

Assessing Digital Engagement and Its Impact on Digital Influence: A College Student Perspective

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ABSTRACT

Driven by the Indian government's commitment to Digital Influence, exemplified by the comprehensive Digital India Initiative launched in 2015, the proposed research investigates the practical impact of these efforts on students. The Digital India Initiative brought together diverse services onto a single platform to boost efficiency and speed up the country's digital shift. This consolidation has led to a more accessible and transparent system for delivering services nationwide. This paper specifically examines the levels of Digital Knowledge, Digital Confidence, and Digital Skills – collectively termed as Digital Engagement – among college students, and explores how these factors contribute to their Digital Influence through the analysis of primary data. The study reveals a generally high level of digital engagement and influence among the student population. However, significant disparities emerge across demographic groups. Notably, female students, while exhibiting superior Digital Knowledge and Confidence, demonstrate a comparative lag in Digital Skills and Influence, indicating a need for targeted educational interventions to ensure equitable development. The research also highlights a strong correlation between students' access to multiple digital devices, diverse digital experiences, and overall Digital Influence, emphasizing the importance of providing students with a wide array of digital tools. Digital confidence and skills significantly strengthen the link between digital knowledge and influence. Digital knowledge also positively moderates the relationships between digital confidence and influence, and digital skills and influence. The strongest moderating effect observed was digital knowledge on the connection between digital skills and influence. Therefore, educational institutions should focus on interventions that address heterogeneity in digital literacy and skill development.

Keywords: *Digital Influence, Digital knowledge, Digital Confidence, Digital Skills, Moderation analysis, E-Services*

Introduction

Digital India Initiative by the Government of India has brought integration of digital technologies and their rapid advancement into almost all domains of present-day society. Active participation in the digital sphere is becoming increasingly crucial for students to align their skills with that of industry and become future ready. Digital media, particularly platforms like Discord and Teams, positively impacts student emotional and behavioural engagement, fostering communication, well-being, and learning [1, 2]. Student adoption of educational technology is influenced by social factors and support [3]. Faculty digital competence is vital for engaging students, imparting digital literacy, and utilizing various AI tools. [4, 5, 6, 7, 8].

Research strongly suggests that digital engagement, encompassing knowledge, confidence, skills, and active participation, is crucial for academic success, leadership development, and career readiness in higher education [9, 10, 11, 12, 13, 14]. This will help in driving online civic participation and influence [15, 16, 17]. Therefore, understanding the critical role of digital engagement in boosting student's digital influence is paramount. In this article, we refer to digital engagement as a multifaceted construct comprising of three interconnected elements, namely, digital knowledge (DK), digital confidence (DC), and digital skills (DS) as done in previous studies.

Digital knowledge encompasses an understanding of digital concepts, tools, and platforms [18]. Digital confidence reflects an individual's belief in their ability to navigate and utilize digital technologies effectively [19]. Digital skills represent the practical competencies required to perform tasks and achieve goals in the digital environment [20]. The authors intend to investigate the relationship between these three dimensions of digital engagement and digital influence (DI) among college students. Digital influence, in this context, refers to the capacity of students to effectively leverage digital platforms and technologies to express their opinions, advocate for change, and participate in decision-making processes that affect their lives. Mechanisms by which individuals and organizations exert influence in digital environments are examined, particularly how they shape online opinions, behaviours, and trends [21].

Youth are undoubtedly crucial stakeholders in the digital economy due to their high adoption and interaction with digital technologies. Growing up with technology, they possess inherent comfort and expertise in navigating the digital landscape. Their fresh perspectives and willingness to experiment drive innovation and adaptation in the digital sphere. They can leverage technology to drive social change and advocate for digital inclusivity. Thus,

educational institutions can play a significant role by motivating and training youth for the ever-evolving digital era. The authors deliberately collect data from the students of undergraduate College, University of Delhi which has got good ranking from various bodies like NIRF, THE WEEK, INDIA TODAY and OUTLOOK.

An attempt is made in the present study to examine the relationship between digital engagement and digital influence by selecting five key e-services as focal points: e-learning, e-recruitment, e-banking, e-health, and e-transport. These services represent crucial aspects of contemporary life where digital engagement can significantly impact individuals' access to resources, opportunities, and overall well-being. We assessed students' digital knowledge, digital confidence, and digital skills related to these specific e-services to understand their overall level of digital engagement.

E-learning resources are incredibly important for youth in today's world [22, 23]. Unlike traditional classroom settings, e-learning platforms allow individuals to learn at their own pace. These platforms offer flexibility and accessibility, benefiting students immensely. Apart from student satisfaction, e-learning's role in maintaining education during challenges like the pandemic highlights its value [24]. E-learning platforms offer vast array of multimedia integrated personalized courses to make learning more engaging and effective than traditional methods. The onus of motivating students to learn these e-skills lies on colleges and universities. The college is contributing to this by providing laptops and free wi-fi to access e-library resources.

E-recruitment offers significant benefits for employee as well as employers. It facilitates access to internship opportunities and work from home options for flexibility and work-life balance. With advanced search filters and targeted job advertisements, employees can focus on positions that align with their skills and interests, leading to a more fulfilling career path [25]. The College has an active placement cell which helps students in getting internships and jobs via campus placement.

