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Enhancing institutional policies and frameworks for E-learning: A case study of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

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Acknowledgments

Abstract

The onset of Covid-19 has made learning online an important component of tertiary-level education. However, for the Kwame Nkrumah University of Science and Technology (KNUST), the challenge has been the lack of a clear policy guiding teaching and learning within online environments. Instructors seem to be unclear about which standards/policies are expected of them when delivering instructions in online settings, and learners are equally unsure of the ethics and responsibilities that come with online learning. This research thus sets out to address this problem by developing frameworks for the institutionalization of a codified E-learning policy for KNUST to guide/regulate online teaching and learning. The research adopted a convergent parallel design in which qualitative and quantitative approaches were used. Three key institutional E-Learning innovators and 73 lecturers from different Departments and Colleges of KNUST were conveniently and purposefully sampled to interview schedules and survey questionnaires for data collection. Audio-recorded interviews were transcribed and coded. Furthermore, a focused group discussion was conducted with seven level 400 students. The quantitative data was analysed using descriptive statistical methods (including standard deviations, percentages, means, and graphs where appropriate). From our preliminary qualitative results, participants agreed that existing policies and infrastructure in KNUST are inadequate and do not fully address online teaching and learning needs. In terms of policy recommendations, while teaching staff are concerned about and advocate for policies that regulate learners' ethical behavior within online learning spaces; learners are interested in policies that regulate the ethical behavior of learners and those that specify standards of teaching for facilitators. Some learners emphasized the need for policies to include adequate support staff for each online learning activity to ensure that both learners and facilitators uphold the standards. Seventy percent of the respondents indicated the need for designed institutional sanctions for student misconduct during online teaching and learning engagements. Again, more than 50% of respondents indicated the need for specific and clearer ethical and copyright guidelines for online teaching and learning as well as clearer instructions regarding student behavior within online teaching environments. The findings that emerge from this research seek to make specific recommendations to address the barriers that hinder effective teaching and learning in online environments. The authors hereby recommend that government institutions such as the Ghana Tertiary Education Commission should strongly encourage stakeholder discussions for a nationwide E-learning policy from which tertiary institutions could use as a springboard in drafting policies/guidelines, policy audit, and conducting a needs assessment.

Keywords: Covid-19, Online teaching and learning, Standards, Policy, Respondents

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Project Description

Project Background

      The Kwame Nkrumah University of Science and Technology (KNUST), prior to the pandemic had been exploiting e-learning technologies and pedagogies to deliver content to its 11,200 distance learners and offering 70 undergraduate and postgraduate programs all over the country. The need to offer instruction to its nationwide student population means that KNUST, through its distance learning (DL) programs, has built some capacity and infrastructure in providing online education. KNUST, through its DL initiative, has implemented training programs for academic staff, ensuring that most academic staff are familiar with the basic online pedagogical tools and delivery strategies. The researchers, however, assert that what is lacking is a clear institutional policy to guide the delivery of instructions online. What are the rights and responsibilities of learners, teaching staff, and non-teaching staff in delivering online education? Which standards (international and context-specific) must be upheld within KNUST's online educational environment? Who must implement and uphold these standards? What are the general and context-specific rights and ethical responsibilities of learners and instructors in providing online education? How do we deliver instruction online in a way that addresses the unique contextual needs of our learners? While some may argue that answers to these questions can be found in the literature, we argue rather that since these questions emerge within specific contexts, their answers and solutions must equally be context specific. The authors seek to use KNUST as a case study to develop an institutional e-learning policy framework to enable effective and quality e-learning. The authors assert that effective online teaching and learning enabled by an engaging content development system cannot be achieved without clearly outlined institutionalized policies as well as increased formal commitment from institutional innovators to support online students. The authors also imagine that the findings of this study will be relevant to educators and instructors in other affiliate and non-affiliate institutions in Ghana, not excluding educational consultants, policy makers and the Ministry of Education.

      The study presents a brief report of our findings and makes recommendations for the development of an e-learning policy. The rest of the report is structured this way: we begin by presenting an overview of the methods that we used to collect the data presented in this report. Subsequently, we present the key findings that emerged from data analysis. We make some specific recommendations for the university to further strengthen the online learning platform.

Problem statement

The Covid-19 pandemic has necessitated changes at various levels of education and within different social institutions. Like other social institutions, educational institutions have had to adjust to the realities brought on by the pandemic. Across the globe, educational institutions had to rely increasingly on e-resources and e-platforms to provide education at the height of the pandemic. While this has been implemented to various degrees of success in different countries, most sub-Saharan African countries have struggled with the need to move teaching and learning online (Adekanmbi et al., 2021; EdTech, 2020). Poor infrastructural access and technology, poor home environment for e-learning, lack of access to devices and internet connectivity and a relative lack of familiarity with online learning by teachers and learners are some of the challenges that have been highlighted (Adekanmbi et al., 2021; EdTech, 2020).

