

# HEI Teachers' E-xperiences in the Use of Digital Tools for Teaching and Learning: Basis for Debugging

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## ABSTRACT

The shift to hybrid flexible learning in response to the global pandemic and post-pandemic changes has accelerated the need for digital tools in higher education. This study aimed to explore the lived experiences of higher education institution faculty specifically in the Province of Bukidnon, Philippines, regarding their use of digital tools in teaching. Employing hermeneutic phenomenology, the study utilized a digital competence survey and interviews to gather data from nine faculty teaching general education subjects ensuring that they taught diverse students from different academic programs. The findings revealed seven key themes, including professional development through online resources, the use of digital platforms for sourcing and creating instructional materials, managing flexible learning, enhancing assessments, and facilitating personalized and collaborative learning environments. However, challenges such as inadequate financial and instructional support, limited access to resources, and varying levels of student digital competence were also identified. The study concludes that while digital tools significantly enhance teaching and learning, there are challenges that need addressing. Recommendations include an intervention plan aimed at providing faculty with the necessary support for effective integration of digital tools into their teaching practices. These findings offer fresh insights into the use of digital tools in the context of Philippine higher education and generate new knowledge that can inform future digital literacy initiatives and strategies.

**Keywords:** *new normal, learning modalities, hyflex learning, educational technology, sustainable education*

## INTRODUCTION

The COVID pandemic has made unprecedented changes in education, halting it for a moment, but prompt responses and mechanisms were created to ensure that education is sustained regardless of this persisting global force majeure. In response, higher education institutions with their learning continuity plan map out their strategies to adapt to the *volatile, uncertain, complex, and ambiguous* (VUCA) environment. One of its strategies is to equip the faculty with competencies in the use of digital tools in teaching and learning through a series of in-service training, mentoring sessions, and regular recalibration of curriculum materials. The transition from solely face to face classes to blended learning has not been without obstacles and difficulties as the faculty have varying levels of proficiency

and aptitude for technology use. Further, the universities offered the students three kinds of learning modalities based on their available resources in compliance to CHED Memo no.4 s. 2020; these are print, pdf, and full online modalities.

The faculty may handle students with different modalities in a class. Each of these learning modalities may necessitate distinctive tools to suit the uniqueness of the learning environments' conditions. After two years navigating through myriads of digital tools for teaching and learning, a report on the teachers' experiences with their use will elucidate challenges they have contended with. For this reason, it is imperative that a study is conducted to sketch their experiences such that the university may be able to assist the faculty further in their dispense of their primary duty to facilitate and optimize learning.

Exploring the faculty's experiences in navigating the new normal in education will provide data on how well the HEIs respond to the changes and what they can do to further assist their faculty in the delivery of education. The pandemic has not ceased yet and determining the faculty's actual experiences will prepare the institutions to adapt for the future; their infrastructure and continuing professional development for faculty retrofitted for the ever-shifting environment

## LITERATURE REVIEW

### *Connectivism Theory: A Learning Framework in the Digital Age*

This study is anchored on the theory of connectivism by Siemens and Downes (2005), which addresses how technology plays an important role in the learning process and how the digital age has accelerated students' access to knowledge. Connectivism begins when a person uses digital technology to address an issue. This could involve researching a subject, contacting a friend, or looking up relevant social media information. The connectivist approach emphasizes that using digital technology to address an issue leads to a deeper comprehension of the topic.

Siemens and Downes (2005) identified eight principles of connectivism, and these are foundational to understanding the nature of knowledge in the digital age: (1) learning and knowledge rest in the diversity of opinions, which deepens understanding through exposure to varied perspectives; (2) learning is a process of connecting, highlighting how building relationships can open one to new skills and ideas; (3) learning may reside in non-human appliances, recognizing that apps, social media, and digital platforms can store and share knowledge; (4) the capacity to know more is more critical than what is currently known; (5) nurturing and maintaining connections is needed to facilitate continual learning through collaborative interaction; (6) the ability to see connections between fields, ideas, and concepts is a core skill; (7) accurate and up-to-date knowledge is the intent of all connectivist learning; and (8) decision-making is a learning process that evolves as new understandings occur.

