

Digital Well-being and Sustainable Academic Performance among University Students: A Self-Determination Theory Perspective

Kriti Nepal

BBS, Shanker Dev Campus

Suman Kamal Prajuli*

Faculty of Management, Tribhuvan University, Nepal

sumankparajuli934@gmail.com

<https://orcid.org/0009-0007-7305-2580>

Corresponding Author*

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Abstract

Digital technology is transforming higher education, but its benefits depend on students' meaningful engagement. Guided by Self-Determination Theory (SDT), this study examines the effects of autonomy, competence, and relatedness on sustainable academic performance. Using a positivist philosophy and descriptive-causal research design, data were collected from 200 students at three Tribhuvan University-affiliated campuses. Descriptive statistics, Kendall's tau-b correlation, and multiple linear regression were used for analysis. The findings show that autonomy, competence, and relatedness significantly and positively influence sustainable academic performance, explaining 33.7% of its variance. Autonomy was the strongest predictor. The results suggest that students' self-directed use of digital learning technologies and AI-supported tools enhances sustainable academic performance by satisfying their basic psychological needs.

Keywords: digital well-being, self-determination theory, autonomy, competence, relatedness, sustainable academic performance, university students

Introduction

Digital technology is now woven into nearly every dimension of university education. Learning management systems, video-conferencing platforms, cloud storage, and increasingly, generative artificial intelligence tools have transformed how students access learning materials, communicate with instructors and peers, and complete academic tasks (Antonopoulou et al., 2023). This transformation raises an important question: does the increasing use of digital tools automatically translate into improved learning outcomes, or does it depend on how students

engage with these tools? A growing body of research suggests that the benefits of digital technology for learning are conditional on the psychological quality of engagement, that is, on whether students use technology in ways that support their sense of choice, capability, and connection, rather than merely on the volume or frequency of use (Harverson et al., 2025; Neagu & Vieriu, 2025).

Digital well-being refers to the balanced, purposeful, and healthy use of digital technology in a manner that supports rather than undermines an individual's psychological and functional needs (Cao & Li, 2023). When applied to an academic context, digital well-being implies that students are able to use digital learning tools in ways that feel self-directed, that build genuine competence, and that strengthen their connection with teachers and classmates, rather than experiencing digital fatigue, distraction, or dependency (Song et al., 2022). Sustainable academic performance, in turn, refers to academic outcomes, such as timely assignment completion, improved grades, sustained motivation, and long-term academic success that are achieved in a manner that can be maintained over time without compromising the student's well-being (Fu et al., 2025).

Self-Determination Theory (SDT), developed by Deci and Ryan, offers a useful theoretical lens for understanding this relationship. SDT posits that human motivation and well-being are shaped by the satisfaction of three basic psychological needs: autonomy (the need to feel volitional and self-directed), competence (the need to feel effective and capable), and relatedness (the need to feel connected to others). When these needs are satisfied in a learning context, students are more likely to be intrinsically motivated, engaged, and academically successful in a sustainable manner. This study applies the SDT framework to the specific context of digital learning among university students affiliated with Tribhuvan University (TU), Nepal, in order to examine whether and how autonomy, competence, and relatedness in digital learning relate to sustainable academic performance.

Literature Review

Self-Determination Theory

Self-Determination Theory conceptualises human motivation along a continuum ranging from controlled to autonomous forms of regulation, and holds that autonomous, intrinsically motivated behaviour is fostered when the basic psychological needs of autonomy, competence, and relatedness are satisfied (Manninen et al., 2022). In educational settings, SDT has been widely used to explain variation in student engagement, persistence, and achievement, on the premise that learning environments (including digital ones) that support these three needs tend to produce more sustained and higher-quality learning outcomes than environments that merely impose external control or rewards.

Digital Well-being in Academic Contexts

Digital well-being has emerged as a construct of growing interest as universities have adopted blended and online modes of instruction. Rather than treating digital technology use as inherently beneficial or harmful, the digital well-being literature emphasises the manner and psychological quality of use: whether it is chosen freely, whether it builds skill and confidence, and whether it fosters or erodes social connection (Khadka et al., 2025; Neagu & Vieriu, 2025). This framing aligns closely with SDT and suggests that digital tools such as learning

management systems, videoconferencing platforms, collaborative document tools, and AI-based assistants can support academic functioning when their use satisfies students' psychological needs.

