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Digital Revolution in Higher Education: An Empirical Assessment of the Association Between Digital Technologies and Learning Outcomes

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Abstract This paper aims to assess the relationship that exist between digital revolution and learning outcomes in higher education. Two research questions and hypotheses guided the study. The study used the survey research design and was conducted in the University of Bamenda in 2023/2024 academic year. A sample of 90 first cycle students of social science (out of a total population of 120) in Higher Teacher Training College were selected using simple random sampling techniques. Data for the study was collected through questionnaire and the reliability coefficient obtained was .914. The data was analyzed using Chi square test of independence and Cramer's V was used to get the size effect. The findings indicated that, the p-value (for the use of digital communication, collaboration, learning and management platform) was less than alpha value of 0.05. Cramer's V (for the use of digital communication, collaboration, learning and management platform) was 0.26, indicating a medium association. Moreover, the results revealed that p-value (for the use of problem-based, project-based and game-based learning) was less than alpha value of 0.05. Cramer's V for the use of problem-based and project-based learning was 0.29 and 0.31, indicating a large association. Cramer's V for the use of game-based and video-based learning was 0.25 and 0.22, indicating a medium association. On the basis of the above findings, it was recommended that developmental seminars should be organized to equip both teacher and students with competences necessary to solve the challenges of digital revolution.

Keywords: *Digital revolution, higher education, digital technologies, learning outcomes*

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1. Introduction

Technological innovation or digitalization in education has cause changes in the teaching and learning trends in Cameroon's higher education system. Recognizing the importance of digitalization in the teaching learning process, the Ministry of Higher Education in Cameroon endorsed Goal 4 of the United Nation's 2030 Agenda for Sustainable Development to ensure equitable and sustainable digital access for students of all ages [1,2]. Currently in the educational scenario, teachers and students effectively use digital tools (such as: computers, smartphones, internet), social media online platforms (like Moodle, Absorb, Docebo, e-learning) and methodologies (like simulation, problem-based learning, project-based learning, game-based learning, video-based learning) to enhance active participation of learners [3,4].

In the school context, digital platforms can be defined as technological systems that facilitate economic, academic and classroom management, allow teachers to give tutorials online, provide students with new learning, interaction and work environments and constitute a channel of communication with families [5]. It is worth emphasizing that, since its introduction in the University of Bamenda in 2020 until 2024, digital platform (like Moodle: learning management) is used to share content and activities, monitor students' progress and assess their work or tasks and create spaces for interactive communication, debates and discussion groups around topics of interest. To support teachers in their transition to online facilitation, the University of Bamenda organized seminars in March 2021, September 2022 and 2023 that focused on strategies to facilitate online teaching-learning, how to encourage active participation, and how to assess students learning. Additionally, seminars and workshops were organized at the level of schools and faculties where manual and other reference materials were also revised to align to the online nature of the programme and courses in the university.

However, it has been observed that the digital knowledge and skills that teachers gained from these seminars helped enhance their subsequent facilitations of online teaching learning sessions only in the short run. This is because, most social science graduates find it difficult to acquire the basis competencies to fit into the

labour market in this digital age due to their teachers' instructional strategies [6]. This implies that, the integration of digital education platform activities like communication, collaboration, learning, planning and management into courses will depend on teachers' digital competence. From the foregoing arguments, it is obvious that, teachers use of tools of: digital communication platform (messages, chats, forums, classes, and surveys); digital collaboration platform (blogs, file sharing and wiki tools); digital learning platform (interactive classes, content pages, quizzes, links, video and audio files, tests, glossaries, and indexes); digital planning platform (timetables and calendars); and digital management platform (online tests, links, and access codes) does not necessarily results in improvement in digital teaching and learning. Thus, a rhetorical question is, whether teachers using Moodle platform align their digital competence of tools with their digital competence of technology-driven teaching methods to enhance active participation of learners.

With Moodle, teachers use various technology-driven teaching methods to get their students engaged in a variety of learning contents. For example, teachers use problem-based learning [7], project-based learning [8], game-based learning [9], video-based learning and simulation [10] to enhance active participation of learners. All of these methods encourage learners to be more enthusiastic about learning. Moreover, each of these methods potentially supports all learning levels of the cognitive, affective and psychomotor domain through their discovery of factual information, comparing, applying, analyzing, synthesizing, evaluating and exchange of ideas. However, there is little doubt that a technology-driven teaching method is changing the way teachers teach and students learn in higher education. This is because the use of these digital technologies in higher education is hindered by limited infrastructure, unreliable internet, constant power outage, inadequate technological pedagogical content knowledge amongst teachers and students [4], among other factors. Thus, the shift from the use of analog electronic to digital technologies in higher teacher training college (HTTC), Bambili remains uncertain.

