

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era



Yaw Odame Gyau¹, Ernest Kwabena Gyan²

¹Snr. Lecturer, Ghana Institute of Journalism, P. O. Box GP 667, Accra, 32 Gamel Abdul Nasser Rr. Osu, Accra, Ghana.

²Snr. Lecturer, Accra Institute of Technology, Caprice, Accra

ABSTRACT: Although the phenomenon of technology is gradually being integrated into tertiary education in Ghana, challenges impeding effective integration are endemic. Among the upfront challenges are the perceptions and attitudes of students and lecturers to adopt and adapt to learning technologies for smooth integration of technology into academic programmes in public universities. From the Constructivist and Positivist paradigm, this is an exploratory study of the perspectives of Policymakers and Implementers in their quest to infuse technology into academic programmes. Qualitative method through in-depth interviews of Policymakers and Policy Implementers (IT Support Staff) was adopted in six (6) accredited public universities. The study found that public universities are at the Adaptation level of integrating technology into academic programmes. This has impacted positively on teaching and learning because it has enhanced the understanding of how to use modern technological tools and techniques, while supplementing and facilitating face-to-face teaching and learning.

KEYWORDS: Perception, Attitude, Acceptance, Adapting, Integration of Technology, Technology Integration Matrix (TIM), COVID19.

INTRODUCTION

Integration of technology into curriculum is a huge issue in educational technology and requires urgent attention to ensure smooth infusion of learning technologies into academic programmes. Integration of technology is an ontological phenomenon that must be carefully studied and understood within the context of higher education. Technology is gradually being integrated into all sectors of the educational ecosystem. Within the higher education ecosystem, the vision of the National ICT in Education Policy (NICTEP, 2004) as well as the National ICT Policy for Development (ICT4D, 2003) are listed respectively as follows: “To enable graduates from Ghanaian educational institutions to confidently and creatively use ICT tools and resources to develop requisite skills and knowledge needed to be active participants in the global knowledge economy by 2015”; and “To transform Ghana into information rich, knowledge based, technology driven, high income economy and society”. Achieving this national vision is critical to the development of Ghana and there is the need for policies to be formulated to steer the smooth integration of technology into tertiary education.

The purpose of this research was to understand the phenomenon of Integration of Technology among Policymakers and Implementers in Higher Educational Institutions (HEIs) in Ghana during the COVID era (2021). First, to explore the perspectives of Policy-makers and Implementers (IT Support Staff) about their own peculiar perceptions and attitudes in the integration process and secondly, elicit perceptions of Policy-makers and Implementers about students and lecturers as end-users, in the process of integrating technology into academic programmes at six(6) top public universities in Ghana; namely, University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Cape Coast (UCC), University of Education, Winneba (UEW), University of Development Studies (UDS) and University of Professional Studies, Accra (UPSA).

The problem is that Policymakers and Implementers (IT Support Staff) in public universities, form the core of principal leadership in the process of integrating technology, and their mandate goes a long way to affect the effective infusion of technology into academic programmes. Integrating technology into tertiary education in Ghana, is impeded by a myriad of challenges. Among the upfront challenges are the perceptions and attitudes of students and lecturers to adopt and adapt to learning technologies for smooth integration of technology into academic programmes. From the Constructivist standpoint, this study explored the perceptions of Policymakers, IT Support Staff, Students and Lecturers and their influence on the level of infusion of technology.

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

The objectives of the research were primarily, to investigate the integration methods currently being used and the impact on teaching and learning. What are the integration methods currently being used and the impact on teaching and learning? Secondly, to determine the level of Integration of Technology based on the domains of the Technology Integration Matrix (TIM). What is the level of infusion of technology into academic programmes? Thirdly, to explore the peculiar perceptions of Policymakers and Implementers in accepting and adapting to integration. What are the perceptions of Policymakers and Implementers towards accepting and adapting to integration of technology? Finally, to elicit the perceptions of Policymakers and Implementers towards students and lecturers, accepting and adapting to use technology in the integration process. What are the subjective views of Policymakers and Implementers concerning the perceptions of students and lecturers in accepting and adapting to integrating technology into academic programmes? The extant literature presents gaps that this study sought to fill because previous studies in Ghana failed to offer a comprehensive outlook to the impact of perception of Policymakers and Implementers on integration in Ghanaian public universities. Furthermore, the level of integration of technology at HEIs through the lens of the Technology Integration Matrix (TIM) remain a gap and this study sought to fill that gap.

LITERATURE REVIEW

Rivers et al. (2015) cited that Ghana has demonstrated a general commitment to using ICTs to improve the quality of education at the presidential and ministry levels, as can be demonstrated by the fact that education receives the highest amount of national budget resources. Some of the major public universities in Ghana have ICT policies, while others have not or are in the process of acquiring one; also, because some ad hoc policies were promulgated at the onslaught of the COVID19 Pandemic. Dagada and Chigona (2013) in their study, realised that some of the universities understudied had put policies in place to encourage adoption of the ICTs to facilitate teaching and learning. However, the authors explained that some policies discouraged some potential users from using the technology in the classroom.

