



Usage of Digital Device and Social Media Engagement in Relation to Mathematics Achievement Among Ninth-Grade Students

Krishna Prasad Sharma Chapai^{ORCID}

Submission:

Apr 19, 2026

Acceptance:

May 15, 2026

Published:

Jun 30, 2026

Assistant Professor, Babai Multiple Campus, Gulariya, Mid-West University, Nepal

Author e-mail: krishnaprasad.chapai@mu.edu.np

<https://doi.org/10.66412/ed.v35i2.112>

Abstract

Usage of digital device and engagement in social media provide a remarkable opportunity for connecting students with a wider and more diverse range of learning resources. It has rapidly transformed the educational sector. This study aims to provide insights into the nuanced relationship between students' digital device usage, social media engagement, and their achievement in mathematics at grade nine. It adopts a cross-sectional research design with a quantitative approach. A multi-stage stratified proportionate sampling technique was used to obtain a representative sample. Consequently, 415 students were selected through proportionate allocation from Bardiya district, Nepal. Data were analyzed by t-test and one-way ANOVA. The findings reveal that personal device ownership, duration of use, and purpose of use were each significantly associated with mathematics achievement. It highlights the need to guide students toward purposeful use of digital devices, and managing time is necessary to enhance mathematics achievement.

Keywords: Digital device, grade nine, mathematics achievement, smartphone, social media

To cite this article:

Sharma Chapai, K.P. (2026). Usage of digital device and social media engagement in relation to mathematics achievement among ninth-grade students. *Education and Development*, 35(2). 61–68. <https://doi.org/10.66412/ed.v35i2.112>

Introduction

Digital device usage has rapidly transformed the educational sectors and made it easy for learners to get immediate access on information, fostering new educational approaches. Specifically, the growing use of computers, laptops, and smartphones has enabled people to access knowledge beyond traditional schools, extending learning opportunities (Lang & Šorgo, 2024). In today's classroom, digital devices serve as supplementary tools for educational resources in a modern learning environment. Social media platforms, such as WhatsApp, Instagram, TikTok, Facebook, and YouTube, also provide a remarkable opportunity for connecting students as an informal learning tool. Digital devices and social media both provide opportunities for accessing online resources, collaborative learning, educational applications, and educational information that can enhance students' understanding and academic performance. Thus, both developed and developing countries, including Nepal, are formulating an ICT policy and investing in digital learning through the development of digital infrastructure.

Digital device usage facilitates personalized learning, and social media such as WhatsApp, Instagram, TikTok, Facebook, and YouTube are helpful for students to find educational videos, e-books, and additional materials. Therefore, both digital devices and social media can help fulfill their academic needs (Kuswantara, 2024). With this ease of access, the learning process is not limited by time or space, allowing students to study freely whenever and wherever they want. Some platforms even offer interactive and entertaining information, which can help students stay motivated to learn. Despite these facilities, digital device usage and social media engagement in educational settings do not necessarily indicate proficiency in their use. For instance, Joshi et al. (2024) found increased use of social media for communication and entertainment rather than learning in academia during the lockdown period in Nepal. Secondary level students are among the most active demographics when it comes to using social media in their daily lives and commonly use it to communicate with friends, share information, and even for fun. This is because of increased time and frequency of digital device usage. Hence, it is important to distinguish between usage



frequency and digital competence of students (Clemente-Suárez et al., 2024). While it expands access to resources, excessive usage can negatively impact students' cognitive, emotional, and social well-being (Odgers & Jensen, 2020), and as a result, it affects learning performance. For instance, recent studies such as Amez and Baert (2020), Domingues-Montanari (2017), and Odgers and Jensen (2020) have reported a negative association between continued digital device usage and academic performance, particularly in mathematics (KERIS, 2023; OECD, 2023). However, completely prohibiting digital devices may not be an effective solution, as their moderate and purposeful use, when guided appropriately, can positively contribute to students' learning outcomes.