This paper aims to assess the relationship that exist between digital revolution and learning outcomes in higher education. Specifically, the paper seeks to: 1) Examine the association between teachers' use of digital platform (Moodle) and learning outcomes in higher education. 2) Analyze the association between teachers' use of digital methodologies and learning outcomes in higher education. 3) Suggest strategies to enhance teachers' technological pedagogical content knowledge (TPACK) in higher education considering the digital revolution.

2. Literature Review

Technological pedagogical content knowledge (TPACK) in the classroom setting is defined as integration of digital technology in teachers' work practice [11,15]. From a theoretical perspective, TPACK is deeply rooted in Shulman's [16,17] theory of pedagogical content knowledge. TPACK theory assumes that, digital technologies in classrooms are context bound in terms of subject matter, grade level, student backgrounds and the type of technology available [15]. The framework of the theory explains that, there are seven types of knowledge: technological knowledge (TK-the general knowledge of digital and emerging technologies, such as using interactive tools), pedagogical knowledge (PK-the general knowledge of how to teach), content knowledge (CK-the knowledge of social science content), pedagogical content knowledge (PCK-the knowledge of adopting pedagogical strategies to foster students' understanding of the content of social science subject), technological content knowledge (TCK-the knowledge to represent the social science content subject with digital technologies), technological pedagogical knowledge (TPK-the knowledge of presence, components and capabilities of various digital technologies which are used for teaching), and technological pedagogical content knowledge (TPACK-the knowledge of using technologies to teach and represent the social science content). The framework of the model is illustrated in Figure 1.

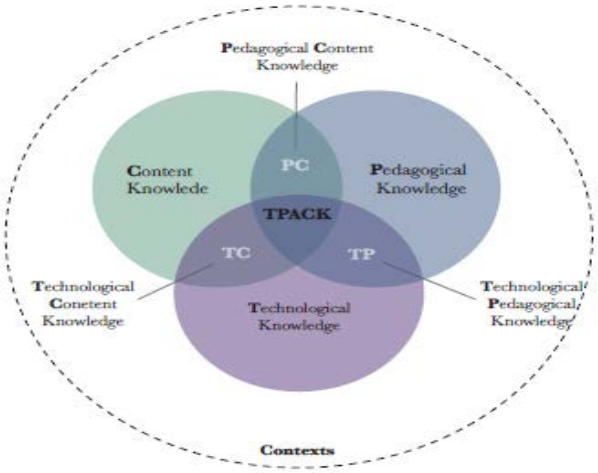

Figure 1. Technological Pedagogical and Content Knowledge framework [11]

Figure 1 indicates that TPACK is the intersection between PCK, TCK and TPK and extends beyond isolated knowledge domains. Interesting, Mishra and Koehler [11] state that, knowledge in digital technologies use do not automatically guarantee good teaching with technologies. This implies that in HTTC, Bambili a central issue for teachers is making a decision on the best way to use technology to facilitate student learning.

Empirically, Fialho, Cid & Coppi [12] used a sample of 105 students and 45 teachers in five schools in Portugal to analyze the advantages and difficulties of teachers and students regarding the use of nine digital platforms and technologies for daily school activities. The results reveal that, using digital platform activities like communication, collaboration, learning, planning and management help in developing students' soft skill and improving their performance. The results further indicate that, factors like obsolete technological tools, insufficient equipment and poor internet access hinder teachers and students use of digital platforms and technologies.

Similarly, Maguatcher & Ning [4] use a survey research design and questionnaire to sample 25 (45.45%) students from the University of Yaoundé I, 17 (30.91%) from the University of Yaoundé II, and 13 (23.64%) from the

University of Maroua. From the findings they recommend that, higher education institutions (HEIs) must adapt their teaching methods to meet digital revolution and labour market trends as well as, increase investment in digital infrastructure and internet access. This will address the challenges of advance digital transformation in Cameroon's higher education sector. Thus, strengthen the rationale for integrating digital technologies in higher education curriculum.