E-Banking offers a plethora of benefits for college students, making it an essential tool for developing financial literacy skills and managing finances, thereby, navigating their financial responsibilities more efficiently. It facilitates 24/7 quick and easy automated transactions. E-banking, a more efficient alternative to traditional banking, has necessitated consumer e-literacy and vigilance while offering rapid transaction processing [26].

E-Health or telemedicine, offers convenient access to healthcare resources, promotes well-being, and supports physical and mental health needs and empowers

students to take charge of their health. They can also access information to understand their present health condition. Accordingly, treatment and prevention of disease can be addressed to make informed decisions. Telemedicine also bridges healthcare disparities in rural India, expanding primary care access through initiatives like E-Sanjeevni and private platforms [27].

Digital technology can make **E-transport** more accessible, convenient, and efficient. It provides real-time information through websites or on-line applications aka Apps about the availability, routes, fares etc. The embrace of e-transport and public transit by today's youth is crucial for India's sustainable future [28]. The Indian government has also implemented various digital initiatives, including online license and registration renewals, and e-challans for traffic violations. Apps like One Delhi and UMANG further simplify metro access by integrating different transport modes and offering services such as ticketing and real-time updates. The multimodal integration, a seamless combination of various transportation methods, is suggested as a promising solution for issues like congestion, air pollution, and social inequity [29].

Overall, the usage patterns of these five e-services by students at University College would give a clear picture of extent of digital knowledge, confidence, and skills of students. This could be a valuable indicator of their preparedness for a future which is increasingly driven by digital technology.

Objectives:

1. To assess the levels of digital knowledge, digital confidence, and digital skills among students in relation to five key e-services (e-learning, e-recruitment, e-banking, e-health, and e-transport).
2. To identify the key demographic factors influencing digital engagement and digital influence.
3. To determine the degree of association between digital knowledge, digital confidence, digital skills and digital influence.
4. To investigate the relationship between digital engagement (comprising of three independent variables digital knowledge, digital confidence, and digital skills) and a dependent variable digital influence among students.
5. To ascertain the moderating effect of one variable on the relationship between an independent and a dependent variable.
6. To propose interventions and strategies aimed at enhancing students' digital engagement and developing their capacity for positive digital influence.

The paper is organised as below. Section 2 presents a comprehensive review of the relevant literature, establishing the theoretical foundation and contextual background for the study. Section 3 details the research methodology, including the research design, sampling procedures, data collection instrument, and analytical techniques employed. Section 4 provides an in-depth presentation of the results. Section 5 offers a critical discussion that interprets the findings in relation to the research objectives and existing literature. It outlines the theoretical and practical implications of the study. Finally, Section 6 concludes the study along with limitations and proposes directions for future research.

Literature Review

The increasing integration of digital technologies has profoundly reshaped higher education, prompting extensive research into their multifaceted impact on student competencies, engagement, and learning outcomes. Studies consistently demonstrate that digital tools can significantly enhance learning engagement; for instance, it is found that digital media positively influence students' emotional and behavioural involvement in educational activities [30]. The judicious implementation of digital tools in instructional settings correlates with student active engagement, subsequently contributing to improved learning outcomes [31]. This underscores that the efficacy of digital tools is contingent upon their pedagogical application.

A pivotal determinant in this digital transformation is faculty digital competence. Instructors' proficiency with digital tools is directly linked to teaching effectiveness and sustained student engagement [32]. Furthermore, a significant positive association between academicians' digital skills and student engagement, a relationship particularly amplified during the exigencies of the pandemic [5]. These findings collectively advocate for institutional investment in enhancing educators' digital proficiencies.

While digital tools offer substantial benefits, their integration is not without challenges. Certain digital platforms, such as Discord and Teams, have been shown to foster improved communication, community building, and peer support among students, leading to enhanced belonging, well-being, engagement, and learning [33]. Conversely, identified digital tools are identified as a potential source of distraction during lectures, which can diminish student engagement [34]. This necessitates strategic management of digital tool integration to mitigate adverse effects. Understanding the determinants of digital tool adoption is also crucial; it is found that social influence and the availability of facilitating conditions significantly predict students'

willingness to adopt educational technologies [35]. Similarly, it is suggested that pedagogical approaches that encourage online peer support, thereby cultivating robust learning communities [36].

Beyond engagement, digital skills exert broader influences on student success. Digital literacy and self-regulation have been identified as mediating factors between emotional intelligence and academic stress among university students, addressing a critical issue in contemporary educational environments [6]. Longitudinal analyses also continue to track the evolution of university students' digital skills in the post-pandemic landscape [37]. Digital competencies additionally impact collaborative attitudes among students [7] and are pertinent to forecasting the effective utilization of Artificial Intelligence within higher education contexts [38]. Despite extensive youth engagement with social media, a notable gap persists in the digital skills requisite for global tech entrepreneurship and broader employability [39].

Further research reinforces several interconnected themes. Firstly, digital engagement is a composite construct where digital knowledge, skills, and confidence are highly interrelated components [40], with their synergistic combination predictive of digital leadership outcomes [41]. Structural equation modelling is utilized to examine the relationships between digital engagement components [40], revealing strong interconnections between knowledge, skills, and confidence ($\chi^2 = 245.67$, $df = 112$, $p < 0.001$). Regression analysis is applied to predict digital influence, finding that a combination of digital knowledge, skills, and confidence explained 67% of the variance in digital leadership outcomes [41].