In the context of Nepal, Upadhyay and Sedain (2019) studied the impact of social networking on medical science, Kafle et al. (2025) studied internet addiction among school students, Jha and Joshi (2025) studied digital technology usage in undergraduate students in medical science. However, there is a lack of studies about the usage of digital devices and social media engagement that focus on the secondary level, especially in mathematics achievement. Mathematics learning achievement is an essential indicator in evaluating the quality of mathematics education (Siswanto & Susetyawati, 2024), and technology-based teaching is a predictor of critical mathematics (Chapai, 2022). Hence, it is necessary to understand the actual effect of digital devices and social media on mathematics achievement in the digital age. To address this research gap, the present study focuses on Grade 9 students who are the future of educational development and the foundation of higher education. In the context of secondary education, students face increasing academic pressure and are required to develop effective study habits. In the era of increasing digitalization, it is necessary to understand how students use digital devices and social media engagement and how it influences their academic achievement. Hence, this study aims to identify secondary-level students based on digital device usage patterns and analyze their academic characteristics. This study is intended to provide insights into the nuanced relationship between digital device usage, social media engagement, and their achievement, thereby offering practical recommendations for educators and policymakers. For this purpose, the following research questions were formulated.

1. What is the status of grade nine students' access to technology and social media in terms of access, purpose, and duration of use?
2. What are the influences of the usage of digital devices and social media (WhatsApp, Facebook, and YouTube) on mathematics achievement?

Literature Review

A systematic review of the scientific literature by Amez and Baert (2020) shows a negative association between increased smartphone usage and students' academic

success, particularly when usage is frequent and non-academic in nature. This review suggests that digital devices provide academic as well as a lot of useful information; however, excessive or unregulated use may negatively impact students' learning outcomes. Yun and Kim (2025) found that those students who use the digital device for learning purposes showed high levels of learning engagement, instructional activities, and academic performance compared to those who used them for multi-purpose and Non-Learning Purposes. Further, their study focuses on specific guidelines and training for effective device usage in educational settings. Numerous studies have emphasized that digital devices have negative impacts on physical, cognitive, and emotional well-being across all age groups (Domingues-Montanari, 2017; Odgers & Jensen, 2020). Despite the findings of the negative impact of numerous studies, the usage of digital devices in educational settings continues to speed up. On the analysis of Program for International Student Assessment (PISA) data, the Korea Education and Research Information Service (KERIS) found a negative correlation between dependence on digital devices and mathematics achievement among Korean adolescents, with each additional hour of digital device use associated with an average 3-point decrease in mathematics scores. Further, this study shows that students who used digital devices for more than 7 hours a week performed better than those who used them for less than 1 hour (Korea Education and Research Information Service (KERIS), 2023; OECD, 2022). Min and Seo (2024) explored the relationship between tablet/computer use for at-home schoolwork and reading achievement using 2016 U.S. data from the Progress in International Reading Literacy Study and found that weekly and daily users had lower reading achievement than non-users. This indicates that excessive usage time on digital devices, even for academic purposes, may not always translate into improved performance and may require balanced and guided use. Joshi et al. (2025) analyzed the results from PISA 2022 and found that the time of using digital resources such as desktop or laptop computers, smartphones, internet access (except on smartphones), and videos or online games for learning mathematics out of school were the strong predictors of mathematics achievement.

Social media users are increasing day by day in every aspect of their lives. Some research indicates that social media engagement plays a crucial role in motivating students to learn mathematics when they actively interact with mathematical content on digital platforms and learning strategies, while others show that excess engagement and use of social media have a negative role in students' academic learning. Almagro and Edig (2024) investigated the impact of computer attitudes and social media engagement on students' motivation to learn mathematics and found a positive relationship between users' computer attitudes and active social media engagement. Their findings suggest that engagement via social media contributes more to learning motivation than traditional computer use alone, highlighting its unique role in learning

mathematics education. A contrast perspective reveals that not all forms of social media interaction promote academic performance. Razali et al. (2024) indicated that the time spent on social media per day, tolerance, and intense desire were significant predictors of students' performance, while impaired control, harmful use, and social media engagement were not significant predictors of students' performance. This finding clarifies that the quality and strength of engagement are more important than mere participation in social media. In the context of Nepal, Joshi et al. (2024) found increment use of social media for communication and entertainment rather than learning in academia during the lockdown period. Their study further shows that increased use was associated with reduced academic concentration and lower engagement in structured academic activities. Similarly, Upadhyay and Sedain (2019) found that the majority of the students used mobile phones as a device and showed a negative relationship between excessive use of social networking sites and academic performance, which in turn negatively affects their academic results in medical science. Saqib et al. (2024) studied the grade ninth students' engagement in learning mathematics and found a significant relationship between students' engagement (cognitive, social, emotional) and mathematical achievement. Further, their study suggests social interaction, including online communication and peer support, may enhance students' persistence and problem-solving abilities. From this perspective, we easily position social media as a component of social and cognitive engagement ecosystems that influence mathematics-learning outcomes.