The use of digital tools as an integral part of the day-to-day lives of people has received great push due to globalization and the demand for innovation and sustainability. Academic institutions have also been exploring the use of such tools in teaching and learning because of the various advantages that benefit the institution, faculty, and students. The flexibility, efficacy, and opportunities offered by digital tools enhance communication,

reduce costs, accommodate individual learning preferences, and compensate for academic scarcities through self-paced learning (Abaidoo & Arkorful, 2014). However, the same study

also noted that these tools have disadvantages, such as reduced interaction, potential ineffectiveness compared to traditional learning, susceptibility to cheating and plagiarism, deterioration of socialization, and unsuitability to certain fields.

The COVID-19 pandemic further highlighted the importance of connectivism as government-enforced restrictions forced academic institutions to migrate to digital platforms. Teachers had to quickly design lessons, assignments, and assessments suitable for online learning environments (Costelo et al., 2021). As stated by Richard and Haya (2009), the Internet has become one of the vital ways for both teachers and students to acquire and share information. This shift, however, presented difficulties in maintaining an online “presence,” a concept emphasized by Garrison (2017), which became more complex in the absence of natural, in-person interactions. These realities demanded a new learning framework—one that connectivism addresses effectively.

### *Cybergogy: Designing for Engaged Online Learning*

The study also draws on the concept of cybergogy as introduced by Wang and Kang (2006), a framework that merges the ideas of pedagogy and andragogy to support engaged learning in online environments. Braund (2018) elaborates that cybergogy encompasses three overlapping domains: cognitive, emotive, and social—underscoring the equal importance of affective and cognitive learning.

Cybergogy emphasizes a learner-centered environment that upholds four motivational conditions: (1) cultivating learner competence in effective and meaningful learning; (2) establishing a respectful and connected learning atmosphere; (3) promoting positive attitudes toward learning through personal relevance, as advocated by Freirean pedagogy (1988); and (4) designing learning tasks and assessments that align with the learner’s goals.

The transition to online learning during the pandemic posed challenges that made these cybergogical elements even more crucial. As pointed out by Palloff and Pratt (2007), not all teachers or students are equipped for online education. The concept of Emergency Remote Teaching (ERT) as described by Milman (2020) and Hodges et al. (2020), illustrates that this was not simply a matter of converting face-to-face classes into virtual formats, but rather a rapid and temporary shift due to a crisis. Social presence, a key aspect of cybergogy, became more difficult to establish. Salmons (2020) highlights that online learners under global distress need increased interaction and support to combat isolation. Thus, a cybergogical approach is vital for designing responsive, empathetic, and engaging learning environments.

### *Digital Tools in Teaching and Learning: Opportunities and Challenges*

The third concept guiding this study focuses on the use of digital tools in teaching and learning. Ruiz and Garcia (2020) define digital tools as software and platforms that function with text, graphics, audio, and video on computers or mobile devices. These tools include editing programs for digital content and platforms that allow collaboration and resource sharing.

Mucundanyi and Woodley (2021) emphasize that some developers provide free access to digital tools for educators, making them essential resources for cost-effective

learning. However, educators must continuously assess these tools to discover new features

aligned with course objectives (Woods & Rosenberg, 2016).

Technology-based e-learning, as Fry (2001) asserts, includes the use of internet and digital technologies to produce instructional materials, facilitate learning, and manage courses. But as the pandemic has shown, digital tools are not without challenges. Aside from infrastructure issues and lack of access, online learning environments may also expose learners to risks like plagiarism or decreased social interaction. Leidner and Jarvenpaa (1995) argue that we cannot assume universal success among students or teachers in online contexts.

Despite these challenges, digital tools remain an indispensable component in education's future landscape. Their continued development and thoughtful implementation, guided by the principles of connectivism and cybergogy, will be essential in debugging issues and improving the digital learning experience.