Aslan et al (2011) recommended that educational policymakers need to find a way to better facilitate and support the customized, learner-centered educational paradigm, including providing funding for technology systems and teacher training, and letting teachers devote additional time to developing customized instruction and assessments. In South Africa, Govender and Govender (2010) in their study found that overall, the educators' perceptions are somewhat positive across most IS constructs with the notable exception of Perceived Behavioural Control and Facilitating Condition.

Kirkwood and Price (2013) suggest that policymakers and school administrators must begin to understand and appreciate the humongous nature of their mediating role as well as the scope of integration of technology in education. Primitive and traditional ways of administering ICTs must be discarded for a more modern approach. Claron et al. (2017), in a quest to disclose the relationship between policymakers and teachers, studied the differences in the perspectives of School Principals and Teachers regarding Technology Integration. The study revealed that there was greater convergence of the views of teachers' and school principals' regarding the contribution of ICT resources to teaching, but there was also more divergence when it comes to the implementation process in public schools in Chile.

Kencaid and Feldner (2002) in reviewing a host of works, revealed that Sandholtz, Ringstaff, and Dwyer (1997) found administrative support was crucial in determining whether teachers would integrate technology. Kofi Mangesi, 2007, stated categorically, that although government attitudes about the use of ICTs in education are positive, these attitudes are less positive among educators and administrators in the universities. To put it in context, if the attitudes of educational administrators towards the use of ICTs are less positive over a decade ago, then it is important to revisit the issue and investigate the attitudes of school administrators in this current dispensation and find out what has changed. Hence the need to study the role of Policymakers and Implementers in the quest to integrate technology into academic programmes.

THEORETICAL FRAMEWORK

Theories underpinning this research are the Constructivist Theories of Perception, Technology Acceptance Model (TAM) and the Technology Integration Matrix (TIM). **The Constructivist Theories of Perception** is the first theoretical foundation for the study. Helmholtz (1821–94), believed that perception was based on a process of inference. He argued that, based on the sensations we receive, we draw conclusions about the nature of the object or event that the sensations are most likely to represent as cited by Rookes and Wilson, (2000). Eysenck and Keane (1995) have suggested three shared assumptions about perception: Perception is an active and constructive process involving more than the direct registration of sensations; Perception occurs indirectly as the end-product of the interaction between the stimulus input and the internal hypotheses, expectations, and knowledge of the observer. Motivational and emotional factors can also play a part in this perceptual processing; Perception is influenced by individual factors, and this means that errors will sometimes be made, leading to inaccurate perceptions (Rooke and Willson, 2000). Neisser (1976) sees perception as an active, cyclic process in which the viewer must check and re-check input against expectations.

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

The Technology Acceptance Model (TAM) developed by Davis (1989), is an adaptation of the Theory of Reasoned Action (TRA) to the field of Information systems as postulated by Venkatesh, Morris, Davis, and Davis (2003). The main objective of the TAM is to express the need for an individual to adopt an innovation and make use of it easily. Numerous research has made considerable use of the TAM framework to investigate the application of technology in education on both a quantitative (Al-Adwan et al., 2020) and qualitative level (Huang et al., 2019). All other facets of technology integration that cannot be fully revealed by quantitative studies are brought to light by a qualitative investigation. Using a qualitative approach, Vogelsang et al. (2013) discovered that trust in colleagues and managers significantly correlated with technology acceptance, however the variable trust did not; a phenomenon which would not have been revealed if the researchers had not used a qualitative approach. Importance of the TAM to this study is that the independent variables of this study, which is perception was modelled on TAM's variables of perceived usefulness and perceived ease-of-use. Positive perceptions and attitudes of students and lecturers leads to ease-of-use while the availability of learning technologies for infusion, informs instructors and policymakers and school administrators on the usefulness of ICTs in the teaching and learning process.

The Technology Integration Matrix (TIM) was introduced by the Florida Center for Instructional Technology (FCIT) at the University of South Florida, as a guide for teachers and administrators in the practice of integrating technology. The TIM is based on the theory of social constructivism in which new learning occurs when students interact with each other to build new knowledge or gain new understanding (Allsopp et al 2007). This Matrix was relevant to this study in two major delineations; the first is to help determine the level of technology integration at the selected public universities and second, to determine how instructors and learners are engaging the five domains in the teaching and learning process. It must be noted however, that the Technology Integration Matrix (TIM) was used to test the levels of integration of technology in the selected public universities, considering the characteristics of the learning environments and the mediating role of perceptions and attitudes of policymakers and implementers, in the quest to infuse technology into higher education.

METHODOLOGY

Policymakers and Policy implementers

(IT support staff) were selected from each of the six accredited public universities in Ghana. According to the National Accreditation Board (NAB) there are fifteen (15) accredited public universities in Ghana. This study purposively sampled six (6) based on their rank as top universities, integration of technology status and geographical/regional representation. The population is 120 Policymakers and Implementers in 6 accredited public universities. Sample size was 17 Policymakers and Implementers drawn from a total of 120 Policymakers and Implementers (IT Support Staff). From a review of many qualitative research studies, when studying phenomenology, the grounded theory prescribes a sample size of 20 – 30 respondents. (Creswell and Poth, 2018; Charmaz, 2006). This study sampled 17 Policymakers and Implementers instead of the initial target of 20, due to the fallouts of some specific personnel which declined the interview request due to health issues pretty much associated with the lingering on of the COVID19 pandemic.