Secondly, significant demographic disparities exist in digital engagement, influenced by factors such as socioeconomic status, geographic location, and gender, necessitating targeted interventions [42, 10, 43, 44]. Demographic factors affecting digital engagement among 3,000 students across multiple institutions reveals significant disparities based on socioeconomic status and geographic location [42]. The impact of digital access on academic performance shows that students with limited digital access scored 23% lower on average in online assessments [43]. Digital confidence across different demographic groups, identifying significant gender-based differences in technology adoption patterns is examined [44].

Thirdly, proficiency in e-services profoundly impacts student success across diverse domains, including financial literacy and banking behavior [45], employment acquisition via digital platforms [46], e-health utilization [47], sustainable transportation choices [48], and overall e-learning success [49, 50]. Usage of e-banking

among college students reveals that digital knowledge significantly influenced financial literacy and banking behavior [45]. Their structural equation modelling showed a strong positive correlation between digital skills and effective e-banking usage ($r = 0.68$). The effectiveness of e-recruitment platforms in higher education is accessed by surveying 1,500 graduating students [46]. Results indicated that students with higher digital engagement were 2.3 times more likely to secure employment through digital platforms. Adoption of e-health among university students during the COVID-19 pandemic is explored [47]. Their mixed-methods study of 900 students identified digital confidence as a critical factor in telehealth utilization. The impact of digital knowledge on academic performance across different demographics is examined [10], uncovering significant variations based on socioeconomic factors ($F = 15.32$, $p < 0.001$).

Adoption patterns of e-learning among 2,000 university students across five countries is analyzed [49]. Their findings highlighted digital confidence as the strongest predictor of e-learning success ($\beta = 0.56$, $p < 0.001$). The relationship between digital confidence and academic achievement, finds that the students with high digital confidence scored 18% higher on digital assessments [50]. Fourthly, methodological advancements include the development of standardized frameworks for measuring digital engagement and its key components [51].

Finally, robust positive correlations between digital engagement and various educational outcomes are consistently observed. Structured digital training is linked to improved student outcomes [9], digital knowledge influences academic performance [10], high digital confidence correlates with superior digital assessment scores [50], and social media engagement predicts leadership roles [12].

The analyses of relationship between digital skills and career readiness finds that students with advanced digital skills were 45% more likely to receive job offers before graduation [14]. Digital citizenship among university students [15] reveals a significant correlation between digital engagement and civic participation ($r = 0.72$, $p < 0.001$). Their study of 1,200 students identified digital knowledge and skills as key predictors of online civic engagement. Student perspectives on digital citizenship is explored through a mixed-methods approach, identifying key themes in digital engagement and civic participation [13]. The link between digital confidence and online participation in a sample of 850 college students is examined [16]. Through regression analysis, they found that digital confidence accounted for 45% of the variance in students' online engagement behaviors. A longitudinal study with 600 undergraduate students, demonstrates that digital skills development

programs boosted students' digital influence by 28% over two semesters [17].

In conclusion, the existing literature unequivocally underscores the critical importance of digital competencies in contemporary higher education. Universities are thus compelled to develop comprehensive strategies that encompass the provision of appropriate digital tools, the cultivation of robust digital skills among students, and the continuous professional development of educators. Such integrated approaches are essential for fostering enhanced student engagement, optimizing learning outcomes, and preparing graduates for responsible digital citizenship and future career readiness.

This research aims to contribute to a deeper understanding of the factors that drive digital influence and provide valuable insights for educators, policymakers, and other stakeholders seeking to foster a more inclusive and digitally empowered society.

Materials and Methods

A structured questionnaire is used as the main tool to collect primary data and check the importance of digital knowledge, digital confidence, and digital skills in predicting digital influence. The framework of the questionnaire is comparable to the one used by the well-known study conducted in past [52]. The questionnaire consists of 23 questions under four factors namely; digital knowledge, digital confidence, digital skills, digital influence which were based on five-point Likert scale. The data collection is done during Aug – Dec 2024 using convenience sampling of respondents from diverse backgrounds including underserved areas like Bihar, Haryana, Rajasthan, Uttar Pradesh and Madhya Pradesh apart from Delhi-NCR. The Questionnaire is administered to 600 students for the purpose of checking their perception about digital engagement and digital influence, out of these 515 responses are complete (85.8%). After collecting responses, the data is analysed using Statistical Package for Social Sciences (SPSS version 21).

Cronbach's Alpha (α) assesses a survey's internal consistency reliability, indicating how closely related a set of items are in measuring a single concept. Its values range from 0 to 1; higher values suggest more reliability. [53]. Further, descriptive statistics are computed including frequency and mean values for each of the four factors viz., digital knowledge, digital confidence, digital skills and digital influence. These mean values offer an average sentiment towards each factor. Additionally, standard deviation (SD) is calculated to understand the dispersion.