In an earlier study, Lopes & Gomes [3] corroborate the idea, claiming that digital platforms are excellent resources to transmit content and activities, monitor students' work, sort out doubts and create spaces for interactive communication, and assess students' progress. Similarly, Calvet, et al., [5] findings reveal that, the use of educational digital platforms, provide new learning and interaction environments between teachers and students. However, the aspects that act as a barrier in the paths of technologies are mainly related to the equipment; time spent accessing it, preparation, technical support, lack of digital competence and teachers' beliefs and attitudes towards the use of digital technologies in the classroom [5]. To reiterate Calvet, et al., [5] arguments, Schneider & Binder [13] state that the use of Moodle helps to promote teachers' activities across disciplines through their working together in order to share the responsibility for their students during the course.

This finding is in agreement with findings that, through the Moodle platform, the learning management system (LMS) can help in teaching and learning in various aspects, including providing teachers with opportunities for integrating different instructional methods and strategies to promote active participation of students [7,8,9,10] An important implication of this finding in the context of project based, problem-based, game based, video-based learning and simulation is that, the areas of student responsibility and initiative, generative learning activities, authentic learning contexts, assessment strategies, and co-operative support are all important considerations for teachers.

3. Methodology

The design of the study is survey and the study was conducted in the University of Bamenda in 2023/2024 academic year. The convenient sampling technique was used to select the school and university. A sample of 90 first cycle students of social science (out of a total population of 120) in Higher Teacher Training College (HTTC) were selected using simple random sampling techniques. The sample size (90) was chosen using the Krejcie and Morgan's table [14]. Data for the study was collected using questionnaire. Generally, the likert scale questionnaire covered items pertaining to: Moodle platform (measured as tools of digital communication, collaboration, learning and management platform), innovative and participatory methods of teaching in the digital age (measured as problem-based, project-based, game-based and video-based learning), learning outcomes (measured as grade, is a function of the following sources of measurement: test and exam. High level if grade in exam was above 50% when digital technology was used during the teaching learning process and low level if grade was below 50%); and strategies to enhance teachers' TPACK (measured as ways to improve teachers' PCK, TCK, TPK). The instrument was face validated by two experts in the Department of Curriculum and Pedagogy from the Faculty of Education, The University of Bamenda. The indicated corrections and suggestions were duly integrated into the final draft of the instrument. Six (06) copies of the questionnaire instrument were trial tested on social science students in the second cycle of HTTC, Bambili. Cronbach Alpha (α) statistics was used to determine the internal consistency of the items. The instrument was found to have the reliability coefficient of .914. The researcher used direct delivery method to administer the instrument to the respondents. The questionnaire was administered within two days and all the administered questionnaires were retrieved.

Two hypotheses were formulated to guide the study.

Ho_1 : There are no significant association between teachers' use of digital platform (Moodle) and students' learning outcomes in higher education?

Ho_2 : There are no significant association between teachers' use of digital driven teaching methods and students' learning outcomes in higher education?

Chi square test of independence was used to test the null hypotheses at 0.05 level of significance. If the p value is less than our alpha level of 0.05, we will reject the null hypothesis (indicating that there is a significant association between our variables). If the p value is greater than our alpha level of 0.05, we will fail to reject the null hypothesis (indicating there is not a significant association between our variables). Cramer's V was used to get the size effect. The Cramer's V guideline for strength of association for a small effect is 0.06, a medium effect is 0.17 and a large effect is 0.29. The students, teachers and head of departments were informed and they were not forced to participate in the study. The instrument constructed was anonymous and confidentiality was guaranteed.

4. Findings of the Study

Before presenting the empirical results, descriptive results are presented in Table 1, 2, 3, 4 and 5 respectively.

Table 1. Differences in response concerning gender, departments and the use of technology to support learning among students of different ages

Age Group	Gender		Total	Department			Total
	Male	Female	Yes	History	Geography	Economics	Yes
19-21	7	33	40	13	15	12	40
22-24	6	21	27	9	7	11	27
>25	6	17	23	8	8	7	23
Total	19	71	90	30	30	30	90

Table 1 revealed that out of 90 respondents of the use of technology to support learning, 40 of them were within 19 to 21 years, 27 were between the ages of 22 to 24 and 23 of them were 25 years and above. Notably, 33 female respondents between the ages of 19 to 21, 21 female respondents between the ages of 22 to 24 and 17 female respondents age 25 and above were of the opinion that, the use of technology would support their learning outcomes. More precisely, 19 male respondents as opposed to 71 female respondents accepted that the use of technology would support their learning outcomes. Out of the 30 respondents from each department, a total of 13 respondents from History, 15 respondents from Geography and 12 respondents from Economics who were within the ages of 19 to 21 were of the opinion that, the use of technology would support their learning outcomes.