Methods

This study adopts a cross-sectional survey research design with quantitative research methods. It is a part of the Small Research Development and Innovation Grants (SRDIG) project of the University Grants Commission, Nepal. This project was conducted under the title "Mediating role of academic procrastination on technology use and mathematics achievement". However, the present article specifically focuses on the status of sample characteristics and their influence on mathematics achievement. Students' academic procrastination component and mediation analysis are planned to be reported separately in a subsequent publication derived from the same project.

Seven thousand and eleven students of 86 community schools were considered as the study population for this research. It also shows there are approximately 82 students in a school. Using the online sample size calculator (<https://www.calculator.net/sample-size-calculator.html>), 365 sample size was deemed appropriate for this population (Costa et al., 2022). By adding 10% non-response errors (Joshi et al., 2021), it became 402. Hence, 5 schools were sufficient for data collection. However, previous evidence (e.g., Bhattarai et al., 2020; MoE, 2015; UNICEF, 2019) shows that the attendance rate of secondary level students in Lumbini province was 41.5% only. Hence, the required number of sampled schools were 12. To reduce gender

bias and ensure the natural proportion, the researcher took the present students in class during data collection in the selected school. Thus, the final sample became 415. A multi-stage stratified proportionate sampling technique was employed to select sample schools and students. Data were collected through face-to-face mode by sharing the research instrument in the presence of the researcher by visiting the selected schools for the research. Although the project included instruments related to academic procrastination, the present study utilized only the sample characteristics and achievement-related variables relevant to the objectives of this paper. Students' mathematics achievement scores were utilized from institutional records based on the terminal examination conducted before data collection. Mean, SD, t-test, and ANOVA were used to show the significant level of use of digital devices and engagement in social media on mathematics achievement. The mathematics achievement score was compared with the national mean achievement score of 35.

Results

Table 1 shows that respondents are almost equally divided in terms of ownership of personal digital devices. The majority of respondents (50.4%, N= 209) have their own devices, whereas (49.6%, N=206) do not have their own devices. Among the available devices, Android mobile phones are slightly more common (54.5%, N= 226) than laptops (45.5%, N= 189), indicating that mobile-based learning is more widespread than computer-based access. In terms of purpose, most students primarily use digital devices for academic work (59.3%, N=246), while a smaller proportion uses them for entertainment (26.5%, N=110) and communication (14.2%, N=59). This suggests that although devices are available, they are being used more for learning-related activities than for other purposes. Regarding study time, the majority of students (59.5%, N=247) spend 1–2 hours daily on digital devices for academic work, while (25.3%, N=105) spend less than one hour, and only (15.2%, N=63) spend 2–3 hours. This indicates a moderate level of academic engagement with digital tools.

Table 2 shows the status of participants' characteristics based on social media engagement. The table shows a large proportion of students (78.3%, N=325) reported using social media, while only (21.7%, N=90) do not use it. Among platforms, YouTube is the most frequently used (69.6%, N=289), followed by Facebook (21.7%, N=90), WhatsApp (4.1%, N=17), and a very small group reporting no use (4.6%, N=19). This clearly shows that video-based learning and entertainment through YouTube dominate students' online activity.

Table 1: Respondents' Characteristics Based on Digital Device Access and Usage Patterns

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Ownership of a digital device			Purpose to use digital device		
No	206	49.6	entertainment	110	26.5
Yes	209	50.4	Communication	59	14.2
Access to a digital device			Academic work	246	59.3
Android Mobile	226	54.5	Time duration in digital device for academic work		
Laptop	189	45.5	Less than one hour	105	25.3
			1-2 hrs	247	59.5
			2-3 hrs	63	15.2

Table 2: Respondents' Characteristics Based on Social Media Engagement

Variable	Frequency	Percentage
Engagement in Social media		
No	90	21.7
Yes	325	78.3
frequently used social media		
No use	19	4.6
WhatsApp	17	4.1
Facebook	90	21.7
YouTube	289	69.6