Sustainable Academic Performance

Sustainable academic performance extends the traditional notion of academic achievement (grades, test scores) to include the durability and healthiness of the processes that produce those outcomes, such as consistent assignment completion, sustained motivation, and long-term academic success rather than short-term or unsustainable spikes in performance driven by stress or external pressure (Parajuli et al., 2023; Rožman et al., 2025). Within a digital learning context, sustainability implies that students' use of technology supports, rather than undermines, their capacity to keep performing well over time.

Autonomy, Competence, Relatedness, and Academic Performance

Prior SDT-informed research consistently links autonomy support with higher intrinsic motivation and academic persistence, since students who feel they can choose how and when to engage with learning technology tend to invest more effort and show greater self-regulation. Competence, reflecting students' confidence and skill in using digital tools, has similarly been linked to reduced technology-related anxiety and more effective task completion. Relatedness, referring to the sense of connection fostered through digital communication with teachers and peers, has been associated with reduced feelings of isolation in online and blended learning and with stronger collaborative learning outcomes (Mishra et al., 2021; Ntoumanis & Moller, 2025). Taken together, the literature suggests that all three needs are likely to be positively associated with sustainable academic performance, though their relative strength may vary across contexts.

Conceptual Framework

Based on the theoretical and empirical literature reviewed above, this study proposes that autonomy, competence, and relatedness (the three basic psychological needs underlying digital well-being) act as independent variables that jointly and individually predict sustainable academic performance, the dependent variable. The following hypotheses were tested:

H1: Autonomy in digital learning is positively associated with sustainable academic performance.

H2: Competence in digital learning is positively associated with sustainable academic performance.

H3: Relatedness in digital learning is positively associated with sustainable academic performance.

H4: Autonomy, competence, and relatedness jointly and significantly predict sustainable academic performance.

Objectives of the Study

1. To assess university students' perception of autonomy, competence, and relatedness in their use of digital learning technologies.
2. To examine the relationship between digital well-being (autonomy, competence, relatedness) and sustainable academic performance among university students.
3. To evaluate the extent to which autonomy, competence, and relatedness predict sustainable academic performance.

Research Methodology

Research Philosophy and Design

This study adopted a positivist research philosophy, which is consistent with its aim of testing theory-derived hypotheses using quantitative, numerical data. A descriptive-cum-causal (explanatory) research design was employed: the descriptive component profiles students' perceptions of autonomy, competence, relatedness, and sustainable academic performance, while the causal component examines the predictive relationship of the three SDT dimensions on academic performance.

Population and Sample

The population for this study comprised university students enrolled in Tribhuvan University (TU)-affiliated campuses; Shanker Dev Campus, Peoples Campus and Nepal Commerce Campus. A sample of 200 respondents was drawn from three TU-affiliated campuses using a convenience sampling technique, reflecting practical constraints on access while ensuring a reasonably diverse student sample in terms of gender, age, and level of study.

Data Collection Instrument

Data were collected using a structured, self-administered questionnaire comprising five sections. Section A measured Autonomy (learning freedom) through five items; Section B measured Competence (digital learning skills) through five items; Section C measured Relatedness (learning support) through five items; and Section D measured Sustainable Academic Performance through six items. All items were measured on a Likert-type scale. The instrument covered a range of digital learning technologies including TUCL, Microsoft Teams, Zoom, Google Meet, WhatsApp, YouTube, Google Drive, ChatGPT, Microsoft Copilot, Google Gemini, educational websites, and digital libraries. The full questionnaire is provided in the Appendix.

Data Analysis Tools

Data were analysed using descriptive statistics (mean, standard deviation, frequency, percentage) to profile the sample and summarise perceptions, Kendall's tau-b correlation coefficient to examine the strength and direction of association between variables, and multiple linear regression to test the combined and individual predictive power of autonomy, competence, and relatedness on sustainable academic performance.

Ethical Considerations

Participation in the study was voluntary, informed consent was obtained from all respondents prior to data collection, and the privacy and confidentiality of respondents' data were maintained throughout the research process.

Results and Analysis

Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the 200 respondents in terms of gender, age, and level of education.

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency	Percent
Gender	Male	71	35.0
	Female	129	64.5
Age	20-25 years	169	84.5

	26-30 years	29	14.5
	31 and above	2	1.0
Level of Education	Bachelor	136	68.0
	Master's degree	64	32.0

The sample was predominantly female (64.5 percent) and concentrated in the 20-25 year age group (84.5 percent), with the majority pursuing a Bachelor's degree (68.0 percent). This profile is broadly consistent with the typical demographic composition of undergraduate-heavy TU-affiliated campuses.