Table 2 portrayed that out of the 90 respondents, 35 of them preferred both face-to-face and online classes while majority (46) of them preferred face to face classes only as opposed to 9 of them who preferred online classes only. Precisely, out of the 40 respondents, who were within 19 to 21 years, 21 of them agreed that they prefer face to face classes, 2 of them preferred online classes as opposed to 17 who preferred both. Moreover, out of the 27 respondents, who were within 22 to 24 years, 10 of them agreed that they prefer face to face classes, 6 of them preferred online classes as opposed to 11 who preferred both. Also, out of the 23 respondents, who were within 25 years and above, 15 of them agreed that they prefer face to face classes, 1 of them preferred online classes as opposed to 7 who preferred both.

Table 2. Differences in response concerning the preference of classes to support learning among students of different ages

Age Group	Face to Face Classes	Online Classes	Both	Total
19-21	21	2	17	40
22-24	10	6	11	27
>25	15	1	7	23
Total	46	9	35	90

From Table 3 the answer to research question number 1 was derived. It shows that 49(54.4%) of the students agreed that they sometimes use online classes during the teaching learning process and, 43(47.8%) of the students agreed that they sometimes use chats during the teaching learning process or rarely send and receive text messages using the Moodle platform. 32 (35.6%) of the students accepted that they often use the Moodle platform to download course outline and content. 40 (44.4%) and 54 (60%) of the students were of the opinion that they rarely use the platform to store course content and to post files in the course blogs respectively. A handful, 20 (22.2%) and 18 (20%) of the students agreed that they often use the platform to engage in group discussions and to download audio files. Similarly, minority 18 (20%) of the students accepted that they usually use the platform to download course references and links. Majority of the students agreed that they rarely use the platform to do quizzes (66.7%), tests (68.9%) and to submit assignments (57.8%). Interestingly, 48.9% of the students agreed that their grade in a course is rarely less than 50% when Moodle platform is used.

Table 3. Distribution of responses according to association between use of digital platform and Learning Outcomes

	Use of Moodle Platform	Frequency (%)				Total
		Rarely	Sometimes	Often	Usually	
1	I use online classes during the teaching learning process	38 (42.2)	49 (54.4)	3 (3.3)	0 (0.0)	90 (100)
2	I use chat during the teaching learning process	27 (30.0)	43 (47.8)	16 (17.8)	4 (4.4)	90 (100)
3	I send and receive text messages using the Moodle platform	43 (47.8)	20 (22.2)	15 (16.7)	13 (13.3)	90 (100)
4	I use the Moodle platform to download course outline and content	24 (26.2)	21 (23.3)	32 (35.6)	13 (14.4)	90 (100)
5	I use the platform to store course content	40 (44.4)	18 (20.0)	23 (25.6)	9 (10.0)	90 (100)
6	I use the platform to post files in the course blogs	54 (60.0)	15 (16.7)	15 (16.7)	6 (6.7)	90 (100)
7	I use the platform to engage in group discussions	38 (42.2)	24 (26.7)	20 (22.2)	8 (8.9)	90 (100)
8	I use the platform to download audio files	39 (43.3)	28 (31.1)	18 (20.0)	5 (5.6)	90 (100)
9	I use the platform to download course references and links	30 (33.3)	19 (21.1)	21 (23.3)	20 (22.2)	90 (100)
10	I use the platform to do quizzes	60 (66.7)	15 (16.7)	7 (7.8)	8 (8.9)	90 (100)
11	I use the platform to do tests	62 (68.9)	14 (15.6)	7 (7.8)	7 (7.8)	90 (100)
12	I use the platform to submit assignments	52 (57.8)	25 (27.8)	8 (8.9)	5 (5.6)	90 (100)
13	My grade in a course is less than 50% when Moodle platform is used	44 (48.9)	36 (40.0)	9 (10.0)	1 (1.1)	90 (100)
14	My grade in a course is more than 50% when Moodle platform is used	29 (32.2)	30 (33.3)	25 (27.8)	6 (6.7)	90 (100)