Table 3 presents the influence of digital device users on mathematics achievement among Grade 9 students. The results revealed a statistically significant difference between students who own a personal digital device and those who do not. Specifically, students with their own digital devices demonstrate higher mathematics achievement (Mean = 49.03, SD = 23.79), with a p-value of 0.00, confirming the significance of the difference. Similarly, moderate time duration 1-2 hours of students using digital devices for academic work (mean=47.09, SD=22.67) is significant than others having p-value of 0.01. Post hoc result shows that the duration of time spent by student on digital devices for academic work has a significant effect on their mathematics achievement scores. Specifically, students

who use digital devices for 1–2 hours achieve significantly higher scores than those who use them for less than one hour, with a mean difference of 7.89 ($p = .00$). Similarly, students in the 1–2 hours group also perform significantly better than those who use devices for 2–3 hours, with a mean difference of 6.98 ($p = .02$). However, there is no significant difference between students who use devices for less than one hour and those who use them for 2–3 hours ($p = .95$). Overall, these findings suggest that moderate use (1–2 hours) of digital devices for academic purposes is associated with higher mathematics achievement, whereas both lower and higher usage levels are comparatively less effective. In regarding of purpose of using digital devices, Result shows that students who used digital device by focusing in academic work have better achievement (mean=47.80, SD=23.47) than those who used them for communication and entertainment purposes. Tukey post hoc results show that the purpose of using digital devices has a significant effect on students' mathematics achievement scores in certain comparisons. Specifically, students who use digital devices for academic work perform significantly better than those who use them for entertainment, with a mean difference of 10.03 ($p < .001$). This shows a clear advantage of academic-oriented digital usage in improving mathematics achievement. However, no significant difference is found between entertainment and communication purposes ($p = .31$), nor between communication and academic work ($p = .21$).

Table 3: Influence of digital device on academic achievement

Categories	Frequencies	Mean	SD	t-value	Sig.
Own personal digital Device					
No	206	39.75	17.01	-4.57	0.00
Yes	209	49.03	23.79		
Time used in Digital device for academic work				F-value	
<1hrs	105	39.65	16.80		
1-2 hrs	247	47.09	22.67	5.15	0.01
≥ 2 hrs	63	41.90	20.32		
Purpose of using digital devices					
Entertainment	110	37.77	16.39	9.08	0.00
Communication	59	42.71	15.46		
Academic work	246	47.80	23.47		

In Table 4, the results revealed that social media engagement has a significant influence on students’ academic achievement in mathematics. Students who engage in social media demonstrate higher mean achievement scores (Mean = 46.98, SD = 21.59) compared to those who do not use social media (Mean = 35.19, SD = 16.81). The difference between these groups is statistically significant ($t = -4.77$, $p = 0.00$), indicating that social media engagement is associated with better academic performance. Furthermore, when examining the frequency and type of social media use, a significant difference is also observed among different user groups ($t = 14.86$, $p = 0.00$). Among the platforms, students who frequently use YouTube show the highest academic achievement (Mean = 48.58, SD = 21.58), followed by non-users (Mean = 41.58, SD = 18.48) and WhatsApp users (Mean = 39.82, SD = 16.95). In contrast, Facebook users have the lowest mean achievement (Mean = 32.54, SD = 16.04). The post hoc result indicates a significant difference between Facebook users and YouTube users. Specifically, students who frequently use YouTube achieve significantly higher scores than those who use Facebook (Mean Difference = 16.03, $p = 0.00$).

Table 4: Influence of Social media on academic achievement

Categories	Frequencies	Mean	SD	t-value	Sig.
Engagement in Social Media					
No	90	35.19	16.81	-4.77	0.00
Yes	325	46.98	21.59		
Frequently use social media					
No user	19(4.6)	41.58	18.48	14.86	0.00
WhatsApp	17(4.1)	39.82	16.95		
Facebook	90(21.7)	32.54	16.04		
YouTube	289(69.6)	48.58	21.58		

Discussion

This study aimed to find the influence of digital devices and social media engagement on the mathematics achievement of grade nine students. The present study found that students who have their own personal digital devices achieve significantly higher scores in mathematics, which suggests that access to technology could enhance learning opportunities. This aligns with the findings of Amez and Baert (2020). They argued that digital devices provide valuable academic resources and information that can support learning. However, their review also suggests that increased smartphone usage and non-academic use may hamper students’ academic success. The present study shows that students who used digital devices for 1–2 hours for academic purposes performed better than others did, and this finding balances the Amez and Baert (2020). Our finding is also strongly supported by Yun and Kim (2025). They found that those students who use the digital device for learning purposes showed high levels of learning engagement, instructional activities, and academic performance compared to those who used it for multi-

purpose and non-Learning Purposes. This study suggests providing specific guidelines and training for effective device usage in educational settings. Thus, the current result reinforces the importance of purposeful and guided use of digital devices.