Descriptive Statistics: Digital Well-being and Sustainable Academic Performance

Table 2 presents the descriptive statistics for the four core study variables.

Table 2: Descriptive Statistics

Variable	N	Min	Max	Mean	Std. Dev.
Autonomy	200	2.80	5.00	4.4050	.47551
Competence	200	2.40	5.00	4.3540	.55264
Relatedness	200	2.00	5.00	4.4160	.54482
Sustainable Academic Performance	200	2.67	5.00	4.3392	.42414

All four variables recorded high mean scores (above 4.3 on the measurement scale), indicating generally favourable perceptions among respondents. Relatedness recorded the highest mean (4.42 ± 0.54), suggesting that students most strongly agreed that digital technologies help them communicate and collaborate with teachers and classmates. Autonomy (4.41 ± 0.48) and Competence (4.35 ± 0.55) followed closely, indicating that students generally felt free to manage their own digital learning and confident in their digital learning skills. Sustainable Academic Performance recorded a mean of 4.34 ± 0.42 , the lowest standard deviation among the four variables, suggesting relatively consistent agreement among respondents that digital learning technologies support their academic outcomes.

Correlation Analysis

Kendall's tau-b correlation coefficients were computed to examine the association between autonomy, competence, relatedness, and sustainable academic performance. Results are presented in Table 3.

Table 3: Correlation Matrix (Kendall's tau-b)

Variable	Autonomy	Competence	Relatedness	SAcademicP
Autonomy	1.000	.350**	.384**	.298**
Competence	.350**	1.000	.388**	.280**
Relatedness	.384**	.388**	1.000	.277**
Sustainable Academic Performance	.298**	.280**	.277**	1.000

Note: ** Correlation is significant at the 0.01 level (2-tailed).

All three SDT dimensions were positively and significantly correlated with sustainable academic performance at the 0.01 level: autonomy ($\tau = .298$, $p < .01$), competence ($\tau = .280$, $p < .01$), and relatedness ($\tau = .277$, $p < .01$). The inter-correlations among the three predictor variables (ranging from .350 to .388) were moderate, indicating that while the constructs are related, they remain sufficiently distinct to be examined as separate predictors of academic performance.

Regression Analysis

A multiple linear regression analysis was conducted to assess the combined and individual predictive power of autonomy, competence, and relatedness on sustainable academic performance. Table 4 presents the model summary.

Table 4: Model Summary

Model	R	R Square	Adj. R Square	Std. Error	Durbin-Watson
1	.580	.337	.327	.34804	2.042

The model yielded an R value of .580 and an R Square of .337, indicating that autonomy, competence, and relatedness jointly explain approximately 33.7 percent of the variance in sustainable academic performance (Adjusted R Square = .327). The Durbin-Watson statistic of 2.042 indicates no significant autocorrelation among residuals, supporting the appropriateness of the regression model.

Table 5: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.057	3	4.019	33.180	.000
Residual	23.741	196	.121		
Total	35.799	199			

The ANOVA results confirm that the overall regression model is statistically significant ($F(3,196) = 33.180, p < .001$), indicating that the combination of autonomy, competence, and relatedness significantly predicts sustainable academic performance.

Table 6: Regression Coefficients

Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	1.831	.253	-	7.243	.000	-	-
Autonomy	.295	.064	.331	4.611	.000	.657	1.522
Competence	.142	.059	.185	2.407	.017	.572	1.747
Relatedness	.134	.062	.172	2.155	.032	.534	1.873

All three predictors made a statistically significant, unique contribution to sustainable academic performance. Autonomy was the strongest predictor ($\beta = .331, p < .001$), followed by competence ($\beta = .185, p = .017$) and relatedness ($\beta = .172, p = .032$). Tolerance values (ranging from .534 to .657) and VIF values (ranging from 1.522 to 1.873), all well within acceptable thresholds, indicate that multicollinearity is not a concern in this model. Based on these results, hypotheses H1, H2, H3, and H4 are all supported.

Discussion

The findings of this study affirm the applicability of Self-Determination Theory to the digital learning context of university students. Consistent with SDT's core proposition, satisfaction of the basic psychological needs for autonomy, competence, and relatedness through digital learning technologies was significantly and positively associated with sustainable academic performance. Notably, autonomy emerged as the strongest predictor, suggesting that students' sense of freedom and self-direction in choosing how, when, and which digital tools to use for learning matters more, in this sample, than either their technical skill (competence) or their sense of social connection (relatedness). This is consistent with SDT's broader emphasis on autonomy as a central driver of intrinsic motivation and sustained engagement.

