Technology-Driven Transformation Education System Using Digitalization: A Study of Makawanpur District, Nepal

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Abstract

Modern education is transforming knowledge through digitalization. Nepalese changing from traditional to advanced learning. This study aims to find recent practices of education, and digital uses applicability in daily life among management students of college levels. Purposively, the public and private colleges of Makwanpur-Bagamati province were chosen. 44 students (22 each from public and private) of higher secondary to Bachelor degree level were set online questions using Google sheet (2024). Interviews (KII and consultative) were performed with IT experts, and admin-officials using the Google Meet program. Results demonstrated digitalization helped students in transformative learning essential devices supported through colleges. Facilities and modern devices are found high in private and learning is noticed high by scholars of public colleges. Uses of AI are limited, E-wallet and manual cash transfers are average in the daily lives of surveyed respondents. The bank account users and overall digitalization practice were found satisfactory. Digitalization helps to become smart in learning among the students and much familiar with use. Policymakers and management can support making digital through policies that provides digital platforms for eminence education.

Keywords**:** *Education, digitalization, students, public and private, practice*

Introduction

The application of digitalization in higher education has been a topic of a significant interest in recent years. Vindača et al. (2020) emphasize the need for an effective digital transformation in higher education, highlighting the potential of digital technologies and the challenges in their implementation (Vindača et al., 2020). This is further supported by Lima et al. (2020) who discuss the role of digital learning platforms in the internationalization of higher education, particularly in the context of online and distance learning (Lima et al., 2020). Ahel and Lingenau (2020) explore the opportunities and challenges of digitalization in improving access to education for sustainable development (ESD) in higher education, with a focus on the virtual academy of sustainability. Lastly, Huynh and Tran (2023) provide a systematic review of the digitalization of teaching and learning for international students, identifying various forms of digitalization and the associated experiences, opportunities, and challenges. These studies collectively underscore the potential of digitalization in higher education, while also highlighting the need for effective implementation and the consideration of diverse student needs (Huynh & Tran, 2023).

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The overwhelming importance of the digitalization of international education stems from the migration of student activities from the physical to the digital campus, which has been taking place over the past three decades (Chang & Gomes, 2022). Many new and exciting learning opportunities have become possible for staff and students in higher education institutions. However, as a result of the COVID-19 pandemic in 2020, online delivery became the sole mode of education in many education institutions across the world. This has hastened the development of dynamic digital campuses and it is now very common to see digital experiences (Bolton et al., 2018). complementing face-to-face engagements between students, teachers, researchers and administrators. This special issue explores the impact of the emergence of digital campuses on international education and those seeking to harness relevant tools to improve the quality and impact of their work in this field. Contributing authors describe a range of ways in which international education is evolving and developing due to mass digitalization. This curated collection provides an overview of current practices driving the sector forward in the digital space and sets an agenda for future research in the digitalization of international education.

Application of Digital Technology in Higher Education in Nepal

The application of digitalization in higher education in Nepal has been a significant area of study, particularly in the context of the COVID-19 pandemic. Giri (2020) and Bhattarai and Maharjan (2020) both highlight the widespread use of ICT tools and applications, such as Zoom, Google Meet, and Facebook, in online education during the pandemic (Giri, 2020). Bhattarai and Maharjan (2020) further identify factors, such as social influence, accessibility, and computer self-efficacy as key determinants of students' acceptance of digital learning. However, the digitalization of indigenous knowledge in Nepal, as discussed by Ghimire (2021), presents a unique challenge, requiring the preservation and global access of this knowledge through digital means. Despite the potential of digitalization to enhance the quality and accessibility of education, Kunwar (2020) underscores the need for policy provisions, infrastructure, and teacher and student competencies to ensure equality in access and delivery of quality education (Kunwar, 2020; Bhattarai & Maharjan, 2020).

Private colleges in Nepal have been more practical in integrating AI into their educational frameworks compared to their public counterparts. These institutions, often with better funding and resources, have implemented various AI-driven tools to enhance the learning experience and streamline administrative processes. For instance, Kathmandu University School of Management (KUSOM) has adopted AI-powered learning management systems (LMS) that offer personalized learning paths for students, adapt course content based on individual learning needs, and provide real-time feedback (Kunwar et al., 2022). Additionally, AI chatbots have been introduced to assist students with academic queries and administrative tasks, significantly reducing the workload on faculty and administrative staff (Shakya & Rauniar, 2002). These AI applications not only improve the efficiency of educational delivery but also enhance student engagement and satisfaction by providing tailored learning experiences.