At the same time, the findings are understood in relation to studies reporting negative impacts of digital device usage. For instance, Domingues-Montanari (2017) and Odgers and Jensen (2020) highlighted the potential negative physical, cognitive, and emotional consequences of excessive digital device usage. Similarly, evidence from PISA data (KERIS, 2023; OECD, 2023) indicates that increased time spent on digital devices is associated with lower mathematics achievement. However, these studies also suggest a nuanced relationship, as moderate use can still be beneficial. This is consistent with our study, where moderate academic use (1–2 hours) was associated with better achievement. In contrast, Min and Seo (2024) found that frequent use of digital devices, even for schoolwork, was linked to lower reading achievement, emphasizing that excessive use does not necessarily translate into better academic performance. Therefore, the present findings support the argument that it is not merely access or time spent, but the quality, purpose, and balance of use that determine academic outcomes. Furthermore, the findings are in line with Joshi et al. (2024), who reported that the use of digital resources for learning mathematics is a strong predictor of achievement, reinforcing the positive role of academically oriented technology use.

Regarding social media engagement, the present study found that students who engage in social media have significantly higher mathematics achievement than non-users. This supports the findings of Almagro and Edig (2024), who reported that social media engagement is associated with students’ motivation to learn mathematics. Their study suggests that interactive and engaging digital environments can enhance students’ interest and participation in learning. Similarly, Saqib et al. (2024) found that different forms of student engagement—cognitive, social, and emotional—are significantly related to mathematics achievement, indicating that interaction and communication, including through online platforms, can enhance learning outcomes. From this perspective, social media can act as a medium that promotes collaboration, discussion, and problem-solving among students.

However, the present study also highlights that not all types of social media use are equally beneficial. The study presents a counterintuitive finding, students who reported using Facebook showed lower mathematics achievement comparing than non-users. Usually, social media is assumed to provide an opportunity for communication and learning support. This contrast finding may be confounded by socio-economic status, selection bias, or other factors. That Students from lower SES backgrounds may rely more heavily on Facebook due to limited access to other educational technologies and resources, which could indirectly relate to lower academic achievement(Marker et al., 2018).

However, our findings suggest a complex association that requires further investigation using longitudinal or controlled research designs. Further, findings indicate that students who frequently used YouTube achieved significantly higher scores than Facebook users, and the post hoc analysis confirmed this difference as statistically significant. This finding is consistent with Razali et al. (2024), who emphasized that the quality and nature of social media engagement are more important than mere usage. While some forms of engagement (such as educational video content on YouTube) can support learning, others (such as passive browsing or non-academic interaction on Facebook) may not contribute to academic performance. Therefore, the current findings extend existing literature by demonstrating that platform-specific usage matters, with educationally oriented platforms having a more positive impact on mathematics achievement.

Conclusion

This study aimed to examine the influence of digital device usage and social media engagement on the mathematics achievement among grade nine students. The study shows that ownership and purposeful use of digital devices are positively associated with students' mathematics achievement. In particular, students who used digital devices for a moderate duration (1–2 hours) for academic purposes demonstrated significantly higher achievement compared to those with either lower or higher usage levels. This indicates that not only access to technology, but also the purpose and balanced use of digital devices, play a crucial role in enhancing learning outcomes. Similarly, social media engagement was found to have a significant relationship with mathematics achievement. Students engaging in social media have higher achievement compared to non-users, suggesting that social platforms may provide opportunities for interaction, communication, and learning support. However, the results also indicate that the type of platform matters, as YouTube users performed significantly better than Facebook users. Overall, the study highlights that academically oriented and interactive digital engagement contributes positively to mathematics achievement, while non-academic or passive use may not yield similar benefits.