To examine the relationships among various independent variables—digital knowledge, digital confidence, and digital skills—correlation analysis is conducted. Subsequently, multiple linear regression (MLR) is employed to assess the impact of these three explanatory variables on digital influence (DI), the dependent variable. This methodological approach aligns with recent studies emphasizing the utility of sophisticated statistical methods, such as factor analysis, regression, and structural equation modelling, for comprehensively understanding and measuring the multifaceted nature of digital engagement and its constituent elements [54, 55, 56].

To explore the conditional nature of the relationship between dependent variable and the three independent variables, a moderation analysis is used. This analysis specifically aimed to ascertain whether the strength or direction of these relationships is contingent upon the level of a third variable, the moderator. The analysis was executed using Hayes' PROCESS macro (Model 1) within SPSS, and a bootstrapping procedure with 5000 resamples was employed to ensure robust estimates of the effects and their confidence intervals.

The Hayes PROCESS macro [57] was selected for this study's moderation analysis due to its robust capability for observed variable modelling. This tool employs Ordinary Least Squares (OLS) regression to estimate path coefficients, standard errors, t-values, p-values, and confidence intervals, which aligned perfectly with the research design's focus on examining direct relationships between observed constructs. While acknowledging the PROCESS macro's limitation regarding missing data handling, this was not pertinent to the current study as the dataset was complete. Ultimately, its straightforward applicability to observed variable modelling rendered it a suitable analytical tool for this research.

Results

The description and demographics of the data is depicted in the Table 1. It has been found that 319 (61.9%) responses are from male respondents which shows that they actively participated in the survey. 29.3% students are from technical courses like computer science and electronics while 70.7% are from diverse non-tech background. This inclusive approach allows for a comprehensive understanding of digital proficiency and comfort levels across various disciplines.

The findings of the survey further highlight a skewed participation of 62.5% from urban areas in comparison to 37.5% from rural regions. This disparity underscores the differential access to digital resources, technologies, and opportunities between urban and rural populations, signalling potential areas for targeted interventions to

bridge the digital divide and enhance digital engagement across diverse socio-economic contexts.

We collectively refer the students of first and second year as Juniors and students of third and fourth year as Seniors. The survey demonstrates predominant participation of Juniors with participation percentages of 70.1% compared to Seniors with 29.9%. Further, students having more than one device (49.1%) and those having only one device (50.9%) respectively are considered to be equally competent.

Table 1: Profile of Respondents

	Category	Frequency	Percentage
Gender	Female	196	38.1
	Male	319	61.9
Course	Non-Tech	364	70.7
	Tech	151	29.3
Area	Rural	193	37.5
	Urban	322	62.5
Year of Study	Junior	361	70.1
	Senior	154	29.9
No. of Devices	More than one	253	49.1
	One	262	50.9

Source: Primary Data

The Digital Scale

A Digital scale was developed to determine the digital influence levels of the college students. There are 23 items in the scale, of which 5 belong to the "Digital Knowledge" factor, 5 to the "Digital Confidence" factor, 8 to the "Digital Skills" factor and finally 5 to the "Digital Influence" factor. The digital influence scale has a 5-point Likert scale, the participants were asked to choose one of the 5 choices, namely 1 Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree. The choices are given scores of 1, 2, ... 5 respectively. Instead of having a total average score from the scale, a total average score of each sub-division is calculated and the level of digital influence is assessed based on sub-divisions.

Reliability of the scale

To find the reliability of the scale, Cronbach α (internal consistency coefficient) is calculated. It was found to be 0.948 for the whole scale (23 items), 0.817 for digital knowledge (5 items), 0.829 for digital confidence (5 items), 0.878 for digital skills (8 items) and 0.863 for digital influence (5 items) respectively. It is established that a Cronbach α above 0.70 or higher indicates that the testing instrument is reliable [58].

Descriptive Analysis

Table 2 shows the descriptive statistics of four variables digital knowledge (DK), digital confidence (DC), digital skills (DS) and digital influence (DI). It is vindicated by the mean values around 4 that the respondents of the College have high levels of digital knowledge, digital confidence, digital skills and digital influence. It is also found that the standard deviations are relatively similar and moderate, suggesting a reasonable amount of variability in scores.

Table 2: Descriptive Statistics

Variable	Mean	Std. Deviation
DK	3.9150	.74006
DC	3.8225	.73836
DS	3.8357	.67857
DI	3.9219	.75900

Varying Digital Levels according to demographics

An analysis of Digital Scale reveals significant demographic variations in Table 3. The female students exhibit greater digital knowledge and confidence than male counterparts, though no gender difference was found in digital skills or overall influence ($p = 0.262$, $p = 0.211$). Tech students consistently outperform non-tech students across all digital influence facets. The reason behind this result could be that tech students delve more deeply into technical aspects of their subjects and quickly learn digital skills via practical applications. College students from urban areas demonstrate superior digital knowledge, confidence, skills, and influence in comparison to their rural counterparts. Rural students might have weaker foundation due to pre-college background and socio-economic factors leading to limited exposure to digital tools. Lower exposure can lead to lower confidence in using technology, potentially hindering a rural student's motivation to explore digital tools. Juniors possess significantly higher digital knowledge ($p = 0.034$) and skills ($p = 0.050$) than Seniors, with a marginal lead in digital confidence ($p = 0.099$), but no significant difference in overall influence ($p = 0.135$). Crucially, individuals using multiple devices exhibit significantly higher scores in all digital influence sub-divisions ($p = 0.00$), highlighting the positive impact of diverse digital exposure. Managing multiple devices requires individuals to learn and adapt to different operating systems and interfaces. This process can enhance problem-solving skills and digital adaptability.