## METHODOLOGY

The study used a qualitative research design and approach. The researchers utilized hermeneutic phenomenology, specifically Moustakas' paradigm in order to examine the lived experiences of teachers from higher educational institutions in the use of digital tools for teaching and learning. The study was conducted among the three state colleges and universities in the province of Bukidnon, namely Bukidnon State University, Central Mindanao University, and Don Carlos Polytechnic State College. These SUCs are monitored by the Commission of Higher Education in the implementation of hybrid flexible learning following CMO no. 4 s. 2020 and CMO no. 6 s. 2022. The participants of the study are selected by purposive sampling procedure. Specifically, general education faculty who have taught in the Hybridflexible Learning System (Hyflex) implementation in their respective schools from 2022 – 2023 were selected. Since GE faculty teach across programs, this allows them to have engagement with different learners with varying majors and specialization. Also, faculty who teach general education have varying educational qualifications due to the GEC Curriculum's multidisciplinary nature.

A digital competence survey adapted from *Questback's Developing ICT for Teacher Education* will be conducted to the GE faculty. Based on the results, three faculty with varying digital competence from each school were selected; there were a total of nine participants. This number was based on the recommendation of Cresswell's (1998) on qualitative studies such as phenomenological studies that five to 25 participants provide sufficient data. Descriptive statistics were used in the treatment of the numerical data from the survey. An interview guide protocol was constructed by the research and to be content validated by experts. The interview was conducted either face to face or online based on the participants' preference. The interviews were transcribed. Prior to the analysis of the data, the transcript was made available to the faculty for participant validation. The digital competence survey was also content-validated as some items were modified to best suit the current study.

Utilizing Moustakas' approach in conducting a hermeneutic phenomenological research, the study adhered to its procedure. This begins by identifying a phenomenon study, that is, the lived experiences of HEI faculty in the use of digital tools in teaching and learning, bracketing out by selecting the participants based on their digital competences and experiences; collecting data through interviewing the participants; analyzing the data from the faculty by reducing the information to relevant statements; combining the statements

into themes; coding the textual description of the experiences; and, presenting the statements of textural and structural description that show the meaning and essence of the experience of HEI faculty.

#### *Ethics Statement*

As part of the research design for the study, ethical considerations have been set in place due to the involvement of human participants in the interview. These considerations include: the participants were free to opt in or out of the study at any point in time; prior to the interview, participants were informed of the purpose, benefits and risks behind the study before they agree or decline to join the discussions; although information is collected from interviews, collected information will be kept hidden and will not be disclosed to the general public, and personally identifiable data and information kept in computer files and documents will be stored securely in a two-factor authenticated account utilizing cloud platform technology; the participants will in no way be subjected to any known and intended physical, social, psychological and other types of risks and harm as part of the research; and, results were accurately represented and reported based on factual findings and conclusions derived from the study.

## RESULTS AND DISCUSSION

Based on the data collected through an in-depth interview, the HEI faculty revealed multi-faced experiences with digital tools in the teaching and learning process. The nine research participants described a spectrum of encounters detailing interest and empowerment to challenges and frustrations. The analysis using hermeneutic phenomenology unveiled themes based on the participants' accounts.

### *Theme 1: Professional Development*

Through thematic analysis they utilized digital tools for professional development. It was identified that Zoom and Google Meet were major tools for institutional capacity building for teachers. Similarly, Saura, Díez-Gutiérrez, Rivera-Vargas (2021) highlight the use of digital platforms specifically Google for teacher-training providing certificates for course completion and educational communities. A participant detailed the subject matter of the online training sessions in which she engaged.

*“The school provided seminars, activities, and an introduction to teaching strategies, right? Especially during COVID, when there were many free training sessions on distance learning activities and assessment tools, and even some institutions offered them directly.”*

This confirms that digital tools are utilized to capacitate the faculty in their respective fields, functions, and courses taught. This is attested by another participant who stated that: *“Especially during the time of pandemic, there are lots of... webinars that I attended...”*

The shift to distance education necessitates that institutions prioritize online learning (Dziubaniuk, Ivanova-Gongne, and Nyholm, 2023) thus there has been an increase in online trainings for faculty for professional development to develop and enhance competencies needed in the conduct of hyflex learning.