Sampling techniques used were Purposive sampling and Stratified Random Sampling technique. Among the Policymakers and Implementers, stratification considered the gender; male and female, status/rank but subject to the number of staff consisting of a strata and the knowledge of subjects understudy (Cresswell, 2018).

Data collection method deployed the use of telecommunication to conduct the interviews from March to October 2021. Due to ethical clearance, a letter of introduction, requesting interviews with the respondents, was sent to the office of the Registrars of the various universities and by extension to the Vice Chancellor's office in some cases, depending on the bureaucratic culture in all the six selected public universities. Consequently, management authorized the requisite faculties, institutes, and departments to provide the high-ranked officers to be interviewed; they were in their designated portfolios as Pro-voists for education, IT Directors, and IT Support Staffs (one in each university). To confirm the legitimacy of the study, each respondent received a memo introducing the interviewer and stating the purpose of the research. All respondents were called beforehand to arrange for a convenient interview time. The interviews were relatively difficult to arrange since these high ranked officers run shift system which varied their work schedules due to the COVID -19 new work policies. Thus, they were partially in the office about half a day on average, making it necessary to interview them not in-person but remotely through telephone. And because almost all respondents were not comfortable with the face-to-face interview, for fear of a possible COVID-19 infection, they opted for telephone interviews though the ZOOM telecommunication video conference app, of which respondents were familiar with operating. Thus, these interviews were conducted via ZOOM with the same set of questions in a question guide with a memo log. Pursuant to this arrangement, each of these interviews which lasted 60 to 90 minutes were done successfully across the six universities. While conducting interviews in-person is ideal in principle, it is always important to adapt to what can be done in practice, and telephone interviews was most effective in this COVID-19 era.

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

Instrument

The instrument, Interview guide, was created based on the Laddering method (Blake, 2004; Bourne and Jenkins (2005) and Means-End Chain model of Attributes, Consequences and Values (ACV) which was structured into three sections; Attributes of Perception and attitude section; Consequences of the challenges and acceptance of technology section and finally the Values of the variables in the TIM and UTAUT Model which were the main theories underpinning the study. Through an Interview guide, with focus on the objectives and research questions, primary data was collected to assess the subjective views of the perceptions and attitudes of policymakers and implementers to determine the extent to which learning technologies and support systems have been provided, to ensure adequate infusion of technology into the teaching and learning process in the various universities.

Data Analyses

The data, collected through interviews, were thematically analyzed by coding data, identifying, and relating the themes and sub-themes, that is, open, axial and selective coding were conducted respectively, and facilitated by a qualitative data analyses tool - using Nvivo software (version 12). The thematic analysis was conducted in accordance with a six-stage process proposed by Braun et al. (2019). These stages included familiarisation with the data, creating initial codes, searching for themes, revising themes, defining and naming themes, and writing the report.

RESULTS AND ANALYSES

The first objective that this study seeks to achieve was to investigate the integration methods currently being used in public universities in Ghana and the impact of these integration methods on teaching and learning. The data gathered from the participants are categorized and summarized as follows.

Category A: Demographic Analyses of Qualitative Data: Demographic Profile of Policymakers and Implementers are detailed as follows.

Demographic Profile of Policymakers and Implementers

Variable	Descriptive	N	(%)
Gender	Male	14	82.4
	Female	3	17.6
Level of Qualification	Professor	2	11.8
	Doctorate	8	47.1
	Masters	7	41.2
Public Universities Representation (17)	UPSA	3	17.6
	UG	3	17.6
	UEW	3	17.6
	UDS	2	11.8
	KNUST	3	17.6
	UCC	3	17.6
Regional Distribution	Greater Accra Region	6	35.3
	Central Region	6	35.3
	Ashanti Region	3	17.6
	Northern Region	2	11.8
Work Experience	7 - 15years	11	64.7
	16 - 32years	6	35.3
Interviewee Ranks	Policymakers	8	47.1
	Policy Implementers	9	52.9

Source: Field data, 2021

Category B: Genesis of Technology Integration into academic programmes.

The subjective views of participants in describing the genesis of technology integration into the academic programs of Public Universities in Ghana are coded into four (4) main themes. The most dominant view expressed by the participants (constituting 35.3%) is in line with the assertion that technology integration began as a tool for Distance Education between the years 2000 to 2010. Following this assertion, a section of the participants (constituting 29.5%) also assert that technology integration began as a pilot project specifically by the science departments between 2000 to 2010. In line with the genesis of technological integration into academic programmes of Ghanaian Public Universities as a tool for Distance Education, a respondent stated that, ".....if my memory serves me right, based on the institutional memory that has been given me, it is around 2009. They started with the Learning Management System. However, there has been other attempts, you know, introducing some amount of video

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

conferencing a bit earlier;...I think there was a synergy project around 2007 or so where they wanted to introduce technology in distance education. So, in 2009 we introduced e-learning to teach distance education students” R4

Similarly, another respondent asserts that,

“.....with regards to the distance education, our distance school formally started by the year 2000. And we started with low technology, low technology in this context refers to using of materials, MOODLES and instructional materials, printing them and sending them to the students. And with that I will say that with distance education, we started introducing technology by the year 2000” R12.