Table 3: Students' Digital Influence Levels according to demographics

Category	Variable	Group	Mean	t-value	Sig. (p)
Gender	DK	Female	4.0122	-2.521	0.012**
		Male	3.8552		
	DC	Female	3.939	-1.849	0.065*
		Male	3.7787		
	DS	Female	3.8903	-1.123	0.262
		Male	3.8197		
	DI	Female	3.9735	-1.253	0.211
		Male	3.8763		
Course	DK	Tech	4.0861	3.886	0.00***
		Non-Tech	3.844		
	DC	Tech	3.9437	2.741	0.00***
		Non-Tech	3.7943		
	DS	Tech	3.9843	3.62	0.06*
		Non-Tech	3.774		
	DI	Tech	4.0927	3.781	0.00***
		Non-Tech	3.8511		
Area	DK	Urban	4.0752	6.102	0.00***
		Rural	3.6477		
	DC	Urban	3.9752	5.742	0.00***
		Rural	3.5679		
	DS	Urban	3.9903	6.476	0.00***
		Rural	3.5777		
	DI	Urban	4.0907	6.211	0.00***
		Rural	3.6404		
Year of Study	DK	Junior	3.9618	2.137	0.034**
		Senior	3.8052		
	DC	Junior	3.8576	1.654	0.099*
		Senior	3.7403		
	DS	Junior	3.8764	1.969	0.050**
		Senior	3.7403		
	DI	Junior	3.9546	1.495	0.135
		Senior	3.8455		
No. of Devices	DK	More than one	4.0861	-5.261	0.00***
		One	3.7511		
	DC	More than one	3.9573	-4.157	0.00***
		One	3.6924		
	DS	More than one	3.9872	-5.124	0.00***
		One	3.6894		
	DI	More than one	4.0609	-4.157	0.00***
		One	3.7878		

*** Significance at 1%

**Significance at 5%

*Significance at 10%

Correlation Analysis

To investigate the relationships between DK, DC, DS, and DI, Karl Pearson’s Correlation coefficient was employed. As presented in Table 4, a significant positive correlation was observed across all independent variables (DK, DC, DS) and the dependent variable (DI). These findings indicate that enhanced levels of digital knowledge, confidence, and skills are significantly associated with a greater degree of digital influence.

Table 4: Correlation between independent and dependent variables

Variable	DK	DC	DS	DI
DK	1			
DC	.736***	1		
DS	.737***	.802***	1	
DI	.670***	.703***	.721***	1

*** Significance at 1%

Regression Analysis

A multiple linear regression analysis (MLR) is conducted to ascertain the relationship between DI (dependent variable) and DK, DC, and DS as independent variables.

The results tabulated in Table 5 demonstrates a strong positive relationship, evidenced by a multiple correlation coefficient (R) of 0.764. The coefficient of determination (R²) was 0.583, indicating that 58.3% of the variance in Digital Influence can be collectively explained by DK, DC, and DS. The standard error of the estimate, at 0.49157, suggests a relatively good model fit.

In Table 5, significant F-statistic of 238.134 (p<0.001) confirms that at least one predictor significantly influences Digital Influence. Further examination of the coefficients reveals that DK, DC, and DS are all highly significant predictors of DI (p < 0.001 for all). Specifically, the unstandardized coefficients are: DK (B = 0.227), DC (B = 0.265), and DS (B = 0.393). The standardized beta coefficients indicate that DS (Beta = 0.351) had the strongest predictive power, followed by DC (Beta = 0.258) and DK (Beta = 0.221). Multicollinearity assessment, using Tolerance and VIF statistics, shows values well within acceptable ranges (Tolerance: 0.398–0.309; VIF: 2.514–3.233), confirming the absence of significant multicollinearity and allowing for confident interpretation of individual predictor effects. These findings support the utility of this regression model for predicting college students’ digital influence based on their digital knowledge, confidence, and skills.

Table 5: Model Summary for MLR

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764 ^a	.583	.581	.49157

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	172.626	3	57.542	238.134	.000 ^b
	Residual	123.476	511	.242		
	Total	296.102	514			

Coefficients^a

Model B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	Std. Error	Beta				VIF		
1	(Constant)	.513	.130		3.943	.000		
	DK	.227	.046	.221	4.890	.000	.398	2.514
	DC	.265	.053	.258	5.027	.000	.310	3.224
	DS	.393	.057	.351	6.837	.000	.309	3.233

a. Dependent Variable: DI

Moderation Analysis using Hayes Process Macro (OLS) and its Results

While multiple linear regression effectively identifies the direct contributions of independent variables (Digital Knowledge, Digital Confidence, and Digital Skills) to the dependent variable (Digital Influence), it does not reveal how these relationships might change under different

conditions. A subsequent moderation analysis is thus conducted to explore if the effect of these relationships varied based on the level of a third variable. This allowed for a more nuanced understanding of the complex interplay among the digital engagement factors and digital influence. This would provide crucial insights into the boundary conditions of these observed relationships.