Table 4. Distribution of responses according to association between use of digital driven innovative teaching methods and Learning Outcomes

	Use of digital driven innovative teaching methods	Frequency (%)				Total
		Rarely	Sometimes	Often	Usually	
1	Identifying a real world problem helps me to actively participate in problem solving during the teaching learning process (via Moodle platform)	16 (17.5)	46 (51.1)	20 (22.2)	8 (8.9)	90 (100)
2	Exchanging ideas concerning a project with other students engages me in active participation during the teaching learning process (via Moodle platform)	13 (14.4)	30 (33.3)	33 (36.7)	14 (15.6)	90 (100)
3	Incorporating the content into games engages me in active participation during the teaching learning process (via Moodle platform)	39 (43.3)	24 (26.7)	19 (21.1)	8 (8.9)	90 (100)
4	Incorporating the content into video engages me in active participation during the teaching learning process (via Moodle platform)	31 (34.4)	39 (43.3)	12 (13.3)	8 (8.9)	90 (100)
5	My grade in a course is less than 50% when digital driven methods are used	50 (55.6)	22 (24.4)	12 (13.3)	6 (6.7)	90 (100)
6	My grade in a course is more than 50% when digital driven methods are used	30 (33.3)	27 (30.0)	18 (20.0)	15 (16.7)	90 (100)

Table 5. Strategies to improve teachers' technological pedagogical content knowledge

Variables	Responses	Frequency	Percent	Cumulative percent
Integrating technology into the subject matter of a course	Organise seminars focusing on how to use the Moodle platform to upload course outline and content	54	60.0	60.0
	Monitor online classes and provide feedback	16	17.8	77.8
	Educate teachers on how to use the Moodle platform to assess learning	20	22.2	100.0
	Total	90	100.0	
Integrating technology into pedagogical practices	Organize seminars and educate teachers on how to engage students in group discussions	38	42.2	42.2
	Organise seminars and educate teachers on how to use problem solving methods	36	40.0	82.2
	Organize seminars and educate teachers on how to use games and videos to teach	16	17.8	100.0
	Total	90	100.0	
Integrating technology into content and pedagogical practices of a course	Organise seminar on how to use the Moodle platform to enhance teaching and learning	32	35.6	35.6
	Provide technological experts to assist teachers	20	22.2	57.8
	Teachers should have access to computers, wifi and internet	38	42.2	100.0
	Total	90	100.0	

From Table 4, answer to research question number 2 was obtained. It shows that 46(51.1%) of the students agreed that using Moodle platform sometimes to identify a real-world problem helps them to actively participate in problem solving during the teaching learning process. 36.7% of the students accepted that using Moodle platform often in exchanging ideas concerning a project with other students engages them in active participation during the teaching learning process. Furthermore, 39 (43.3%) of the students agreed that using Moodle platform either rarely or sometimes for incorporating the content into games and video engages them in active participation during the teaching learning process. Interestingly, 55.6% of the students agreed that their grade in a course is rarely less than 50% when digital driven innovative teaching methods are used.

From Table 5 the answer to research question number 3 was obtained. Out of the 90 respondents who made suggestions on the strategies of integrating technology into the content of the course, 54(60%) of the them agreed that seminars should be organized focusing on how to use the Moodle platform to upload course outline and content, 20(22.2%) of them accepted that teachers should be educated on how to use the Moodle platform to assess learning and, 16 (17.8%) of them agreed that online classes should be monitored and feedback provided. As concern the integrating of technology into pedagogic practices, 38(42.2%) of the students suggested that seminars should be organized and their teachers should be educated on how to engage students in group discussions; 36 (40%) of them said seminars should be organized and their teachers should be educated on how to use problem solving methods while; 16 (17.8%) of them suggested that seminars should be organized and their teachers should be educated on how to use games and videos to teach. Out of the 90 respondents who made suggestion on strategies of integrating technology into the content and pedagogical practices of a course, a handful, 20 (22.2%) of them proposed that technological experts should be provided to assist teachers. Majority of them recommended that seminar should be organized on how to use the Moodle platform to enhance teaching and learning (35.6%) and teachers should have access to computers, wifi and internet (42.2%).

Testing of hypotheses using chi square test for independence is presented in Table 6 and 7.