Category C: Relevance of Technology Integration into academic programmes.

As a follow-up to the above question, the study sought to find out the relevance of introducing technology into academic programs in public universities. The views expressed by the participants in describing the relevance of integrating technology were coded into five main themes. The dominant view expressed by participants (constituting 56.3%) is the assertion that integration of technology, facilitated online teaching & learning and serves as a supplement to face-to-face teaching & learning.

“.....we use technology to facilitate online teaching and learning; It was so relevant because we use it to supplement face-to-face teaching; even though we have only in-person students, we use technology to supplement what was going on”. R1

“.....so the Institute of Distance Learning (IDL) utilized it because it was very helpful for them, instead of having to travel all the time, you could actually make materials available online so that people can have access to it; So at the time there were some people who were proponents or advocates for complete face to face and there were others who were more of looking at the blended approach so that there will be some amount of virtual learning, but then majority will be face to face; So what IDL was doing is that kind of mix. It was during the COVID era that we moved completely online”. R17.

Category D: Methods of Technology Integration being used in Public Universities in Ghana.

The researcher sought to find out the method or combination of methods of technology integration that is currently being used by the Public Universities. A total of three methods emerged from the data gathered from the respondents. These methods include Technological, Pedagogical and Content Knowledge (TPACK) method, Substitution, Augmentation, Modification and Redefinition (SAMR) method and the Technology Integration Matrix (TIM) method. To ascertain which of method is the most used among the Public Universities, a word frequency query was conducted on the top hundred (100) most salient and frequently used words by participants in describing the method or combination of methods of technology integration that is being used by their respective Universities. The result of the word frequency revealed that “TIM” had a weighted percentage of 4.51% with 20 references, “TPACK” had a weighted percentage of 4.29% with 19 references and “SAMR” had a weighted percentage of 3.84% with 17 references. Although there are differences in the frequencies of “TIM” and “TPACK”, the weighted percentages revealed that “TIM” is the method of technology integration that is mostly being used by the Public Universities in Ghana. The closeness of “TIM” and “TPACK” also revealed these two methods are mostly combined as technology integration methods in Public Universities. Figure 1 illustrates the dominance of “TIM”, “TPACK” and “SAMR” in a word-cloud chart.



Figure 1. Word cloud of hundred most used words in describing methods of technology integration. Source: Field data, 2021

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

Category E: Impact of Technology Integration Methods on Teaching and Learning

Pursuant to the above assertion, we sought to find out how the methods of technology integration used have impact teaching and learning in these Universities. The data that emerged from the respondents in response to this query is analysed as follows.

Table 1. The Impact of Technology Integration Methods on Teaching and Learning

Themes	Code Frequency	Code %
Enhanced understanding of modern learning and teaching tools and techniques.	10	55.6
Idea generation among students.	1	5.6

Source: Field data, 2021

As illustrated in table two (1), the views expressed by the participants in narrating the impact of technology integration methods on teaching and learning in the Public Universities were coded into six (6) main themes. The dominant view expressed by the respondent (constituting 55.6%) is the assertion that the technology integration methods being used across the Public Universities, have significantly *enhanced the understanding of modern learning and teaching tools and techniques*. Although there are both positive and negative impact, it is significant to point out that the positive impacts (72.3%) outweigh the negative impacts (22.2 %). Some of the views shared by participants in line with this assertion are as follows. A respondent stated that,

“...the methods have caused both lecturers and students to use learning tools or modern ways of doing things very well. In fact, it does cause every member of the academic fraternity or community to first know or understand new ways of doing things or to be exposed to new tools to do things differently” **R1**.

Similarly, another respondent stated that,

“So, I think it has affected the lecturers positively that they know now that there’s a different methodology of teaching apart from face to face. And then they acquire knowledge under a different methodology of teaching online. So that one has really impacted the teaching and learning very well” **R3**

Category F: Level of Integration of Technology at Public Universities in Ghana

Specifically, with regards to using Technology Integration Matrix (TIM) as a method, the researcher sought to find out the level of integration that have been attained by Ghanaian Public Universities. The data gathered from the respondents in line with this query is analysed as follows.

