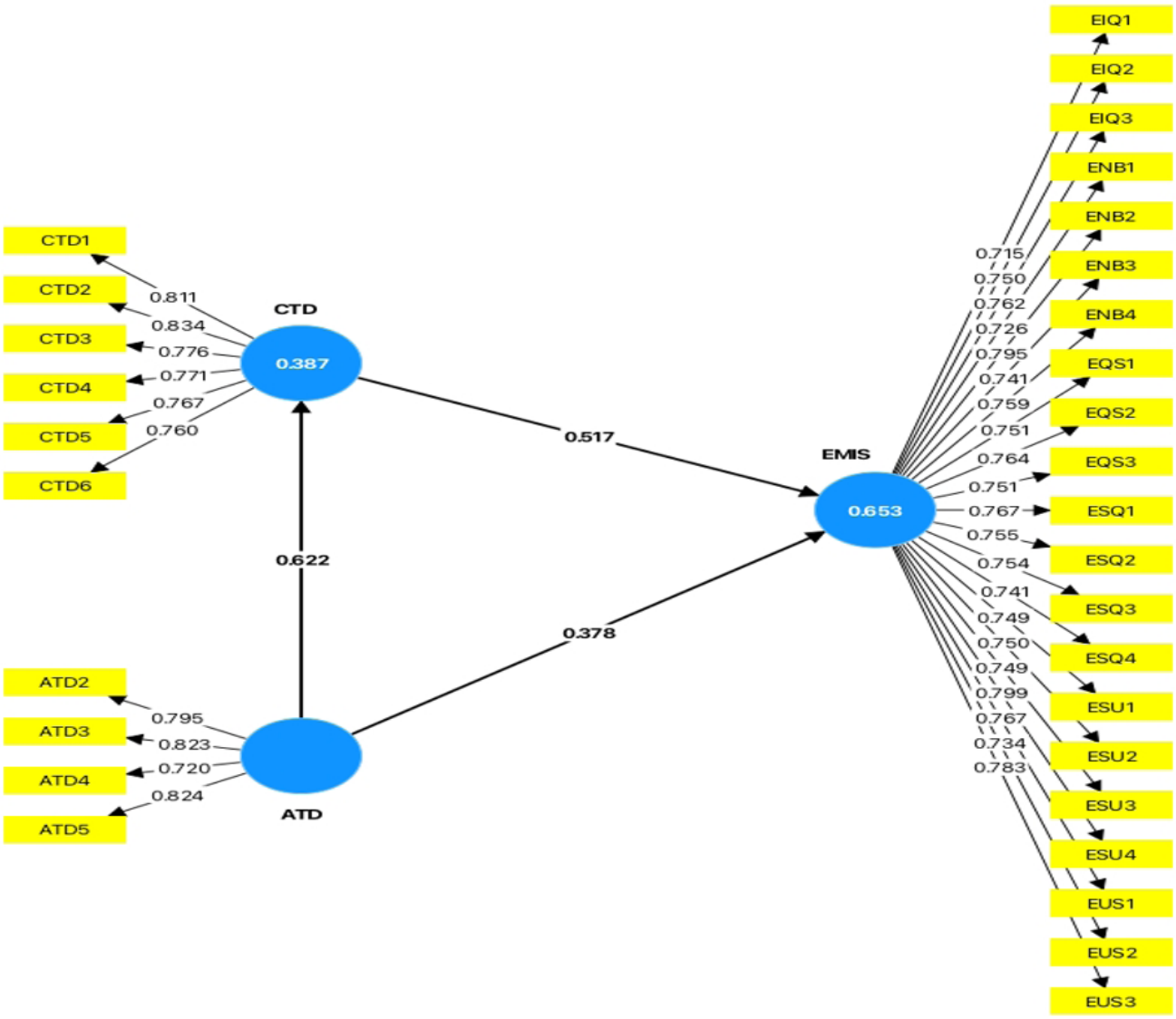

Figure 3: Standardized association between EMIS, CTD, and ATD (Source: own calculation)

	Original sample (*O*)	Sample mean (*M*)	Standard deviation (*STDEV*)	*T* statistics (|*O*/*STDEV*|)	*p* values
ATD -> CTD	0.622	0.624	0.047	13.273	< 0.001
ATD -> EMIS	0.378	0.376	0.073	5.179	< 0.001
CTD -> EMIS	0.517	0.520	0.085	6.080	< 0.001
ATD -> CTD -> EMIS	0.321	0.325	0.061	5.244	< 0.001

Table 5: Total direct and indirect effects among variables (Source: own calculation)