### *Theme 2: Sourcing Digital Resources*

Digital tools also served as means for faculty members to identify different digital applications to help them in the development of instructional materials, assessment, and

other classroom based activities. As stated by one participant:

*“Google Docs and Google Slides are there, right? But you’d still look for something like Canva, which is faster, easier to use, and free... For recorded discussions, there are also online tools now that make creating and downloading much simpler.”*

Other digital platforms have also made digital learning materials available for faculty to share the said digital books and according to a participant of the study, also for students. The participant mentions that:

*“...books that you can just download online. These can then be provided to students and shared with their classmates...”*

A participant also made use of smartphone applications in the sourcing and creating of digital resources one of which is the use of camscanner. The said participant stated that:

*“...books that you can just download online. These can then be provided to students and shared with their classmates...”*

The participants underscored the ways in which digital tools enable them to improve their teaching methods, aiding in the creation of instructional materials and assessments. They also noted the benefits of utilizing platforms for simple access and sharing of learning materials. Furthermore, smartphone apps illustrate the efficiency of these tools in sharing educational materials in a user-friendly format. This corroborates with Danca, Štempelová, Takáč, & Anuš (2023) who stressed the importance of taking advantage of the digital tools in the post-pandemic environment.

### *Theme 3: Teaching and Learning Management*

Digital technologies were also utilized by the participants in the management and delivery of instruction and adapting the learning process to flexible learning. A participant highlighted this matter by emphasizing on the learning modalities utilized through the means of learning available to students. A participant stated that:

*“In [my university] there are varied means or choices for students. If one cannot join online there are modules for them. If they have difficulties in using modules especially if they are working. Majority are also submitting their activities asynchronously ”*

It was also found out that the faculty also made use of specific hardware such as scanners made available to them in converting traditional learning materials such as books and other readings into downloadable PDF materials for student and faculty use. A participant confirms this finding:

*“Of course there are still traditional books and others. Most of the time you convert something soft copy into traditional formats.”*

Furthermore, faculty have also made adjustments in the use of these technologies by also asking for feedback in the use of one digital learning tool or online platform for teaching. They take into consideration the degree of satisfaction of the students. Student feedback or reaction have been used in adjusting the use of a learning management system (LMS) and other digital tools available during the implementation of flexible learning. As mentioned by a participant below:

*“You really ask the students, even if it’s not during your asynchronous class—but through Messenger—whether they find it easy to use and if they’re enjoying it. Isn’t that the first question? Did you enjoy it? Did you learn something? Or if their reactions are just so-so, you ask, ‘Why didn’t you seem to enjoy it much? Were you not happy with the platform we used?’”*

As mentioned by the participants, the digital tools provided flexible options for online classes, modules, and asynchronous activities to accommodate students' diverse needs. They even used students' feedback to adjust digital tools to enhance the flexible learning experience. This aligns with the study of Tautz, Sprenger, and Schwaninger (2021) who evaluated the use of digital tools in the classroom and how they impacted students' engagement.

#### *Theme 4: Enhancing Assessment*

Assessing student outputs and other relevant submissions have also been affected with the use of digital technologies during the implementation of flexible learning especially during the Covid-19 Pandemic. In the enhancement of assessment tools and adjusting assessment strategies, it was found that faculty tend to look into the digital competence of students in the use of digital tools especially in the creation of their outputs. As one faculty mentions below:

*“Let’s just say that I have activities that will be given to them which will allow them to use different platforms. I do this through activities. Let’s say that they will do infographics, through this I would know who among my students are truly capable of using different tools.”*

The statement above affirms that the adjustments in the use of digital tools as a means of enhancing assessment tools and strategies is connected to faculty identifying whether the students are capable of completing their tasks in their respective subjects using online and offline applications. Another participant also emphasized that quizzes are also employed using Google Forms but in order to ensure the integrity of the such assessment tool, faculty are also competent enough to not only limit the time in which the student can answer the quiz but also install and run applications that hinder students from opening other sites to look for answers. The faculty stated that:

*“There are digital tools that help us as an example in the giving of quizzes there is a setting which when students will leave the quiz it will prompt them that they are prohibited to leave the window.”*