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In contrast, public colleges in Nepal face significant challenges in adopting AI technologies due to limited financial resources, inadequate infrastructure, and a general lack of technological expertise among faculty and student (Adhikari et al., 2020). However, there are notable exceptions where public institutions have made strides in incorporating AI into their operations. Tribhuvan University, the largest and oldest university in Nepal, has begun experimenting with AI in its administrative processes and academic programs. The university has initiated pilot projects to use AI for automating administrative tasks such as enrolment management, grading, and data analysis (Bhattarai & Maharjan, 2020). Furthermore, there are efforts to leverage AI for research purposes, where AI tools are used to analyse large datasets, identify patterns, and generate insights that can inform academic research. Despite these initiatives, the broader adoption of AI in public colleges remains constrained by financial and infrastructural limitations, highlighting the need for increased investment and capacity-building initiatives to bridge the technological gap between private and public institutions in Nepal.

Application of AI by Teachers and Learners in Teaching and Learning in Nepal

The application of AI in teaching and learning in Nepal is an area that requires further exploration. Aryal (2023) and Halimah et al. (2021) both highlight the need for teachers to be more proficient in using technological tools, including AI, to enhance the learning experience. Chandra et al. (2024) provide a practical example of how AI can be used to increase student participation in the classroom, while Zhai et al. (2021) emphasize the potential of AI to revolutionize both teaching and learning. These studies collectively underscore the importance of integrating AI into the education system in Nepal to improve the quality of teaching and learning (Aryal, 2023; Chandra, et al., 2024; Zhai, et al., 2021).

In Nepal, the adoption of AI by teachers in the classroom is gradually transforming traditional teaching methodologies, making them more interactive and personalized. AI tools such as intelligent tutoring systems and adaptive learning platforms are being employed by educators to customize the learning experience for individual students. For instance, AI-driven platforms like BYJU'S, which have gained popularity among Nepali teachers, use algorithms to assess student performance and adapt content delivery to address learning gaps (Sah et al., 2024). These platforms provide real-time analytics and feedback, allowing teachers to monitor student progress closely and tailor their instructional strategies accordingly. Additionally, AI-based assessment tools facilitate more efficient and accurate grading, enabling teachers to focus more on instructional activities rather than administrative tasks (Joshi et al., 2023). The integration of AI in teaching methodologies not only enhances the effectiveness of instruction but also helps in identifying and supporting students who may need additional assistance, thus promoting inclusive education.

Learners in Nepal are increasingly engaging with AI-driven tools that offer personalized learning experiences, fostering greater engagement and motivation. AI applications, such as personalized learning apps and virtual learning environments are becoming common in higher education institutions. These tools provide customized learning pathways based on the individual learner's pace and understanding, which is particularly beneficial in addressing the

diverse educational needs of students (Paudel & Ghimire, 2022). For example, students at Tribhuvan University and Kathmandu University are using AI-based platforms that offer interactive and immersive learning experiences, such as virtual labs and simulations, which enhance their understanding of complex subjects. Moreover, AI-powered language learning apps are aiding Nepali students in mastering foreign languages by providing real-time feedback and personalized practice sessions. These AI applications not only cater to the academic needs of students but also help in developing critical thinking and problem-solving skills, essential for their overall cognitive development.

Despite the promising advancements, the widespread application of AI in teaching and learning in Nepal faces several challenges. One significant issue is the digital divide, where access to AI tools and technologies is unevenly distributed, particularly between urban and rural areas (Kunwar, 2020). This disparity limits the benefits of AI to a small segment of the population, exacerbating existing educational inequalities. Additionally, there is a lack of digital literacy among both teachers and learners, which hampers the effective utilization of AI tools (Giri, 2020). Teachers often require extensive training to integrate AI technologies into their teaching practices effectively, while students need guidance on how to use these tools for optimal learning outcomes. Furthermore, concerns regarding data privacy and security pose significant risks, as the use of AI involves the collection and analysis of vast amounts of personal data. To address these challenges, it is crucial to invest in digital infrastructure, provide comprehensive training programs, and develop robust data protection policies. Looking ahead, the future of AI in teaching and learning in Nepal is promising, with the potential to revolutionize education by making it more personalized, efficient, and inclusive. Continued efforts to bridge the digital divide and enhance digital literacy will be key to realizing the full potential of AI in Nepal's educational landscape (Shakya & Rauniar, 2002).