DISCUSSION

The findings of the current study indicate that ATD is positively associated with EMIS, supporting Hypothesis 1. This positive relationship highlights the importance of user attitudes in the acceptance and efficiency of digital tools within educational settings. For example, Gezer and Karagözoğlu (2023) found a significant relationship between teachers' levels of digital literacy and their attitudes toward distance education, suggesting that enhanced digital competencies lead to a more favorable disposition toward digital systems. Hadi et al. (2022) also support this view by showing how user satisfaction with online EMIS is influenced by users' attitudes toward these systems. Their research indicates that a positive attitude toward digital tools correlates with higher user satisfaction, thereby enhancing system effectiveness. This finding underscores that it is not only the technology itself but also users' perceptions of the technology that ultimately determine the success of its implementation in educational management. Consequently, EMIS initiatives that focus solely on technical infrastructure without addressing users' attitudes risk underutilization, resistance, or superficial compliance. When educators and administrators perceive digital systems as burdensome, misaligned with their needs, or imposed without adequate support, the potential benefits of EMIS for decision-making

and institutional effectiveness may remain unrealized. This finding suggests that successful EMIS implementation requires parallel investment in change management strategies, including continuous training, participatory system design, sustainability-oriented higher education policy, and clear communication of system benefits (Mader et al., 2013). By actively shaping positive user perceptions, institutions can enhance acceptance, sustained use, and the overall impact of EMIS on educational management outcomes. Moreover, the longitudinal study by Ward et al. (2005) emphasizes that attitudes toward digital technologies can change over time and should therefore be managed beyond the initial implementation phase of a system. Ultimately, the integration of digital technologies such as EMIS in educational settings requires ongoing support, attention to critical factors, and a cultural shift toward embracing digital tools (Mwangi–Ng'ayo et al., 2023).

Another finding revealed that CTD was positively associated with EMIS, supporting Hypothesis 2. This aligns with previous research suggesting that creative approaches to integrating digital tools foster innovation in educational data management, leading to more adaptive and responsive systems (Di Vaio et al., 2021; Lee-Partridge et al., 2000; Massaro et al., 2012; Seidel et al., 2010). Widiyatmoko et al. (2024) argued that the development of web-based systems can significantly improve data management efficiency within educational processes, showing how creativity can lead to solutions that enhance operational effectiveness. In addition, Kuleshova et al. (2021) emphasized the critical role of creativity in digital education models. They argued that the creative component of digital learning encourages students to tackle interdisciplinary problems, thereby increasing their engagement and motivation. This holistic approach underscores the importance of fostering creative thinking in educational settings, allowing more innovative EMIS applications that are tailored to the specific needs of educational institutions. From an implementation perspective, this implies that EMIS success depends not only on system functionality but also on whether institutions intentionally create conditions that encourage experimentation, flexibility, and creative problem-solving in digital practices. Without organizational structures that allow users to adapt EMIS features, propose innovations, and integrate the system into local workflows, creative potential may remain underutilized. Therefore, institutions should move beyond standardized EMIS deployment models and adopt flexible governance approaches that support user-driven innovation and contextual customization. Furthermore, the work of Del-Valle-Rojas et al. (2023) provides compelling evidence that educational leadership plays an essential role in promoting creativity among teachers. Their findings suggest that when teachers feel supported in their creative efforts to implement digital solutions, they are more likely to enhance the usability and effectiveness of EMIS, ultimately improving teaching and learning outcomes. This points to the need for institutional frameworks that empower and incentivize creative approaches in educational management. The evidence positions creativity as a fundamental aspect of successful educational information management and demonstrates that fostering an environment where new ideas can flourish is essential for the sustained success of EMIS.

Furthermore, this study found that ATD positively predicted CTD, supporting Hypothesis 3. This finding is consistent with previous research (Panori et al., 2021; Van Deursen et al., 2021). According to Crittenden et al. (2019), individuals who embrace digitalization are more likely to experiment with novel tools and approaches, thereby fostering creative digital solutions. Similarly, Bruno and Canina (2019) observed that a constructive attitude toward technology encourages exploration, adaptability, and problem-solving, which are key drivers of digital creativity. Tuan (2022) further highlights that individuals who maintain an optimistic outlook on technology are more inclined to explore new digital tools and approaches, facilitating the development of creative and effective solutions in educational contexts. This relationship is crucial because it suggests that when educators feel empowered and positive about digitalization, their creativity flourishes, resulting in innovative instructional strategies that better meet learners' needs (Cahyono et al., 2025; Suherman & Vidákovich, 2024b). These insights suggest that cultivating a positive attitude toward digitalization is essential not only for effective EMIS use but also for nurturing creativity in digital processes, thereby amplifying the benefits of technology integration in education. From a practical standpoint, this finding implies that efforts to enhance digital creativity should begin by strengthening users' attitudes toward digitalization through targeted training, mentoring, and supportive digital cultures. Professional development initiatives that emphasize confidence-building, experimentation, and reflective digital practice may be particularly effective in translating positive attitudes into creative outcomes. Without such attitudinal foundations, investments in advanced EMIS technologies may fail to generate meaningful innovation because users may lack the motivation or confidence to explore their full potential.