The relatively high mean score for relatedness suggests that students perceive digital tools such as Microsoft Teams, Zoom, Google Meet, and WhatsApp as effective channels for maintaining

academic communication and collaboration with teachers and peers, even outside the traditional classroom setting. At the same time, the comparatively smaller (though still significant) beta coefficient for relatedness in the regression model indicates that while social connectedness matters, it is a less powerful driver of sustainable performance than the sense of autonomous control over one's own learning process.

The moderate explanatory power of the model ($R^2 = .337$) suggests that while autonomy, competence, and relatedness are important, a substantial portion of variance in sustainable academic performance is explained by other factors not captured in this model, such as institutional support, quality of internet infrastructure, socio-economic background, or individual differences in self-regulation and digital literacy. This points to the need for a more comprehensive model in future research.

Conclusion

This study examined the relationship between digital well-being, framed through the lens of Self-Determination Theory, and sustainable academic performance among 200 university students from TU-affiliated campuses. The findings demonstrate that autonomy, competence, and relatedness in digital learning are all positively and significantly associated with sustainable academic performance, both individually and jointly, with autonomy exerting the strongest influence. These results underscore the importance of designing digital learning environments and institutional practices that support students' sense of choice, build their technological competence, and foster meaningful connection with teachers and peers, rather than focusing solely on technology access or adoption rates. Ensuring that digital learning technologies satisfy these basic psychological needs appears to be central to translating digital engagement into sustainable, rather than short-term or superficial, academic performance gains.

Implications

For students, the findings suggest that exercising greater self-direction and choice in how digital tools are used for learning, rather than passive or compelled use, can support better and more sustainable academic outcomes. For educators and university administrators, the results imply that digital learning initiatives should be designed to maximise students' autonomy (for example, offering flexible tool choices and self-paced options), build competence (through digital literacy training and technical support), and strengthen relatedness (through structured opportunities for online interaction and collaboration), rather than treating technology adoption as an end in itself. For policymakers, the findings support investment not only in digital infrastructure but in pedagogical and support structures that help students use that infrastructure in psychologically need-supportive ways.

Limitations and Directions for Future Research

This study is subject to several limitations. First, the use of convenience sampling limits the generalisability of the findings beyond the three TU-affiliated campuses studied. Second, the cross-sectional design captures perceptions at a single point in time and cannot establish causal direction between digital well-being and academic performance. Third, the reliance on self-reported data introduces the possibility of common method bias and social desirability effects. Future research could employ probability sampling across a broader range of institutions, adopt

longitudinal designs to examine causal and developmental relationships, and incorporate objective performance measures (such as actual grades) alongside self-reported perceptions. Future studies might also examine additional variables, such as institutional support, digital infrastructure quality, and individual self-regulation, to build a more comprehensive explanatory model of sustainable academic performance in digital learning environments.

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Data availability

All data will be provided with a reasonable request to the corresponding author.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Appendix: Survey Questionnaire

Digital learning technologies referred to in this questionnaire include TUCL, Microsoft Teams, Zoom, Google Meet, WhatsApp, YouTube, Google Drive, ChatGPT, Microsoft Copilot, Google Gemini, educational websites, digital libraries, and other online learning tools used for university study.

Section A: Autonomy (Learning Freedom)

1. I can choose how to use digital tools for my studies.
2. I decide when to use digital resources for learning.
3. I choose digital learning methods that suit me.
4. I use digital tools to improve my learning.
5. I feel free to manage my online learning.

Section B: Competence (Digital Learning Skills)

1. I can use online learning platforms confidently.
2. I can find learning materials using digital technology.
3. I can complete my assignments using digital tools.
4. I can solve simple problems while using learning technology.
5. I can learn new educational technologies easily.

Section C: Relatedness (Learning Support)

1. Digital technology helps me communicate with my teachers.
2. Digital technology helps me learn with my classmates.
3. I receive learning support through online platforms.
4. I feel connected with my classmates during online learning.
5. I can easily discuss academic topics using digital tools.

Section D: Sustainable Academic Performance

1. Digital learning technologies help me complete my assignments on time.
2. Digital learning technologies improve my learning.
3. Digital learning technologies help me achieve better grades.
4. Digital learning technologies keep me motivated to study.
5. Digital learning technologies improve my academic performance.
6. Digital learning technologies support my long-term academic success.

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