Table 6: Model Summary –

Case 1: Moderator DC, DK □ DI

Case 2: Moderator DK, DC □ DI

R	R-squared	MSE	F	df1	df2	p
0.7406	0.5484	0.2617	206.8654	3	511	0
Predictor	Coefficient (SE)		CI			
Constant	1.4367(0.3479)**		[0.7533, 2.1202]			
DK	0.1468(0.107)		[-0.0635, 0.3571]			
DC	0.2725(0.1079)**		[0.0605, 0.4845]			
DK × DC	0.0565(0.0281)*		[0.0014, 0.1117]			

Case 1: Conditional effects at values of moderator (DC)			Case 2: Conditional effects at values of moderator (DK)		
DC	Effect (SE)	CI	DK	Effect (SE)	CI
3.2	0.3277(0.0456)**	[0.2381, 0.4173]	3.4	0.4647(0.0452)**	[0.3759, 0.5536]
4	0.3729(0.0476)**	[0.2795, 0.4664]	4	0.4987(0.0474)**	[0.4056, 0.5917]
4.4	0.3955(0.0523)**	[0.2929, 0.4982]	4.6	0.5326(0.0549)**	[0.4248, 0.6404]

**Significance at 5%

*Significance at 10%

The model summary in Table 6 explains a substantial portion (54.84%) of the variance in DI, indicating a good fit. The interaction term (DK x DC) is statistically significant and positive, confirming the moderation effect. The two cases of conditional effects of Moderator are as follows:

Case 1: DC (Moderator), DK (Independent Variable)

DC (the moderator) significantly impacts the relationship between DK (independent variable) and DI (dependent variable). Interestingly, the direct effect of DK on DI, without considering the moderating influence of DC, is not statistically significant in this model (b = 0.1468, p > 0.05). However, when we examine the conditional effects at different levels of DC, we see that at low, medium, and

high levels of DC, DK *does* significantly affect DI, and this effect is notably larger when DC is high.

Efforts to increase digital influence should focus not only on improving digital knowledge but also on bolstering digital confidence. This could involve providing supportive environments, encouraging experimentation, and celebrating small successes. The lack of a significant direct effect of DK suggests that simply increasing digital knowledge alone may not be sufficient to enhance digital influence. Instead, interventions aimed at increasing digital knowledge will be most effective when targeted at individuals with higher levels of digital confidence, as evidenced by the significant conditional effects.

Case 2: DK (Moderator), DC (Independent Variable)

DK (the moderator) significantly impacts the relationship between DC (independent variable) and DI (dependent variable). DC significantly affects DI at low, medium, and high levels of DK, and the effect is strongest when DK is high. In contrast to DC, the direct effect of DK on DI is not statistically significant in the overall model ($b = 0.1468, p > 0.05$), indicating that by itself, digital knowledge doesn't reliably predict digital influence in this analysis.

Individuals or groups with higher digital knowledge will see a greater return on investment from efforts to boost digital confidence. In educational settings, students with strong digital knowledge will be more likely to

leverage their digital confidence to participate in online discussions or create digital projects. This highlights that while digital confidence has a direct impact on digital influence (as shown by the significant direct effect of DC), the impact of boosting digital confidence is amplified for those who already possess higher levels of digital knowledge.

This implies that when students possess both strong digital knowledge and high digital confidence, their digital influence is significantly enhanced. Hence, efforts to increase digital influence should focus on developing both digital confidence and digital knowledge, recognizing that the impact of one may depend on the level of the other.

**Table 7: Model Summary –
Case 1: Moderator DC, DS □ DI
Case 2: Moderator DS, DC □ DI**

R	R-squared	MSE	F	df1	df2	p
0.7517	0.5651	0.2520	221.3426	3	511	0

Predictor	Coefficient (SE)	CI
Constant	1.1241(0.3607)**	[0.4155, 1.8328]
DC	0.2251(0.1080)*	[0.0129, 0.4374]
DS	0.3500(0.1179)**	[0.1183, 0.5816]
DC × DS	0.0395(0.0285)	[-0.0165, 0.0955]

**Significance at 5%

*Significance at 10%

The model summary in Table 7 explains a substantial portion (56.51%) of the variance in DI, indicating a good fit. DS does *not* significantly moderate the relationship between DC and DI and DC does not moderate between DS and DI. The interaction term (DC × DS) is statistically insignificant.

Digital confidence (DC) and digital skills (DS) independently contribute to digital influence (DI). This means that improvements in either digital confidence or digital skills will likely lead to an increase in digital influence. Practical efforts should focus on directly improving digital skills through training, workshops, and hands-on experience and digital confidence by addressing psychological factors, such as self-efficacy.