Interestingly, the study also found that CTD positively mediated the association between ATD and EMIS, supporting Hypothesis 4. This result aligns with the perspective that while a positive attitude toward digitalization provides the motivational foundation for technology adoption, the creative application of digital tools transforms such attitudes into tangible improvements in system performance (Janse Van Rensburg et al., 2022; Safavi & Ghazinoory, 2024; Shao et al., 2022). Prior studies, such as Skrbinjek et al. (2024), have shown that creativity serves as a critical mechanism through which digital attitudes are translated into innovative and efficient practices in educational management. Moreover, in the context of educational management, creative digitalization empowers stakeholders to design new workflows, develop data visualization dashboards, integrate interoperable platforms, and streamline decision-making processes (Martínez-Peláez et al., 2024). By allowing stakeholders to design customized solutions, adapt EMIS functionalities, and address context-specific challenges, CTD enhances the value of ATD in driving successful EMIS implementation. This mediating role underscores the importance of not only fostering positive digital attitudes but also equipping users with the skills and opportunities to engage creatively with digital systems. From an institutional perspective, this finding suggests that EMIS implementation strategies should move beyond awareness-building or attitude change alone and place greater emphasis on enabling creative digital practices. Training programs should be designed not

merely to promote system acceptance but also to develop users' capacity to experiment with, customize, and innovatively apply EMIS functionalities to their specific organizational contexts. At the policy level, flexible governance structures and institutional support for experimentation can further strengthen the translation of positive digital attitudes into effective and sustainable EMIS outcomes through participatory and communicative processes that involve school staff in shaping and improving system implementation (Hillen, 2020).

In addition to individual attitudes and creativity, EMIS adoption may also be influenced by institutional and policy-level factors. For example, organizational support, leadership commitment, and the availability of resources and training programs can significantly shape the effectiveness of EMIS implementation, as well as user motivation and engagement (Donmez-Turan, 2020; Hidayatullah et al., 2024). Policies that encourage innovation, provide incentives for creative engagement, and ensure equitable access to digital tools can further enhance the positive effects of ATD and CTD on system outcomes. Recognizing these contextual factors highlights that while individual attitudes and digital creativity are critical, their full potential is realized when they are supported by conducive institutional frameworks and policies.

Despite its valuable contributions, this study has several limitations that should be acknowledged. First, the research relied on self-reported data, which may be subject to response bias or social desirability effects, potentially influencing the precision of the attitudes, creativity, and EMIS use reported by the participants. Second, the study design was cross-sectional, limiting the ability to establish causal relationships between ATD, CTD, and EMIS effectiveness. Third, the sample was drawn from a specific educational context, which may restrict the generalizability of the findings to other regions or educational systems with different technological infrastructures and cultural attitudes toward digitalization. In addition, the study focused primarily on individual-level factors (attitude and creativity) and did not account for institutional, technical, or policy-related variables that might also influence EMIS implementation and performance.

Future research should address these limitations by employing longitudinal designs to explore how ATD and CTD evolve over time and how these changes influence EMIS adoption and impact. Expanding the scope of research to include diverse educational settings, countries, and institutional contexts would improve the generalizability of the findings. Moreover, integrating multi-source data, such as system usage logs, performance metrics, and qualitative interviews, could provide a more comprehensive understanding of how attitudes and creativity translate into actual EMIS usage and innovation. Future studies should also examine the role of organizational culture, leadership support, and infrastructure readiness in strengthening the link between ATD, CTD, and EMIS outcomes. By incorporating these broader contextual and structural factors, future research can develop a more holistic framework to optimize EMIS implementation in education.

CONCLUSION

In conclusion, the findings of this study highlight the critical interplay between ATD, CTD, and EMIS. The evidence shows that ATD has a direct positive association with EMIS performance and also significantly predicts CTD, which in turn positively impacts EMIS. In addition, the mediating effect of CTD between ATD and EMIS underscores that while positive attitudes form the foundation for technology adoption, the creative use of digital tools transforms these attitudes into meaningful innovations that improve performance. These findings align with previous literature emphasizing that user perceptions and creative capacities are key drivers of successful technology implementation in educational settings. Therefore, both attitudinal and creative dimensions must be strategically cultivated to maximize the benefits of EMIS and ensure its adaptability to changing educational demands.

The implications of this research extend to policymakers, school leaders, and educational technology developers. First, institutions should invest in continuous professional development programs that not only enhance digital literacy but also nurture creative problem-solving skills among educators and administrators, so that EMIS can be implemented more efficiently in daily institutional practices. Second, leadership must foster an organizational culture that values innovation and provides incentives for creative digital practices, allowing staff to tailor EMIS functionalities to their unique institutional contexts and thereby improve the efficiency of administrative and academic processes. Third, policymakers should consider integrating creativity-focused digital competency frameworks into teacher training curricula to ensure that future educators are equipped to leverage EMIS innovation for more efficient and effective educational management. By addressing both attitudinal readiness and the creative application of digital tools, stakeholders can ensure that EMIS functions not only as an administrative instrument but also as a dynamic driver of educational improvement, innovation, and efficiency.

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