There are also participants who have expressed that they also do away with the use of social media platforms such as TikTok despite being the most accessible to students. Instead, they made use of other online digital sites/platforms such as QuizIt and Kahoot to better deliver their summative tests to students. According to one participant, creativity through TikTok does not really compare to an actual performance task done in a face-to-face classroom set-up, nor does it compare to other digital tools mentioned above. The participant’s statement is as follows:

*TitTok, though it may be creative but it is not comparable to role playing where it is more personal like quiz bowls. It's not the same with online modes like QuizLit, and Kahoot."*

The frequency of the use of digital tools to enhance assessment also varies from participant to participant. Some would use digital tools more frequently than other teachers. In one of the academic institutions, one participant made it clear by mentioning that:

*"I also use (digital tools) but not as often as I should."*

The results indicate that digital tools as used by the faculty significantly transformed how they assess their students. Cosi, Voltas, Lázaro-Cantabrana, et al, (2020) found that digital tools, specifically Socrative and Moodle applications, enhanced teaching-learning by providing immediate feedback and engaging students. On the other hand, though there are educators who have embraced various digital tools, there are those who are still cautious, preferring the more traditional methods. However, these choices show there is still a diverse range of approaches in students' academic performance.

#### *Theme 5: Personalized Learning*

The teachers also shared that they leveraged digital tools to create an inclusive learning environment, tailor-fit instruction for learners' needs, and engage students more in the learning process. This finding corroborates with Sparks (2019) observation that digital technologies once used appropriately could constitute a fresh context for teaching and learning. A participant explained how digital tools had assisted her students to catch up with the lessons when absent from the class sessions.

*"There are students who would excuse themselves because they're absent for a myriad of reasons. What I do is to provide a platform for them to monitor their missing outputs.. So they can submit face-to-face or online for those who cannot submit face-to-face...It really is a big help."*

Digital tools enable students to access the learning materials, ensuring equitable opportunities for all learners regardless of physical presence. Another participant described how enthusiastic her students were when their learning content was delivered through digital tools:

*"They (students) really prefer if there is a PowerPoint or...videos...they're attention is easily caught when our discussion is about culture. So I show them videos for example during discussion. They will then report...write their reflections."*

The multimodal formats including text, images, and sounds cater to students' diverse learning styles and preferences. Indeed, digital tools promote inclusion in the teaching and learning by improving learning content, accessibility for all, and personalization (Gottschalk and Weise, 2023).

#### *Theme 6: Collaboration*

The teachers also narrated how these tools provide platforms for information, communication, and collaboration. This relates to how Siemens (2005) underscores that learners connect with each other through non-human means, but allowing for relationship building and exposing oneself to new skills, thoughts, and ideas otherwise inaccessible. The

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utilization of digital tools has become a means for students to interact and collaborate with their peers and instructors building relationships necessary for teaching and learning. This is evident by one participant who stated how she learned about her students' interests from the tools she used in their class activities:

*"In (courses) Understanding the Self we have this topic on Digital Self so I would find about their interest based on what they share from our activities since they're gonna talk about themselves)."*

Another participant detailed how her students would communicate with each to complete a group work.

*"Whenever I give them assignments, they communicate with each other to accomplish the task."*

The participants shared that most of the platforms for these students were Messenger and Google Meet as these were the most accessible applications. The responses of the participants based confirms that the advantages of the use of digital or e-learning tools includes the fact that these are flexible, enhances efficacy, provides opportunities and eliminates barriers in communication, cost effective, considers individual learning, compensates for academic scarcities, and allows for self-pacing (Abaidoo and Arkorful, 2014).

### *Theme 7: Challenges*

The participants also experienced varied challenges in the use of digital tools for teaching. These were insufficient financial support, instructional support, limited resources and access, and limited digital competency.

#### *Subtheme 1: Financial Support*

The faculty faced insufficient finances, hindering the integration of the essential digital tools in teaching and learning. A teacher observed that the students did not have money to spend on data for mobile internet use. A respondent shared that her students would inform her that they did not have the budget for mobile data. A faculty member also shared that she had to spend her own money to purchase data.