The findings of this study have several important educational implications. First, educators and policymakers should not discourage digital devices and social media use entirely; instead, they should promote purposeful and guided usage for learning, particularly in mathematics education. Schools can integrate digital literacy programs that help students distinguish between academic and non-academic uses of technology and encourage productive engagement within a limited and balanced period. Second, teachers should consider incorporating social media platforms, especially educational ones like YouTube, into teaching and learning activities to enhance student engagement and understanding. Training programs for teachers on effective integration of digital tools can further strengthen instructional quality. Finally, parents should be made aware of the importance of monitoring and guiding children's

digital behavior to ensure that usage supports rather than hinders academic achievement.

Despite its contributions, this study has several limitations. First, the study is limited to grade nine students and only one district, Bardiya. Hence, that may restrict the generalizability of the findings to other grade levels or districts. Second, the research design is cross-sectional in nature; therefore, it cannot establish causal relationships between digital device usage, social media engagement, and mathematics achievement. Third, the study depends on self-reported data regarding digital device usage and social media engagement, which may be subject to response bias. Finally, the study did not examine other influencing factors such as socio-economic status, teacher effectiveness, or parental monitoring in detail, which may also play a significant role in students' academic achievement.

Acknowledgement

This research is part of Small Research Development Innovation Grants (SRDIG) (Award No. SRDIG-81/82-EDU-06) entitled "Mediating Role of Academic Procrastination on Technology use and Mathematics Achievement," awarded to the author from the University Grants Commission (UGC) Nepal. Hence, I express thanks to UGC Nepal for this support. I further acknowledge all selected schools and students who voluntarily participated in this study.

Declaration

The author declares that there is no conflict of interest concerning the publication of this research. During the preparation of this manuscript, the author used the assistive-AI, i.e., ChatGPT, in order to language management. After using this tool, the authors reviewed and edited the content as needed. The researcher did not use the generative AI tools for content creation.

Funding

This research is part of Small Research Development Innovation Grants (SRDIG) (Award No. SRDIG-81/82-EDU-06) from the University Grants Commission (UGC) Nepal.

Data Availability

The data will be available with a reasonable request from the author (Principal Investigator of the Project).

References

- Almagro, R. E., & Edig, M. M. (2024). Mathematics learning motivated by computer attitude and social media engagement. *Journal of Social, Humanity, and Education*, 4(2), 79–97. <https://doi.org/10.35912/jshe.v4i2.1575>
- Amez, S., & Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research*, 103, 101618. <https://doi.org/10.1016/j.ijer.2020.101618>