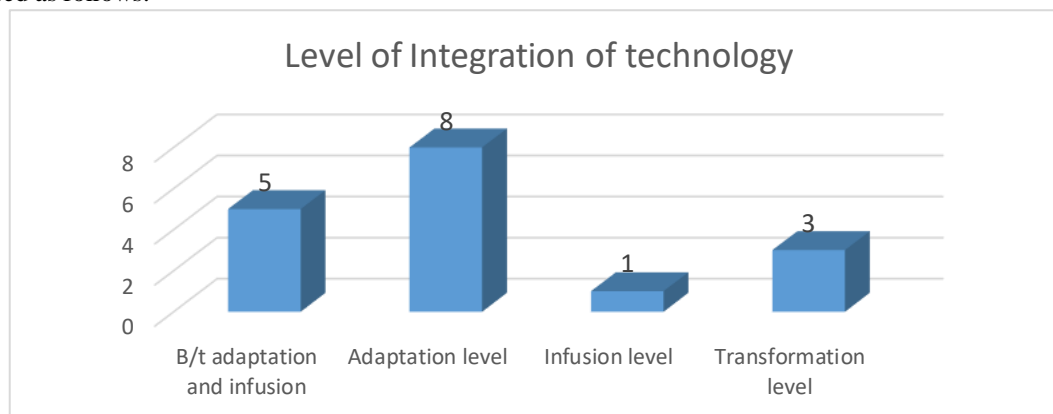


Figure 2. Themes and the Frequency of codes. Source: Field data, 2021

The dominant views expressed by the participants (with a frequency of 8) is the assertion that Public Universities are at *the Adaptation level* in the Technology Integration Matrix (TIM.) Excerpts of participants’ views in line the assertion that Public Universities are at *the level of adaption* are illustrated as follows. According to one of the participants,

“.....I cannot say the first, because we moved beyond that. We teach our diverse students in the conventional and procedural use of technology and teacher facilitates; we also teach them the independent and procedural way of using technological tools; so I will say we are at the adaptation level” **R16**.

Category G: Perceptions of Policymakers and Implementers on the Integration of Technology?

In a quest to explore the perceptions of the three key actors in the integration process, the study sought to elicit from the Policymakers and Implementers their own peculiar perceptions on the integration of technology into academic programmes in the selected public Universities. The responses of the participants in lieu of this query is summarized as follows.

Table 3. The Perceptions of Policymakers and Implementers on the Integration of Technology. Source: Field data, 2022

Themes	Code Frequency	Code %
Relevant and Necessary	8	32.0%
Increased Access to Education and Information	6	24.0%
Total	25	100%

The Perceptions of the Policymakers and Implementers towards Integration of Technology into academic programmes are coded into five (5) main themes. The most dominant perception is that technology integration into academic programmes is Relevant and Necessary (constituting 32.0%). In buttressing this assertion, three of the respondents, for instance, stated that.

“..... It is very relevant. And very beneficial both to the institution and to the learner. Mainly, because once you have technology embedded, you will have situations where the student could experience otherwise, very isolated scenarios, you could have videos, have processes that we wouldn't have experienced or even known about otherwise. So, it's very relevant, and very, very necessary, in my opinion.” **R5.**

Pursuant to the assertion that Technology integration is Relevant and Necessary for academic programmes, it was ideal to find out from the Policymakers and Implementers their perceptions towards accepting and adapting to integration and the extent to which they have accepted technology into academic programmes. This is presented in the next section.

Category H: Perception of Policymakers and Implementers in Accepting and Adapting to Integration of Technology.

In a quest to explore the perceptions of the three key stakeholders in the integration process, the study sought to solicit from the Policymakers and Implementers their perceptions towards accepting and adjusting to integration of technology into academic programs in the selected public Universities. The responses of the participants in relation to this query is summarized as follows.

Table 4. What is your perception as a Policymaker/implementer towards accepting and adjusting to Integration of Technology into academic programmes? Source: Field data, 2022

Theme	Code Frequency	Code %
Level of Acceptance and Adjusting (60-90%)	13	31.0%
Provision of Support and Training	9	21.4%
Policy Direction and Motivation	8	19.0%
COVID19 Mediated Acceptance	7	16.7%
Total	37	100%

The Perceptions of the Policymakers and Implementers towards accepting and adapting to Integration of Technology into academic programmes are coded into five (5) main themes. The most dominant perception of the Policymakers and Implementers in accepting and adapting to technology is that they perceive the Level of Acceptance and Adapting to be High (ranging from 60-90%) and with a constituent value of 31.0%. This is closely followed by Provision of Support and Training (constituting 21.4%). Whiles Policy Direction and Motivation polled 19.0%. COVID19 Mediated Acceptance scored 16.7%. In buttressing this assertion, tow of the respondents, for instance, stated that.

“..... Yeah, so on a scale of 0 to 100, i will place the level of acceptance at 70%. And actually, some surveys we've done shows that we have between 60 to 70% of the people accepting as per the directives.” **R1.**

“..... So, on a scale of zero to 100. I will place the level of acceptance at 90%. ADJUSTMENT: For adjusting, I'll say 60%. Because the early adopters, the early adopters can adjust easily.” **R2.**

Category I: Perception of Policymakers and Implementers towards Students Accepting and Adapting to Integration of Technology.

Exploring the perceptions of the three key stakeholders in the integration process took a different dimension during the in-depth interview. As a follow-up question to the acceptance and adjustment of Policymakers and Implementers, it became necessary to solicit from the participants, their perceptions towards Students accepting and adapting to integration of technology into academic programmes. The responses of the participants in relation to this query is summarized in table 5 as follows.