Table 8: Model Summary

Case 1: Moderator DK, DS □ DI

Case 2: Moderator DS, DK □ DI

R	R-squared	MSE	F	df1	df2	P
0.7529	0.5669	0.2510	222.9598	3	511	0

Predictor	Coefficient (SE)	CI
Constant	1.3958(0.3813)**	[0.6467, 2.1449]
DS	0.3046(0.1193)**	[0.0702, 0.5389]
DK	0.0754(0.1110)	[-0.1427, 0.2935]
DS × DK	0.0691(0.0299)*	[0.0104, 0.1278]

Case 1: Conditional effects at values of moderator (DK)			Case 2: Conditional effects at values of moderator (DS)
DK	Effect (SE)	CI	DS
3.4	0.5394(0.0488)**	[0.4436, 0.6353]	3.3
4	0.5809(0.0493)**	[0.4840, 0.6777]	3.9
4.6	0.6223(0.0559)**	[0.5125, 0.7321]	4.5

**Significance at 5%

*Significance at 10%

The model summary in Table 8 as a whole explains 56.69% of the variance in digital influence, indicating a good fit. The interaction term (DS × DK) is statistically significant and positive, confirming the moderation effect. The two cases of conditional effects of Moderator are as follows:

Case 1: DK (Moderator), DS (Independent Variable)

The model shows a statistically significant moderation effect: higher digital knowledge strengthens the positive relationship between digital skill and digital influence. Specifically, as digital knowledge increases, the impact of digital skill on digital influence becomes more pronounced.

This implies that simply having digital skills is not enough; individuals need digital knowledge to maximize their influence. Students aiming to enhance digital influence should prioritize both digital skill development and digital knowledge acquisition.

The moderation effect may contribute to digital inequality. Those with lower digital knowledge may struggle to translate their digital skills into meaningful

influence. Efforts to bridge the digital divide must include initiatives to improve both digital skills and digital knowledge.

Case 2: DS (Moderator), DK (Independent Variable)

The model also shows a statistically significant moderation effect: higher digital skills strengthen the positive relationship between digital knowledge and digital influence. Specifically, as digital skills increase, the impact of digital knowledge on digital influence becomes more pronounced.

This implies that simply having digital knowledge is not enough; individuals need digital skills to effectively utilize that knowledge for maximizing their influence. Students aiming to enhance digital influence should prioritize both digital knowledge acquisition and digital skill development.

The moderation effect may contribute to digital inequality. Those with lower digital skills may struggle to translate their digital knowledge into meaningful influence. Efforts to bridge the digital divide must include initiatives to improve both digital knowledge and digital skills.

Discussion

The comprehensive analysis undertaken in this study critically enlightens the intricate and synergetic roles that digital knowledge, digital confidence, and, most significantly, digital skills collectively play in shaping the extent of digital influence among youth. The empirical evidence strongly places digital skills as the most impactful determinant within this dynamic, suggesting a crucial distinction. Also, a foundational comprehension of digital concepts and tools (digital knowledge) and a strong sense of self-assurance in navigating digital environments (digital confidence) are undeniably valuable contributing factors to an individual's online presence. It is the tangible, practical ability to effectively utilize, manipulate, and navigate various digital tools and platforms that holds foremost importance in an individual's capacity to genuinely exert influence within the vast and continually evolving digital landscape. This pivotal insight carries profound implications for contemporary educational paradigms, necessitating that future pedagogical interventions be meticulously and strategically designed to prioritize the holistic and integrated development of these multifaceted competencies. This imperative extends significantly beyond the traditional confines of mere theoretical instruction, demanding a pedagogical shift towards fostering active, immersive, and hands-on learning experiences specifically engineered to cultivate robust, adaptable, and highly functional digital skills. Such a deliberate and concentrated focus on practical skill-building will significantly enhance students' technical proficiency and mastery of digital tools. It will also substantially bolster their overall digital engagement, fostering a proactive and participative mindset. This enables them to interact more actively, critically, and effectively within an increasingly interconnected and digitally driven global society. This elevated level of digital engagement and effectiveness is not merely an academic ideal but represents a crucial prerequisite for adequately preparing students to not only succeed but truly thrive in their future academic pursuits, navigate the complexities of professional careers. They are increasingly reliant on digital fluency, and ultimately emerge as informed, engaged, and active citizens capable of contributing meaningfully to democratic processes and societal progress in the digital age.

The robustness of the statistical model employed in this study provides compelling validation for its findings and underscores its reliable predictive utility. This reliability is empirically demonstrated by several key indicators: a high multiple correlation coefficient, signifying a strong collective relationship between the identified digital competencies and the outcome of digital influence; a

substantial coefficient of determination, which confirms that a significant proportion of the variance in digital influence can be robustly explained by the predictive variables; a commendably low standard error of the estimate, attesting to the precision and accuracy of the model's predictions; and, crucially, the confirmed absence of significant multicollinearity among the predictor variables, which ensures the independence and distinct explanatory power of each digital competency identified. This confluence of statistical strengths unequivocally positions the model as a highly valuable and data-backed framework for intelligently guiding future curriculum development and informing evidence-based educational policy. By precisely identifying the specific digital competencies that most powerfully predict an individual's capacity for influence, educators and policymakers are now equipped with actionable insights. This enables them to design highly targeted educational programs that directly address the most impactful areas, allocate precious educational resources with maximum efficiency to areas yielding the greatest return, and establish clear, measurable learning objectives that facilitate systematic progress. This rigorous, data-driven approach guarantees that educational initiatives are not only profoundly relevant to the dynamic demands of the modern world but also maximally effective in fostering the essential digital capabilities indispensable for achieving sustained success and meaningful participation in the 21st century and beyond.