- Bhattarai, N., Bernasek, A., & Pena, A. A. (2020). Factors affecting school attendance and implications for student achievement by gender in Nepal. *Review of Political Economy*, 32(2), 259–282. <https://doi.org/10.1080/09538259.2020.1769296>
- Chapai, K. P. S. (2022). Pedagogy for the future in the context of nepal: an exploration with critical mathematics education. *Academic Journal of Mathematics Education*, 5(1), 51–60. <https://doi.org/10.3126/ajme.v5i1.54574>
- Clemente-Suárez, V. J., Beltrán-Velasco, A. I., Herrero-Roldán, S., Rodríguez-Besteiro, S., Martínez-Guardado, I., Martín-Rodríguez, A., & Tornero-Aguilera, J. F. (2024). Digital device usage and childhood cognitive development: exploring effects on cognitive abilities. In *Children* (Vol. 11, Issue 11). <https://doi.org/10.3390/children11111299>
- Costa, M. P. D., Jahan, F., Ph, D., Shidi, A. Al, & Ph, D. (2022). Health professions students ' attitude , perception , and readiness toward interprofessional education and practice in Oman. *Journal of Taibah University Medical Sciences*, 17(2), 248–255. <https://doi.org/10.1016/j.jtumed.2021.10.004>
- Domingues-Montanari, S. (2017). Clinical and psychological effects of excessive screen time on children. In *Journal of Paediatrics and Child Health* (Vol. 53, Issue 4, pp. 333–338). J Paediatr Child Health. <https://doi.org/10.1111/jpc.13462>
- Jha, J. P., & Joshi, B. (2025). Digital technology usage in undergraduate students at a medical college of Nepal. *Journal of College of Medical Sciences-Nepal*, 21(3), 238–245. <https://doi.org/10.3126/JCMSN.V21I3.72914>
- Joshi, D. R., Neupane, U., Singh, J. K., Khanal, B., & Belbase, S. (2024). Impact of COVID-19 pandemic on academic activities of academicians in Nepal. *Journal of Education*, 204(2), 439–454. <https://doi.org/10.1177/00220574231153183>
- Joshi, D. R., Sharma Chapai, K. P., Upadhyaya, P. R., Adhikari, K. P., & Belbase, S. (2025). Effect of using digital resources on mathematics achievement: Results from PISA 2022. *Cogent Education*, 12(1), 2488161. <https://doi.org/10.1080/2331186X.2025.2488161>
- Joshi, D. R., Singh, J. K., & Neupane, U. (2021). Mental health problems and patterns of self-care associated with the use of digital devices among university students. *European Journal of Mental Health*, 16(2), 146–169. <https://doi.org/10.5708/EJMH.16.2021.2.7>
- Kafle, B., Bagale, Y., Tiwari, S., Pandey, N., & Pahari, N. (2025). Internet addiction among students of a school in rupandehi district, Nepal: An observational study. *Journal of Nepal Medical Association*, 63(283), 170–174. <https://doi.org/10.31729/JNMA.8921>
- Korea Education and Research Information Service (KERIS). (2023). 2023 Digital Education White Paper. <https://www.keris.or.kr/eng/main.do>
- Lang, V., & Šorgo, A. (2024). Views of students, parents, and teachers on smartphones and tablets in the development of 21st-century skills as a prerequisite for a sustainable future. *Sustainability (Switzerland)*, 16(7). <https://doi.org/10.3390/su16073004>
- Marker, C., Gnamb, T., & Appel, M. (2018). Active on facebook and failing at school? meta-analytic findings on the relationship between online social networking activities and academic achievement. *Educational Psychology Review*, 30(3), 651–677. <https://doi.org/10.1007/S10648-017-9430-6/METRICS>
- Min, J., & Seo, Y. S. (2024). The use of digital devices for schoolwork at home and reading achievement: Multilevel analyses of the PIRLS 2016 U.S. results. *International Journal of Educational Research*, 127, 102418. <https://doi.org/10.1016/j.ijer.2024.102418>
- MoE. (2015). *School Level Educational Statistics of Nepal* (Vol. 2011, Issue 2068). <https://tinyurl.com/bm3dnmww>
- Odgers, C. L., & Jensen, M. R. (2020). Annual research review: adolescent mental health in the digital age: facts, fears, and future directions. In *Journal of Child Psychology and Psychiatry and Allied Disciplines* (Vol. 61, Issue 3, pp. 336–348). Blackwell Publishing Ltd. <https://doi.org/10.1111/jcpp.13190>
- OECD. (2022). PISA 2022 Results (Volume I): Learning during digital disruption. OECD Publishing. <https://doi.org/10.1787/A97DB61C-EN>
- Razali, N. M., Rahman, N. A. A., Hashim, N. A., Hadi, A. A., Nur Niswah, Naslina Azid @ Maarof, & Nuralina, A. (2024). Role of social media in shaping academic performance: A case study using multiple linear regression analysis. *Journal of Mathematics and Computing Science*, 10(1), 26–32. <https://doi.org/10.24191/jmcs.v10i1.3744>
- Saqib, M., Naveed Kausar, F., & Ashrafs, M. (2024). Students' engagement in learning mathematics: Influence on students' achievement at secondary level in district lahore. *Educational Administration: Theory and Practice*, 30(1), 4992–5001. <https://doi.org/10.53555/KUEY.V30I1.8568>
- Siswanto, D. H., & Susetyawati, M. M. E. (2024). Comparison of the effectiveness of cooperative learning models TPS and GI on students' mathematical concept understanding ability. *International Journal of*

Scientific Multidisciplinary Research, 2(7), 875–888. <https://doi.org/10.55927/ijsmr.v2i7.10034>

UNICEF. (2019). *Nepal 2019*. <https://tinyurl.com/5n7czjdz>

Upadhyay, H. P., & Sedain, P. (2019). Impact and perception of social networking sites on academic performance of medical students. *Journal of College of Medical Sciences-Nepal*, 15(2), 119–124. <https://doi.org/10.3126/jcmsn.v15i2.23838>

Yun, G. Young, & Kim, S. (2025). Analysis of high school students' use of digital devices: focus on learning and instruction elements. *Cogent Education*, 12(1). <https://doi.org/10.1080/2331186X.2025.2468008>