Currently, there are eleven universities and four medical academies available in Nepal. The Universities are Tribhuvan University (T.U.), Nepal Sanskrit University (NSU), Kathmandu University (K.U.), Pokhara University (PokU), Purbanchal University (P.U.), Lumbini Bauddha University (LBU), Agriculture and Forestry University (AFU), Mid-Western University (MWU), Far Western University (FWU), Nepal Open University (NOU) and Rajarshi Janak University (RJU) who are providing higher education in different streams across the nations. And the medical academies are the National Academy of Medical Sciences (NAMS), Patan Academy of Health Sciences (PAHS), B. P. Koirala Institute of Health Sciences (BPKIHS) and Karnali Academy of Health Sciences (KAHS) (Acharya et al., 2022).

In the year 2018/19, there are altogether 1432 higher education campuses, 147 constituents (10.27%) campuses, 747 private (52.16 %) and 538 communities (37.56 %) campuses. Tribhuvan University, a leading university in Nepal, has 1141 campuses (61 constituents and 1080 affiliated campuses). The other major universities in terms of student numbers are PU, PokU, and K.U. These universities have more than 18000 students and more than 20 campuses. PU has 116 (8.1 %) campuses, PoKU has 67 (4.68 %) campuses, and KU has 24 (1.68 %) campuses (Bhatta, 2015).

After the federal act 2015 Nepal distributed with seven province and 3-tiers of government established started proving service from the door steps. Province Government and Local government (LG) played a vital role in the development and all services were provided through LG from the door steps. The education sector and monitoring taken into the consideration under LG system for the lower secondary and higher education sectors further classified and taken onto the Provincial system where monitoring and management of all activities decentralized to the parent institution followed by the Provincial and LG system (Chhetri & Manandhar, 2023).

In the case of Bagamati Province, all 13 districts are well connected to motorable roads, but rural connectivity is still challenging in many areas.

Makwanpur district is considered the district Headquarter of the Bagamati Province and one of the representative reflections of the Bagamati province covering all three distinct geographies of Mountain, Hills and Terai, topography all together in the same district. The Hetauda Municipality is district Headquarters of the Makwanpur covering nearly 15 wards. The academic institutions played a significant role in the transformative education system.

Thus, this study mainly aims to analysed the current practice of digitalization among the students of commerce in Makwanpur and another objective is set as to find out the digitalization practice in the students of the study area.

Methods

The research was cross-sectioned and designed using a mixed-method approach Qualitative and quantitative research methods were applied. Purposively, Makwanpur district *(Figure-1)* within Bagamati Province was chosen to represent all three geographies of Hills. Mountain and Terai are in the same district. Hetauda sub-metropolitan city as a district headquarters of this district was purposively chosen due to facilities and availability of public and private colleges in same city compared to another city in the district. Consultation with online meetings and mobile phone communication confirmed the institutions students and course stream as well a secondary review confirmed the popular colleges among Hetauda are listed here;

Table1: ***List of Colleges, courses and level within Hetauda sub metropolitan city.***

Sl No	Types	Name of Institution	Classes	Subject	Location
1	Public	MMC	Bachelor to Master	Humanities, Commerce, Science, Education	HNP-2
2	Public	Hetauda	Bachelor to Master	Humanities, Commerce, Education	HNP-4
3	Public	Nirmal Multiple	Bachlor	commerce, Education	HNP-19
4	Public	Banksha Gopal	Bachelor	Education	HNP-6
5	Public	Padampokhari	Bachelor	Commerce	HNP-13
6	Private	HSoM	Bachelor to Master	Commerce, Science	HNP-4
7	Private	Narayani	Bachelor	Commerce	HNP-10
8	Private	Zenith International	Bachelor	Commerce, Humanity, Sceince	HNP-5
9	Public	Aakash Memorial	Bachelor	Commerce	HNP-5