Table 6. Association between use of digital platform and degree of learning outcomes

Variables		Value	df.	Asymptotic Significance (2-sided)
Use of digital communication platform (Message)	***Pearson chi square***	18.691[a]	9	0.028
	Likelihood Ratio	19.286	9	0.023
	Cramer's V	0.263		0.028
	Contingency Coefficient	0.415		0.028
	No of Valid Cases	90		
Use of digital collaboration platform (blogs)	***Pearson chi square***	18.870[a]	9	0.026
	Likelihood Ratio	21.884	9	0.009
	Cramer's V	0.264		0.026
	Contingency Coefficient	0.416		0.026
	No of Valid Cases	90		
Use of digital learning platform (Group Discussion)	***Pearson chi square***	18.548[a]	9	0.029
	Likelihood Ratio	20.526	9	0.015
	Cramer's V	0.262		0.029
	Contingency Coefficient	0.413		0.029
	No of Valid Cases	90		
Use of digital Management platform (Quizzes)	***Pearson chi square***	22.544[a]	9	0.007
	Likelihood Ratio	21.753	9	0.010
	Cramer's V	0.289		0.007
	Contingency Coefficient	0.448		0.007
	No of Valid Cases	90		
Use of digital Management platform (Assignments)	***Pearson chi square***	19.689[a]	9	0.020
	Likelihood Ratio	18.789	9	0.027
	Cramer's V	0.270		0.020
	Contingency Coefficient	0.424		0.020
	No of Valid Cases	90		

From the statistical test in Table 6, it is evident that the p- value for the use of digital communication, collaboration, learning and management platform are all less than our alpha value of 0.05. Thus, the null hypothesis is rejected. This implies that there is a statistically significant association between the use of digital platform and students' learning outcomes in higher education.

Cramer's V for the use of digital communication, collaboration, learning and management platform are 0.26, indicating a medium association. Looking back at our contingency table, we would be able to conclude that the use of digital platform is significantly more likely to be related to learning outcomes in higher education among students of difference gender, ages, departments and preferences of classes to support their learning.

Table 7. Association between use of digital driven innovative teaching methods and degree of learning outcomes

Variables		Value	df.	Asymptotic Significance (2-sided)
Use of problem-based learning	***Pearson chi square***	22.740[a]	9	0.007
	Likelihood Ratio	24.917	9	0.003
	Cramer's V	0.290		0.007
	Contingency Coefficient	0.449		0.07
	No of Valid Cases	90		
Use of project-based learning	***Pearson chi square***	26.317[a]	9	0.002
	Likelihood Ratio	25.420	9	0.003
	Cramer's V	0.312		0.002
	Contingency Coefficient	0.476		0.002
	No of Valid Cases	90		
Use of games-based learning	***Pearson chi square***	17.556[a]	9	0.041
	Likelihood Ratio	18.773	9	0.027
	Cramer's V	0.255		0.041
	Contingency Coefficient	0.404		0.041
	No of Valid Cases	90		
Use of video-based learning	***Pearson chi square***	13.339[a]	9	0.148
	Likelihood Ratio	14.837	9	0.104
	Cramer's V	0.222		0.148
	Contingency Coefficient	0.359		0.148
	No of Valid Cases	90		

From the statistical test in Table 7, it is clear that the p-value for the use of problem based, project-based and game-based learning are all less than our alpha value of 0.05. Thus, the null hypothesis is rejected. This implies that there is a statistically significant association between the use of digital driven innovative teaching methods and students' learning outcomes in higher education. However, the p-value for the use of video-based learning is 0.14 which is greater than our alpha value of 0.05. Thus, we fail to reject the null hypothesis, meaning there is not a significant association between the use of video-based learning and learning outcomes in higher education.

Cramer's V for the use of problem based and project-based learning are 0.29 and 0.31 respectively, indicating a large association. Cramer's V for the use of game-based and video- based learning are 0.25 and 0.22 respectively, indicating a medium association. Looking back at our contingency table, we would be able to conclude that the use of digital driven innovative teaching methods is significantly more likely to be related to learning outcomes in higher education among students of difference gender, ages, departments and preferences.