Table 5. Perception towards Students accepting and adjusting to Integration of Technology? Source: Field data, 2022

Theme	Code Frequency	Code %
Level of Acceptance and Adjusting (50-70%)	13	35.1%
Ease-of-Use of Platforms and Tools (<i>Always ready</i>)	11	29.7%

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

More Tech-Savvy	5	13.5%
Policy Direction and Motivation	4	10.8%
Providing Support and Training	4	10.8%
COVID19 Mediated Acceptance	1	3%
Total	37	100%

The Perceptions of the Policymakers and Implementers towards Students Accepting and Adjusting to Integration of Technology into academic programmes at Public Universities are coded into six (6) main themes. The most dominant perception of the Policymakers and Implementers towards Students accepting and adapting to technology is that they perceive the Level of Acceptance and Adapting to be above average (ranging from **50-70%**) and with a constituent value of 35.1%. This is closely followed by Ease-of-use of Platforms and Tools (Always ready) constituting 29.7%. In buttressing this assertion, two of the respondents, for instance, stated that.

“..... So, on a level of zero to 100 I will you place the level of acceptance at 70%. Because this very semester for example, students were like they don't want face to face exam. They want an online exam.” **R6**.

“..... So, on a scale of zero to 100. I will place the level of acceptance at 90%. **ADJUSTMENT:** For adjusting, I'll say 60%. Because the early adopters, the early adopters are able to adjust easily.” **R2**.

Category J: Perception of Policymakers/Implementers towards Lecturers Accepting and Adapting to Integration of Technology.

Exploring the perceptions of the three key stakeholders in the integration process took a different dimension during the in-depth interview. As a follow-up question to the acceptance and adjustment of Policymakers and Implementers, it became necessary to solicit from the participants, their perceptions towards Lecturers accepting and adjusting to integration of technology into academic programs in the selected public Universities. The responses of the participants in relation to this query is summarized in table 6 as follows.

Table 6. Perception of Policymakers, towards Lecturers accepting and adjusting to Integration of Technology? Source: Field data, 2022

THEME	Code Frequency	Code %
Level of Acceptance and Adapting (50-80%)	11	24.4%
Providing Support and Training	10	22.2%
Total	21	100%

Perceptions of the Policymakers and Implementers towards Lecturers Accepting and Adjusting to Integration of Technology into academic programmes at Public Universities are coded into six (6) main themes. The most dominant perception of the Policymakers is that they perceive the Level of Acceptance and Adapting to be above average (**ranging from 50-70%**) and with a constituent value of 24.4%. This is closely followed by Providing Support and Training constituting 22.2%. In buttressing this assertion, two of the respondents, for instance, stated that.

“..... In the case of the lecturers, sometimes I'll rate them 55%. Why? Why is that? We are in a society where we are used to the traditional model of teaching. Yes. And so, when we adopt technology, then of course, we don't really blend the technology with teaching and learning. And so, we have percentages at which we blend, depending on the lecturer's level of use of the technology? Yes. So, the lecturer's level of use of technology determines acceptance and adjustments, and that's how come I'm rating it 50% and adjustment too, I will give it the same 50%.” **R11**. “.....So I think acceptance is high, but with certain bugs. So maybe I'll put it at 60% or 70% for accepting and adjusting.” **R16**.

Category K: How the Acceptance of Technology Integration by Students and Lecturers is affecting Teaching and Learning.

Pursuant to the assertion that both students and lecturers have accepted and adjusted to integration of technology due to the factors enumerated above, the coding of interview data, further sought to find out the extent to which acceptance and adjusting to integration of technology, by students and lecturers, have affected teaching and learning in the selected public Universities. The themes that emerged in relation to this query is summarized as follows.

Table 7. Acceptance of Technology Integration by Students and Lecturers is affecting Teaching and Learning. Source: Field data, 2022

Theme	Code Frequency	Code %
Positively Affecting	13	27.1
Improved Assessment	7	14.6
TOTAL	20	100%

The most dominant perception is that Policymakers and Implementers perceive teaching and learning to have been Positively Affected (constituting 27.1%). In buttressing this assertion, two of the respondents, for instance, stated that.

“..... Okay. In my opinion, teaching and learning has been affected positively. Already? Yes. it's across board. Right. Now we have this platform, My MIS Lab, from Pearson. Apart from the learning management system, where they go to practice pre-requisites before they actually do their assignments. That is at the master's level so it's across positively. So, on a scale of 0 - 100 I will place the level of impact at say 80%. Yes positive.” R2.

Assessments Improved and Flexibility and Convenience in the teaching and learning process are the two main emerging themes that may have contributed to the reasons why Teaching and learning have been positively affected by students and lecturers accepting and adjusting to integration of technology.

DISCUSSION

Generally, integration of technology into academic programmes of most Ghanaian Public Universities commenced in the first decade of the 21st century; specifically, 2001 to 2010 and has progressed till today. Perception, which is the major phenomenon under study, has also been found to be *Relevant and Necessary* among the Policymakers and Implements, due to the factors that in recent times have contributed to the need for integration. This finding is in line with the second assumption of Eysenck and Keane (1995) that Perception occurs indirectly as the end-product of the interaction between the stimulus input and the internal hypotheses, expectations, and knowledge of the observer. Although all the Universities studied use three different methods of integration, most (4 out of 6) public Universities use a combination of TIM and TPACK. These technology integration methods have had both *positive* and *negative* impact on teaching and learning across the Public Universities, but the positives outweigh the negatives. This article has also demonstrated that public universities in Ghana are currently at the *Adaptation Level* of integration based on the Technology Integration Matrix (TIM). Using TIM and TPACK and attaining Adaptation level of integration, implies that public universities are currently in tune with the modern methods of integrating technology into academic programmes, and they need to improve on the methods after two decades of integration.