(Source: Field interaction, 2024)

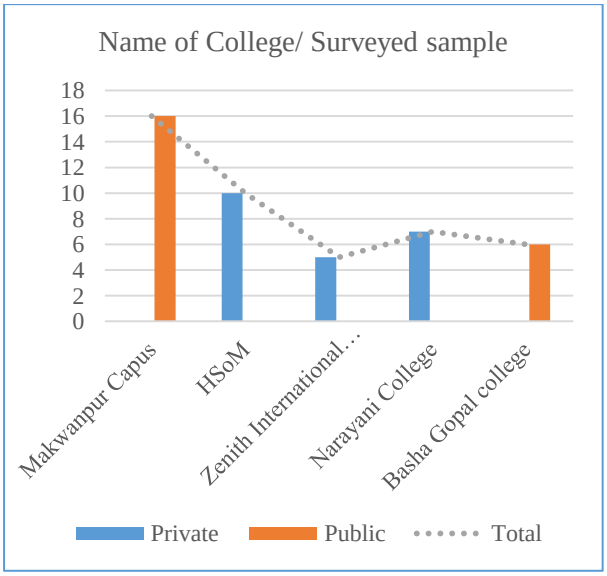
Further commerce and education courses were found popular and available in majority of consulted colleges, thus education-management-based colleges and students of higher secondary (10+2) to Bachelor level were chosen for survey execution. The survey questionnaire for students was prepared on Google Form (*Annex-A*).

From in-depth analysis from Table-1, 44 data / respondents (*22 from the public and 22 from the private colleges*) were targeted to collect online using Google sheet (*https://docs.google.com/forms/d/1FGwxEfbu5OtEckmQGbdQ3Aqsf7P7D_V0qg7UjiX9DjA/*) . The link was created and sent to all IT and commerce, education faculties of the schools which was disseminated to the students' network.

A digital interaction with the head of colleges, IT professionals and experts in the field of IT, Education, and Commerce were consulted and 1.5 hour-long meeting through Google Meet (*link:- https://meet.google.com/goj-ncms-rfu*) was conducted (*Annex-B*). The voice recording was captured after taking concern from all participants for quality information. The study was conducted in between 5th to 14th June 2024.

Results

The data obtained from various sources are compiled analysed through graph and table preparation using Excel sheets and data obtained from the Google sheet analysis sections are illustrated herewith:



(Figure 1; *Sample Surveyed, Name of Colleges Where the Interview was Taken)*
(Source: Survey, 2024)

In public colleges, 22 students (*16 from Makwanpur Multiple Campus and 6 from Bansha Gopal colleges*) and 22 from Private (*Hetauda School of Management, Zenith and Narayani colleges*) were chosen for this survey and a sum of 44 students went through an online survey.

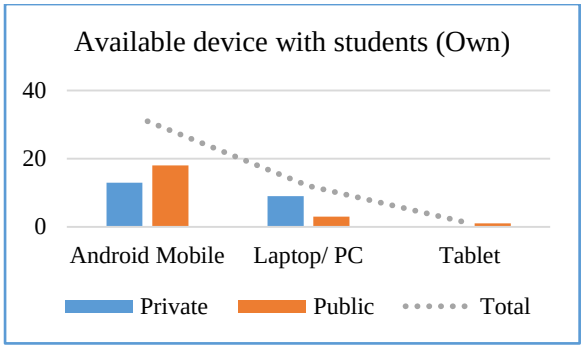
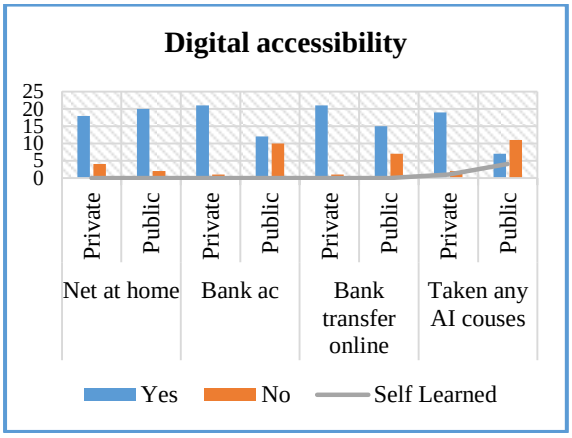


Figure 2: ***Available device with Students in the study Area***
(Source: Field survey, 2024)

Among the surveyed students, android mobile owned more than laptop/ pc devices (*Figure-2*) and a single piece of the tablet (*public college-gift by relative*) was recorded. During online classes, Android mobile is more in use portable, compatible, and effective in learning. Even in social networking channels, the respondents use Android phones much easier to perform work and communication.