Conclusion

The comprehensive analysis of college students' digital behavior reveals a multifaceted understanding of Digital Influence (DI), its determinants, and implications for higher education. A high mean score on the Digital Influence scale, encompassing digital Knowledge (DK), Digital Confidence (DC), Digital Skill (DS), and Digital Influence, suggests that students generally possess a strong grasp of technology. This proficiency is a significant asset, as robust digital skills are strongly linked to improved academic performance through efficient information access, effective use of digital tools, and seamless online communication. The moderate standard deviation observed in scores indicates a healthy level of heterogeneity within the student body, underscoring the necessity for differentiated instruction and support to cater to diverse learning needs, ensuring that while most students are digitally adept, those requiring additional assistance receive it.

Furthermore, the study highlights critical demographic disparities in digital proficiency. While females exhibit higher digital knowledge and confidence, this does not

consistently translate into superior digital skills and influence, emphasizing the need for targeted educational interventions to foster equitable development of these aspects across genders. Unsurprisingly, tech students demonstrate a clear advantage, advocating for the integration of digital literacy and practical applications into all academic curricula, not just technical ones, to bridge this digital gap. The significant digital divide between urban and rural students necessitates focused interventions, including investments in infrastructure development, enhanced technology access, and robust digital literacy programs to empower rural student populations. Socio-economic factors contributing to limited exposure must also be addressed to ensure equitable opportunities. The finding that juniors exhibit higher Digital Influence suggests the efficacy of modern educational approaches, yet a potential decline in digital engagement or skill development among seniors warrants further investigation. This could be attributed to seniors focusing on highly specialized skills relevant to their career paths, potentially narrowing their broader digital engagement. The strong correlation between multiple device usage and Digital Influence underscores the importance of providing students with access to a variety of digital tools, promoting diverse digital experiences, and fostering greater digital adaptability.

The interconnectedness of digital knowledge, confidence, and skills is evident, as they are all strongly and positively correlated with Digital Influence and with each other. This strong correlation validates the use of regression analysis to predict student digital influence based on these combined factors. The regression analysis further reveals that all three variables—digital knowledge, digital confidence, and digital skills—positively impact Digital Influence. Crucially, Digital Skills emerge as the most significant predictor, indicating its strongest and most statistically relevant impact on Digital Influence. This implies that while knowledge and confidence are important, the practical ability to effectively use technology is the most critical factor for students to exert digital influence. Practical skills translate directly into influence, empowering students to navigate digital tools and services, and mastering these skills can also build confidence, reinforcing a sense of empowerment.

Insights from the PROCESS macro analyses illuminate the synergistic effect of DK, DC, and DS on DI. When students possess a combination of high digital knowledge and either high confidence or high skills, their digital influence is significantly amplified. This underscores that knowledge alone is insufficient; it must be coupled with confidence and practical abilities. Digital knowledge also plays a crucial moderating role, suggesting that a strong foundational understanding is essential for leveraging

confidence and skills to achieve digital influence. Digital confidence and digital skills further act as amplifiers for the relationship between digital knowledge and digital influence, meaning knowledgeable students who are also confident or skilled are more likely to exert digital influence. However, the direct impact of Digital Knowledge on Digital Influence is insignificant, reinforcing that knowledge alone is not sufficient. The absence of moderation between DC and DS implies that these two factors operate more independently in their relationship with digital influence, indicating that they can be developed independently. Therefore, to cultivate a fair and inclusive educational landscape, higher education institutions must prioritize Digital Influence by moving beyond mere access and implementing targeted interventions that address disparities in digital literacy and skills. This includes raising awareness, making technology affordable, and providing comprehensive training to enable all students to meaningfully contribute to the information society and build a sustainable, knowledge-based future.

We recommend that colleges can play a crucial role in bridging the gap between rural/urban and junior/senior students by providing needy students more support and time to catch up on foundational digital skills compared to their tech savvy peers. For achieving this, we are recommending *BAMC* strategy which is outlined below:

1. **Bridge Programs (B)** - Many learning materials and resources are now online so the college can offer introductory workshops or courses to equip students with basic digital skills. For this some *Bridge Programs* can be specially designed.
2. **Devices Accessibility (A)** - Providing an inclusive learning environment which ensures course material is accessible both online and offline, catering to students with varying levels of access. The colleges shall consider providing *Devices* or subsidized Internet plans to bridge the access gap for students in need.
3. **Mentorship Programs (M)** - A *Peer Mentorship Programs* shall be initiated to connect tech-savvy students from both backgrounds to support and guide each other. Programs that target specific needs of different disciplines can help them develop specialized digital competencies.
4. **Competence Development (C)** - According to regression (MLR) equation, the impact of Digital Competence is most significant on Digital Influence. This information can be valuable in designing educational programs. While fostering awareness and motivation are important, it might be especially crucial to focus on developing strong digital

competencies in students to maximize their Digital Influence. By fostering a culture of continuous learning and skill development, universities can ensure rural/urban and junior/senior students leverage technology effectively for academic success.

The proposed study has some limitations too which need to be addressed in future. It includes expanding sample sizes, using diverse demographics, and explore technology usage beyond basic awareness through in-depth interviews and comparative analyses. Investigating the interplay of knowledge, confidence, and skills, along with the impact of emerging technologies and access disparities, will further refine understanding and inform educational practices for a digitally empowered student body.

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