Level of Accepting and Adapting to technology integration, in this article, have been found to be high (60-90%) among Policymakers and Implementers. This is also justified by the finding that University Leadership and management have provided support and training, for policy implementers and support staff, during the pre-COVID, COVID and post-COVID periods. This finding is confirmed by the findings of Rivers et al. (2015), that Ghana has demonstrated a general commitment to using ICTs to improve the quality of education at the presidential and ministry levels, as can be demonstrated by the fact that education receives the highest amount of national budget resources. The recommendations of Aslan et al (2011) has also been confirmed in this article because the authors urged educational *policymakers* to find a way to better facilitate and support the customized, learner-centered educational approach, including providing funding for technology systems.

The provision of support and training as a finding in this article, is a clear indication of management's commitment to improving and investing in learning technologies to boost integration of technology into academic programmes. However, this particular outcome, contradicts the finding of Kofi Mangesi in 2007, that although government (leadership) attitudes about the use of ICTs in education are positive, these attitudes are less positive among educators and administrators in the universities. This article has proven otherwise that by the high level of acceptance and adjustment, backed by positive perception, the attitudes of educators and administrators in the public universities in Ghana have become more positive than ever before. Fifteen years after, the public universities in Ghana, have demonstrated, by the level of acceptance and adjustment that Policymakers and implementers who form the core leadership of integration, have become more committed to integration by providing support and training to ensure improved integration of technology into academic programmes. Moreover, Policy-direction and motivation from again, university leadership, as well as COVID19 Mediated Acceptance in this article, have been found to be additional stimuli for the increased level of Acceptance and Adjustment to technology integration in the public universities. This is confirmed by Dagada and Chigona (2013) in their study that some of the universities understudied had put policies in place to encourage acceptance of the ICTs to facilitate teaching and learning.

The perceptions of Policymakers and Implementers towards Students accepting and adjusting to integration of technology into academic programmes has become critical in this part of the world, because of the onslaught of COVID19 pandemic and the fact that students are the end-users of the various learning technologies and resources that policymakers have provided in the institutions. Policymakers and Implementers in public universities, perceive the level of Accepting and Adapting

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

to technology among students to be above average (50-70%). This is also justified by the finding that *Ease-of-use of online platforms and tools* have contributed to the above-average level of acceptance and adapting to technology integration. Moreover, it is not so much about the onslaught of COVID19 but rather the Ease-of-Use of the technological platforms and tools that makes students accept and adapt to integration of technology. One assumption of the Technology Acceptance Model (TAM) has been confirmed in this study because when students in the public universities were presented with new learning technologies, a few factors influenced their decision about how and when they will use it, namely: *Perceived Use (PU) and Perceived Ease-of-Use (PEOU)*, (Legris, Ingham, and Collette, 2003). Other factors that were found to have supported this assertion include, the fact that students are *More Tech Savvy, provision of Training and Support* as well a *Policy direction and Motivation*. These factors have significantly accounted for the *above-average level* of acceptance and adjustment to the use of new technologies which in effect, is contributing to the success of integrating technology into academic programmes.

The perceptions of Policymakers and Implementers towards Lecturers accepting and adapting to integration of technology into academic programmes has become critical in this part of the world, because of the onslaught of COVID19 pandemic and the fact that lecturers are the end-users of the various learning technologies and resources that policymakers have provided in the institutions. In summary, the Level of Accepting and Adapting to technology integration among Lecturers, is also above average (50-70%) in the public universities under study. Provision of Support and Training for Lecturers and the readiness to conform to Policy Directions, during the COVID era, are other factors that have contributed immensely to the above-average level of acceptance by Lecturers. So, for the Lecturers, it is not so much about the onslaught of COVID but rather the Provision of Support and Training as to how to use the technology to teach, that makes them accept and adapt to new technologies and integration of technology. From the analysis of the data gathered, it is evident from the Policy-makers perspective that the acceptance and adjustment of students and lecturers to integration of technology into academic programmes have Positively Affected Teaching and Learning in the public universities.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the authors advance some recommendations and significant contributions. One major contribution is that this study has to some extent, added to the body of knowledge in educational technology, considering the influential role of perception of Policymakers and Implementers towards Students and Lecturers in Integration of technology into academic programmes in Public Universities. This research has also filled the contextual gap in literature by eliciting the perceptions of Policymakers and Implementers about integration of technology in Ghanaian public universities. Furthermore, the level of infusion of technology and its impact of teaching and learning in the HEIs, through the lens of the Technology Integration Matrix (TIM), have also been adequately discovered and addressed by this article. Policymakers are by this discovery, better positioned and challenged to leapfrog to the next level of integration as prescribed by the domains of the TIM (FCIT, 2017). In terms of Policy Significance, this article offers policymakers a better understanding into the role of perception of students and lecturers in the process of integrating technology into academic programmes. It also highlights the need for policies to be revised and sustained. Practically, Students and Lecturers accepting and adapting to the use of technology are key drivers for integration and have the potential to practically curtail the challenges that impede Integration. Policymakers and Implementers should now understand the need to encourage students and lecturers to practically accept and adapt to the new learning technologies by providing more training sessions to enable them to adapt and improve integration of technology into academic programmes. The effect of perception on the level of integration of technology through the lens of the TIM must also be seriously considered as a method that holds the key to steer public universities to the transformation level and absolute integration. We recommend that future studies should apply a mixed method approach to advance the discourse by delving more into the attitudes and challenges of Policymakers and the implications on integration of technology.