(Figure 3: ***Digital Accessibility in the Study Area)***
(*Source: Field visit, 2024*)

In contrast of digital accessibility, internet facilities use was sufficiently available for private and public colleges. The bank account was available in both the cases, but significantly high in Private colleges because due to online fees schemes in the most of the colleges. Whereas, Bank transfer through online mode found good ratio in both private and public colleges as transfer was the most common trend of sending money, and students used to do for this.

For AI courses, respondents from the private colleges took some classes in an individual way compared to the public colleges.

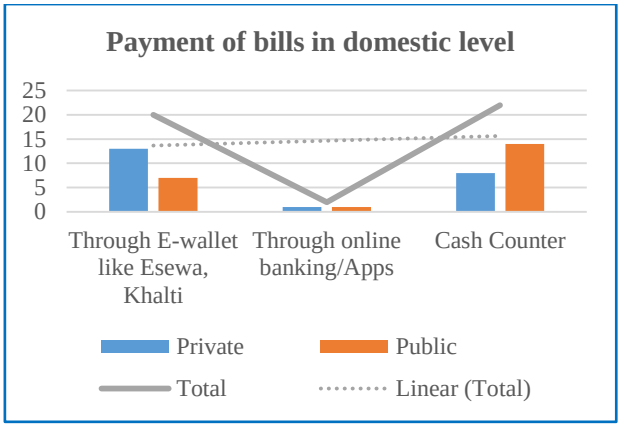


Figure 4: ***Bills Payment at the Domestic Level***

The trend of payment for the water, electricity, internet and communication-charge was performing through two major modes. E wallet and Cash Counter payment, the e wallet was the best mode in the recent situation and private school students had privileged. The Online Banking transfer rate was low that required aps, internet banking login and online transfer login and such performance is possible when have a frequent transfer on daily or weekly basis. Such students were employees and this aps and transfer was common to them.

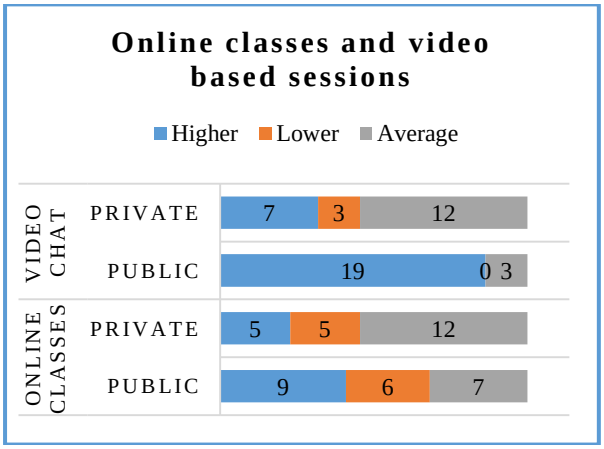


Figure 5: ***Online Classes and Video Based Sessions***

Figure 5 illustrates that online classes and Video based sessions were average in both the surveyed areas because after the COVID wake, the online continuation was high and gradually after ending pandemic situation it resumed to the normal face to face classes recorded. During some special classes and project-based activities, it was found that the video and online sessions were usually conducted on that purpose.

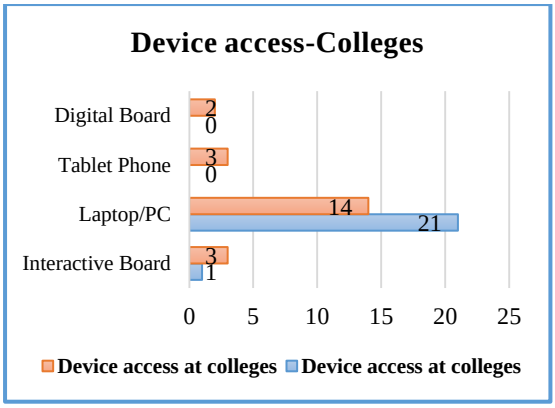


Figure 6: ***Device Access in Colleges***

Figure 6 shows that the use of the Laptop/ PC was higher in the both schools; some of the Students opted Tablet and Digital board but rare and Interactive board on Private colleges was also insignificant that indicates that the uses of PC and Laptops were higher in the most of the schools.