5. Discussion of Findings

From the analysis of the results, it was observed that

there are positive and significant associations between teachers' use of digital platform and students' learning outcomes in higher education. Out of the four digital education platform activities studied, the relationship was significant in all the platform activities. The digital education platform activities included communication, collaboration, learning, and management. These results are comparable to Fialho, Cid & Coppi [12] in which using digital platform activities like communication, collaboration, learning, planning and management help in developing students' soft skill and improving their performance. The medium relationship could be as a result of effective use of message, blogs, group discussions, quizzes and assignments in the different departments by both the teachers and students. Lopes & Gomes [3] as well as Calvet, et al., [5] agreed with this. They found out that digital platforms are excellent resources to transmit content and activities, monitor students' work, provide new learning and interaction environments between teachers and students. This confirms the findings of this study that the students' grade in a course is rarely less than 50% when Moodle platform is used.

Positive and significant relationship was observed in the use of digital driven innovative teaching methods and students' learning outcomes in higher education. However, out of the four digital driven innovative teaching methods examined, the relationship was significant in the use of problem-based learning, project-based learning and game-based learning. The significant relationship could be attributed to the effective use of methods that promote active participation of students and students of different ages effective use of technology to support their learning outcomes. These were highlighted in the works of Sinulingga & Moenir, [8], Yang, et al., [9], Cattaneo, et al., [10] and Herayanti, et al., [7]. The large and medium relationship that exist between teachers' use of digital driven innovative teaching methods and students' learning outcomes in higher education is an indication of students' active engagement during the teaching learning process. This implies that they can identify new ideas, think critically, implement and integrate them. This corroborates Schneider & Binder [13] findings and the findings of this study that students' grade in a course is rarely less than 50% when digital driven innovative teaching methods are used.

The findings have also indicated that there is a relationship between the strategies of integrating technology into the content and pedagogic practices of a course and students learning outcomes. The results reveal that teachers' knowledge to integrate technology into the content and pedagogic practices of a course could increase as their technological pedagogical content knowledge increases. This is explained by the proposal that, seminar should be organized on how to use the Moodle platform to enhance teaching and learning and technological experts should be provided to assist teachers. These suggestions are consistent with those of Mishra & Koehler, [11] and Koh & Chai, [15] that, there should be the integration of digital technology in teachers' work practice. The suggestion that teachers should have access to computers, wifi and internet are similar to the recommendations by Maguatcher & Ning [4].

Again, the results reveal that the relationship between digital revolution in higher education and students' learning outcomes is indispensable. The use of four digital education platform activities, digital driven innovative teaching methods integrate with teachers' strategies of integrating technology into the content and pedagogic practices of a course. As a result, the History, Geography or Economics teacher of HTTC, Bambili regardless of his/her period of study, is obliged to have some basic knowledge of educational technologies since much of man's activities in society is concerned with technological matters. Generally, therefore, teacher' knowledge of digital revolution is an essential characteristic of teachers' pedagogical content knowledge and it is an enormous responsibility of every higher education policymaker, student and educator to have a fair knowledge of other digital platform activities and innovative strategies if they should be able to improve students' learning outcome effectively. To corroborate the aforementioned discussion on the implications of the result to pedagogic practice, [4], affirm that, the use of these digital technologies in higher education is hindered by, inadequate technological pedagogical content knowledge amongst teachers and students, among other factors.

6. Conclusion

Through the Moodle platform, the learning management system (LMS) can help in teaching and learning in various aspects, including providing teachers with opportunities for integrating different instructional methods. From the findings the study concludes that: there were statistically significant associations between teachers' use of digital platform and students' learning outcomes in higher education. Moreover, there were statistically significant relationships between teachers' use of digital driven innovative teaching methods and students' learning outcomes in higher education. Also, the study reveals that teachers' knowledge to integrate technology into the content and pedagogic practices of a course could increase as their technological pedagogical content knowledge increases. Thus, strategies to enhance teachers' technological pedagogical content knowledge (TPACK) in higher education considering the digital revolution include: organization of seminars focusing on how to use the Moodle platform, monitoring online classes and providing feedback.

Recommendations for Innovative Policy and Practice

- The Ministry of Higher Education is advised to strengthen grass root quality assurance and standard structures by way of provision of adequate human and material resources to monitor the implementation of digital technology in higher institutions of learning.
- To university administration, the study recommends that they should organize seminars or workshops and make a follow up with the aim of ensuring that technological innovations are implemented effectively and efficiently.
- To teacher trainers, the study recommends that they should take technological innovation or digitalization in education with dedication and seriousness.

To students, the study recommends that, they should

not only see technological innovations or digitalization in education as use of technology but as a way of participating actively in the teaching learning process and using higher level thinking to solve complex problems.

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