REFERENCES

- 1) Alpert, M. and Shepherd, C. M. (2015). Using Technology to Provide Differentiated Instruction for Deaf Learners. *Journal of Instructional Pedagogies*, v16 July 2015. Retrieved from: <https://eric.ed.gov/?id=EJ1069390>
- 2) Aslan, S., Huh, Y., Lee, D. and Reigeluth, C. M. (2011). The Role of Personalized Integrated Educational Systems in the Information- Age Paradigm of Education. *Contemporary Educational Technology*.
- 3) Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. In P. Liamputtong (Ed.), *Handbook of research methods in health social sciences* (pp. 843–860). Springer.
- 4) Chigona, A., Chigona, W., Kausa, M. and Kayongo, P. (2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. *International Journal of Education and Development using ICT*, 6(2), 21-32.
- 5) Claro, M., Nussbaum, M., López, X., & Contardo, V. (2017). Differences in Views of School Principals and Teachers regarding Technology Integration. *Educational Technology & Society*, 20 (3), 42–53.

Integrating Technology into Academic Programmes in Heis: The Perspectives of Policymakers in Covid Era

- 6) Creswell, J.W. and Creswell, D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. Fifth Edition. Sage edge; Los Angeles.
- 7) Davies, R. S., and West, R. E. (2014). Technology integration in schools. *Handbook of research on educational communications and technology* (4th ed., pp. 841–853). Springer New York.
- 8) Dagada, R. and Chigona, A. (2013). Integration of E-Learning into Curriculum Delivery at University Level in South Africa. *International Journal of Online Pedagogy and Course Design*. DOI:10.4018/ijopcd.2013010104
- 9) Eysenck, M.W., and Keane, M. (2015). *Cognitive psychology: A student's handbook*. Hove: Psychology Press
- 10) FCIT, (2017). *Technology Integration Matrix (TIM)*. Florida Centre for Instructional Technology.
- 11) Govender, D. and Govender, I. (2010). Educator Acceptance of Information and Communications Technology (ICT) integration in teaching and learning in a developing country. In J. Herrington & C. Montgomerie (Eds.), *Proceedings of ED-MEDIA 2010--World Conference on Educational Multimedia, Hypermedia & Telecommunications* (pp. 52-61). Toronto, Canada: Association for the Advancement of Computing in Education (AACE). Retrieved October 2, 2022, from <https://www.learntechlib.org/primary/p/34618/>.
- 12) Kencaid, T. and Feldner, R. (2002). Leadership for Technology Integration: The Role of Principals and Mentors. *Educational Technology & Society* 5(1). January 2002. Retrieved from:
- 13) Mangesi, K. (2007). *Survey of ICT and Education in Africa: Ghana Country Report Ghana -1*. ICT in Education in Ghana. Retrieved from: www.infodev.org
- 14) NAB: www.nab.gov.gh
- 15) Rivers, J. K., Rivers, P. A. and Hazell, V. (2015). *Africa and Technology in Higher Education: Trends, Challenges, and Promise*
- 16) Rooke, P. and Willson, J. (2000). *Perception; Theory, development, and organization*. Routledge Modular Psychology series book.
- 17) Smith, B., Caputi, P., and Rawstorne, P. (2000). Differentiating computer experience and attitudes toward computers: Anempirical investigation. *Computers in Human Behavior*, 16, 59–81
- 18) USF (2005-2018). *The Technology Integration Matrix: A project of the. College of Education, University of South Florida* © 2005-2018. Retrieved from: <https://fcit.usf.edu/matrix/project/five-levels-of-technology-integration-pdf/>
- 19) Vasbieva, D. G. and Saienko, V. N. (2018). Exploring students' perception and efficiency of technology-mediated ESP teaching. *XLinguae*, Volume 11 Issue 1XL, January 2018, ISSN 1337-8384, eISSN 2453-711X137.
- 20) Zuhail, Hussein (2017). Leading to Intention: The Role of Attitude in Relation to Technology Acceptance Model in E-Learning. *Procedia Computer Science* 105 (2017) 159 – 164. IEEE International Symposium on Robotics and Intelligent Sensors, IRIS 2016, 17-20 December 2016, Tokyo, Japan.



There is an Open Access article, distributed under the term of the Creative Commons Attribution–Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.