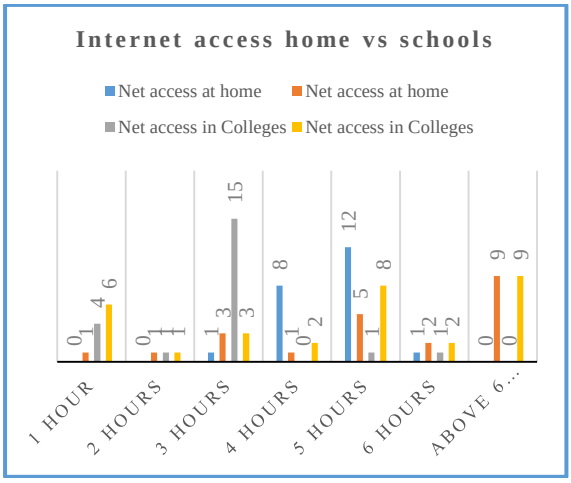


Figure 7: ***Internet Access Home Vs Schools***

In case of internet access, the rate of 3 hours by the private colleges and 5 hours at Home witnessed that the private college students' access to internet was high. In public colleges, only 5 scholars had an access for the 5 hours at home followed by the 1 hour in the colleges as only 6 students from the public opted such an option.

Facebook and social media-based apps like Instagram, tiktok and other apps were used most by both groups of students. Whereas in context of learning material search Microsoft based apps, such as WinWord, MS Excel, and Power point were more in search practices within the school premises. The trend shows that the internet access and social media connections were somehow aware of the various types of access on the internet for the students. This was also a part of education and learning.

The digitalization perception of students stood extremely higher for the private students followed by the public level students and still the few opted average rate of digitalization.

A mixed opinion generated during a question of future destinations. Majority (12 from private and 8 from public colleges) could not decide and some decided for abroad and an equal number of students decided to remain in Nepal for the future study.

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The respondents hugely accepted (21 from Private and 20 from the Public) as the uses of digitalization that supported to enhance the skills and knowledge among the students of the study area.

The notes and voice recorded during online interview was transcribed and translated exactly in the analysis section.

Table 1: Internet Surfing Status at Home Vs Schools

Legend		Microsoft Office Aps	Social media like Facebook, Instagram, TikTok others	Video Streaming Apps like Youtube, Netflix, Amazon Prime others	Search Engine Apps like Google, Bing and others	AI chatbot like ChatGPT, Gemini, Copilot and others	Mobile games, Video Games
At home	Private	0	21	0	0	1	0
	Public	0	16	1	2	1	2
At college	Private	11	2	0	6	3	0
	Public	5	2	1	8	3	3

Participant 1: AI and Digitalization reveal two scenarios, students are familiar and teachers have an average or limited pedagogy with modern sophisticated tools in digital landscape. This gap is phenomenon in the education sector nowadays. The classrooms are well equipped with modern devices like multimedia, projectors, and various presentation devices but teachers often use manual notes and assign tasks accordingly. Students saw practicing AI chatbots for comprehensive information. Reliance on digital tools declined handwriting skills and grammatical errors very commonly. AI courses would be better introducing Teachers and students. Significant perception relies on AI being fewer creative people but this may be another research. Beside uses, the ethical consideration (*Personal and Professional level*) and security priority prioritise on top. Digital users are advised caution and safe practises to avoid the risk of digital misconduct *(KII Participants of MMC @ Hetauda)*

Participant 2: During COVID-19, digitalization significant contribution to education sectors, attention heavily increased users. Till now, equal access to diverse students has been challenging colleges to learn online. The rural and Urban cities do not have equal digital services. For better learning, college-students and parents prioritize digital platforms. The classrooms are equipped with modern devices. Previously, handout learning was common, but now PowerPoint presentations are in use. Still, lack of adequate training in teaching methodology and digital literacy has been noticed. Corporate students, particularly those engaged in financial jobs like banking, are more digitally literate. *(KII Participants of Chitwan colleges, visiting lecturer of surveyed colleges)*