This financial constraint impacted the opportunities for both teachers and students to use digital tools that would enhance educational experiences. This particular finding aligns with the of De Vera, Mastul and Jayme (2023) who emphasized that schools must have adequate budgetary allocation to accommodate the use of technologies in instruction; insufficient or lack of funds will be a significant hindrance to its application. *Subtheme 2: Instructional Support*

Another challenge was limited instructional support. A respondent shared that she was not an education graduate and felt the inadequacy in her skills to assess students thus she hoped to be provided with tools that would assist her.

*"Just like me, I am not (an) education (graduate). So it is very challenging from my end on I can really assess my students. How do I make*

*assessment (activities) that I'll give them. So it would be nice if tools will be provided which we can use for assessment."*

Aside from the provision of assessment tools, a respondent shared that in-house trainings on the use of digital tools in teaching were limited, but there were external providers of webinars.

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The limited instructional support may impede the teachers' capacity to cultivate innovative teaching approaches, adjust to the varying needs of students, and assess them effectively.) There is indeed an additional instructional design to help teachers effectively integrate technology (Méndez, Méndez, Anguita, 2022; Ernst and Clark, 2012).

### *Subtheme 3: Limited Resources and Access*

Another crucial issue that emerged was the limited resources that they had in teaching and the accessibility of the resources. The respondents shared the following:

*"They don't have signal. And, Zoom is a burden, so they resort to just using their phone so it's not easy for them to actually navigate the Zoom application...Most of the students are from far-flung areas, so their signals are slow.*

The challenges outlined underscore significant hurdles stemming from limited resources and especially problems in accessibility. There was a heavy reliance on Messenger for communication indicating that the faculty had not utilized a variety of digital platforms because the platform was more accessible for students. The heavy data requirements of tools like Zoom render them difficult for many students to use. The inadequate internet signal further inhibited the use of other tools. These constraints may impede the effective delivery and participation in online learning. This only proves that there is a digital divide between urban and rural areas, with varying availability and accessibility of technology, exacerbating disparities in educational opportunities and outcomes. Lastly, some teachers and administrators may resist the integration of technology in the classroom due to a perceived threat to traditional teaching methods (De Vera, Mastul and Jayme, 2023).

### *Subtheme 4: Limited Digital Competency*

Limited digital competency of students emerged as another challenge in teaching and learning. There were respondents who shared that the students lacked the necessary skills to effectively integrate technology into their instruction, which may lead to suboptimal educational experiences.

*"They don't have signal. And, Zoom is a burden, so they resort to just using their phone so it's not easy for them to actually navigate the Zoom application...Most of the students are from far-flung areas, so their signals are slow.*

Another participant stated that there is a need to capacitate students in their uses so that they too will be updated and capable of utilizing them. This is confirmed by a participant who stated that:

*"They don't have signal. And, Zoom is a burden, so they resort to just using their phone so it's not easy for them to actually navigate the Zoom*

*application...Most of the students are from far-flung areas, so their signals are slow.*

These show that students with limited digital literacy may struggle to navigate online platforms and tools, further hindering their academic progress. This also indicates that there is also a divide amongst schools and its students when it comes to the utilization of digital tools. Many are still comfortable with the traditional way of teaching, making them hesitant

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to try something new and discover its positive effects. Administrators should take the lead in promoting the use of educational technology in schools (De Vera, Mastul and Jayme, 2023).

#### *The Debugging: The Intervention Plan*

Based on the themes mentioned above and the experiences shared the participants from the higher education institution, the researchers recommends the following debugging/intervention plan:

Action to be Taken (HEIs)	Outcome	Activities	Outputs	
Provide continual capacity building programs for both faculty and students in the use of digital tools for teaching and learning	Faculty			
	<ul style="list-style-type: none"> <li>Design engaging instructional materials through the use of digital tools and virtual platforms</li> </ul>	<ul style="list-style-type: none"> <li>Interactive workshops</li> <li>Simulated Teaching Sessions</li> </ul>	<ul style="list-style-type: none"> <li>Innovative and engaging instructional materials</li> </ul>	
	<ul style="list-style-type: none"> <li>Employ digital tools for formative and summative assessments, providing timely and feedback to students</li> </ul>	<ul style="list-style-type: none"> <li>Participation in professional learning communities;</li> <li>online courses and certifications;</li> </ul>	<ul style="list-style-type: none"> <li>Digital assessment tools</li> <li>Virtual learning spaces</li> </ul>	
	<ul style="list-style-type: none"> <li>Create collaborative learning environments using digital tools to enhance communication and interaction among students</li> </ul>	<ul style="list-style-type: none"> <li>webinars and conferences</li> </ul>	<ul style="list-style-type: none"> <li>Linkages and consortia</li> <li>Original collaborative digital outputs</li> </ul>	
	<ul style="list-style-type: none"> <li>Engage in ongoing professional development to stay current with emerging digital tools and trends in educational technology.</li> </ul>			
	Students			
	<ul style="list-style-type: none"> <li>Utilize educational technologies for learning and collaboration</li> <li>Create original content using digital tools</li> </ul>	<ul style="list-style-type: none"> <li>Interactive workshops</li> </ul>		
Ensure financial support in the subscription digital tools that are utilized by the faculty in the implementation of flexible learning to better adapt to the New Normal.	The HEIs			
	<ul style="list-style-type: none"> <li>Allocate a portion of their budget specifically for the acquisition and subscription of digital tools</li> </ul>	<ul style="list-style-type: none"> <li>Inclusion of subscriptions and acquisitions of digital tools in the institutional budget</li> </ul>		
	<ul style="list-style-type: none"> <li>Forge strategic partnerships with universities, tech companies, and educational technology providers</li> </ul>	<ul style="list-style-type: none"> <li>Creation of linkages and partners with relevant institutions and agencies</li> </ul>		
	<ul style="list-style-type: none"> <li>Engage alumni networks for significant sources of financial support</li> </ul>	<ul style="list-style-type: none"> <li>Alumni foundation programs</li> </ul>		
Provide students access to software and hardware necessary for utilizing digital tools and other applications for teaching.				
	<ul style="list-style-type: none"> <li>Grant access to essential software through lending libraries or online platforms</li> </ul>	<ul style="list-style-type: none"> <li>Construction of technology laboratory and hubs</li> </ul>	<ul style="list-style-type: none"> <li>Innovation labs and sandbox environments</li> </ul>	
	<ul style="list-style-type: none"> <li>Upgrade computer labs with up-to-date hardware and software</li> </ul>	<ul style="list-style-type: none"> <li>Purchase of software and hardware</li> </ul>	<ul style="list-style-type: none"> <li>Institutional learning application</li> </ul>	
	<ul style="list-style-type: none"> <li>Implement remote access solutions that allow students to access institution-owned software and applications</li> </ul>	<ul style="list-style-type: none"> <li>Creation of institutional learning application</li> </ul>		

The intervention plan as presented in the matrix, serves as a debugging tool by addressing the challenges through a comprehensive strategy to strengthen the digital and learning ecosystem within HEIs. To resolve the issue of insufficient financial support, the plan proposes budget allocation for the subscriptions of digital tools and collaboration with educational technology providers, ensuring sustainable digital resources for both faculty and students. For limited instructional support, the plan proposes interactive workshops, simulated teaching sessions, and participation in professional learning communities; these enable faculty to improve instructional design and assessment skills. Regarding limited resources and access, the plan supports the construction of technology labs, upgrades to

computer hardware/software, and implementation of remote access modalities, thus improving resource availability and reducing disparities caused by connectivity issues. Lastly, to mitigate limited digital competency, the plan incorporates capacity-building programs, such as digital literacy workshops for students and continuous professional development for faculty, enabling them to confidently navigate and leverage digital tools for collaborative and engaging learning experiences.

### CONCLUSION

The study confirms that the identified higher education institution (HEI) faculty have utilized digital technologies in the conduct of their classes, facilitating collaboration and communication among their students and their colleagues and providing access to valuable academic and training resources. However, the faculty encountered significant challenges that show that there are gaps in infrastructure and institutional preparedness, thus underscoring the importance of context-specific debugging and intervention strategies. Higher education institutions ensure that these plans address the unique and immediate needs of the faculty in the use of digital technologies thereby ensuring a sustainable uninterrupted delivery of education to students, the primary stakeholders, and institutional resilience

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