Participant 3: There is no need to fear the integration of AI into the job market and education. AI should be used as a tool to assist in these sectors. Society is gradually becoming more digitized, and his college has implemented an EMIS system for teaching and learning. AI should be used appropriately in various fields. Students are increasingly familiar with online billing and transactions for daily activities. (*KII Participants of Chitwan college, Visiting lecturer of Makwanpur Multiple Colleges*)

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Participant 4: The technology should be used as a tool for solving problems rather than ending them. He cites the saying, "Think Globally, Act Locally," and encourages the creative use of AI and the latest technology to generate knowledge. In his college, AI and digital tools are effectively integrated into the teaching and learning process, and digital literacy is high among students. *(KII and Expert of Manthali, Visiting Lecturer of various colleges in Hetauda))*

Participant 5: The respondent reports that his college has fully digitalized its classrooms, utilizing Learning Management Systems like Google Classroom and Microsoft Teams for teaching and learning. Students use AI-powered apps to search for knowledge and resources, which is impacting traditional markets. AI can potentially reduce the labor market. Students are generally more familiar with the latest technological gadgets than their teachers. Overall, the impact of AI and digitalization is positive, enhancing students' learning attitudes *(KII and Experts@ Padam Thapa)*

Participant 6: Solely relying on AI chatbots and digital sources for knowledge might hinder creativity. The academic field is fundamentally about knowledge creation, so AI should be connected to this process. Traditional faculty training is insufficient; there is a need to build a positive attitude towards technology use. For better outcomes, UGC should conduct curriculum-based learning and continuously update the Curriculum *(KII expert and Administrator @ Chitwan Colleges, Visiting Lecturer of Hetauda).*

Participant 7: The respondent states that the first IT college in Hetauda has completely digitized classrooms and a functioning e-library. Students are required to have laptops for IT classes and often request PowerPoint presentations from teachers to facilitate understanding. Students feel more comfortable and familiar using AI as a learning resource. (*IT Head@City Colleges, Hetauda, Makwanpur*)

Participants 8: The online assessments are regularly conducted using digital tools and technology. Students frequently use Google and ChatGPT for their assessments, which should be viewed positively as it reflects the free global-market. There should be a balance between AI and human creativity, and future policies should aim to achieve this balance. Advancing digitization is essential. (*Management Head @Hetauda School of Management, Hetauda, Makwanpu.*

Conclusion

Digitalization helps in learning students and the interviewed colleges support devices for a better future. Students nowadays are smart and digitally-familiar with elderly members in home. Online learning and digitalization easier for people to save time in the present world. Students' curiosity, awareness, learning attitudes and internet access is more towards all curiosity need a cross-examined by parents, teachers and learning institutions for safe and positive access delivered positive results. On the other hand, complexity is genuine among students and legal consequences witnessed nowadays towards negative. Henceforward, this side is essential to control. The basic facilities provided by colleges are satisfactory and

continued monitoring and support is essential. The use of AI for learning is an average prerequisite to increasing knowledge in many ways.

Recommendation

- It is advised to wider sample survey in the public and private colleges to obtain findings on AI and digitalization.
- Digitalization and legal consequences are the most prominent aspects to be considered at present, hence awareness of a legal class, and cyber acts are suggested
- Institutional upgradation is advised, and practical and research orientation through digital way (concept development and analysis using AI tools) through extra classes are advised.
- **Acknowledgement**: *The research team acknowledged surveyed participants of colleges, teachers, faculty of Hetuda, Makwanpur, HSoM and for the key not support provided by the experts of different colleges who were closely to the surveyed college. Paying deep gratitude to Hetauda College RMC and staff members for publication priority in the upcoming journal.*

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Annexes:

A: Questionnaires for the students set in Google Sheet

(https://docs.google.com/forms/d/1FGwxEfbu5OtEckmQGbdQ3Aqsf7P7D_V0qg7UjiX9DjA/).

Link:- (link:- https://meet.google.com/goj-ncms-rfu) for consultative meetings with teachers

B:- Online meeting with the experts and Faculties of different colleges-Public and private colleges (recording was on progress after taking concern with all participants).