Higher educational institutions across sub-Saharan Africa tried to implement e-learning, with some having prior experience and functioning learning management systems in place. For most of these institutions, however, the challenge has been the lack of a clear policy guiding teaching and learning within online environments. Instructors seem to be unclear which standards are expected of them when delivering instructions in online settings, and learners are equally unsure of the ethics and responsibilities that come with online learning. For some institutions across the African continent, management does not possess the human resources needed to develop clear regulations to manage teaching and learning within virtual environments. This lack of policy guiding instructor-learner interaction within online environments is problematic for different reasons. Without guiding policies, instructors are likely to develop and deliver content that may not address the needs of learners. Lack of an institutional policy framework within which online learning takes place may present barriers for learners (as different instructors will design instruction differently), which may affect their ability to meet expected outcomes for specific courses. To deliver quality education, it is imperative that institutions begin to develop policy frameworks to guide online education. This is especially crucial since epidemiologists predict that the world, over the next few decades, may witness more pandemics like COVID-19 (Høiby, 2020).

Context and Rationale

Over the years, some success stories have been evidenced especially with E-learning in some public and private universities in Ghana. Furthermore, efforts are ongoing by the government to update existing policy frameworks in Ghana to better enable public universities to augment the traditional face-to-face modes of teaching with quality e-learning. However,

codified institutional policies hinged on national frameworks to guide, maintain, and monitor the effective implementation and commitment to content development which are key drivers for E-learning are lacking in Ghanaian higher educational institutions. The Kwame Nkrumah University of Science and Technology, prior to the pandemic had been exploiting e-learning technologies and pedagogies to deliver content to its distance learners (11,200) and offering 70 undergraduate and postgraduate programs all over the country. The need to offer instruction to its nationwide student population means that KNUST, through its distance learning programs, has built some capacity and infrastructure in providing online education. KNUST, through its DL initiative, has implemented training programs for academic staff, ensuring that most academic staff are familiar with some of the basic online pedagogical tools and delivery strategies. What is lacking though is a clear institutional policy to guide content creation and the delivery of instructions online.

The researchers of this study thus seek to use KNUST as a case study, the findings of which will help to formulate an e-learning policy framework to enable effective and quality e-learning. The researchers believe that effective online teaching and learning coupled with engaging content development cannot be achieved without clearly outlined institutionalized policies as well as increased formal commitment from institutional innovators to support online students. The authors also believe that this policy document will have relevance for educators and instructors in other affiliate and non-affiliate institutions in Ghana not excluding educational consultants, policy makers, and the Ministry of Education.

Research Questions

(1) To what extent do existing policies facilitate learner-centered online teaching, learning, and content development.
(2) What gaps exist in infrastructural capacities and resources to develop sustainable policy frameworks to guide and support the delivery of effective learner-centered online teaching?
(3) What online institutional policies are required to design and implement online teaching and learning strategies?

Literature Review

The concept of e-learning

E-learning has been used by distinctive authors to mean different things ranging from mode of education to the use of electronic media to disseminate instructional material to support learning. The public university landscape in Ghana ascribe to the definition that perceives e-learning as a mode of delivering instruction online without lecture room or face-to face encounters. Figure 1 shows key components of the e-learning ecosystem in higher educational institutions in Ghana.

Figure 1:

Institutional e-learning Ecosystem in higher educational institutions in Ghana
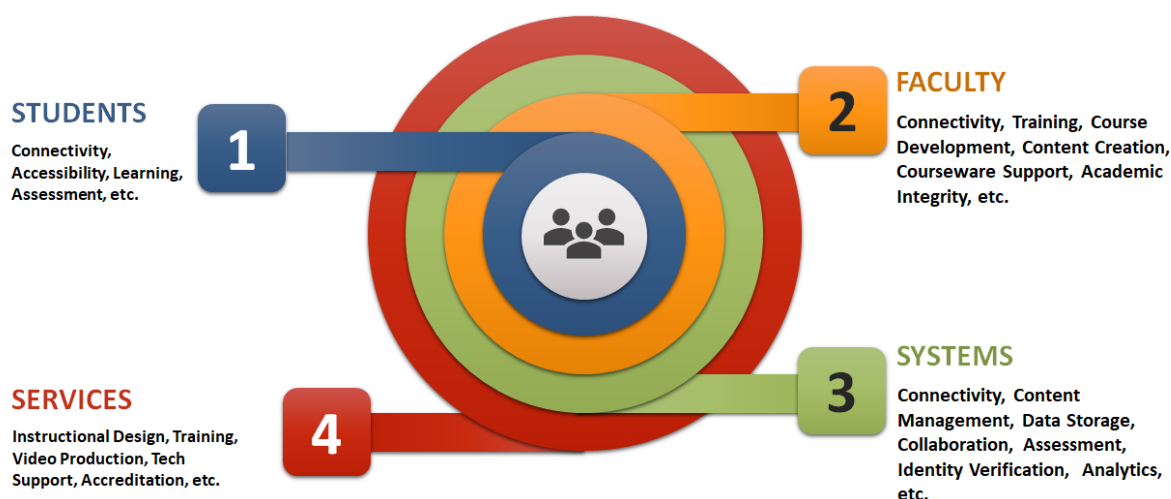
Source: Adapted from MCF eLearning Initiative Tier 3 Workshop Presentation (UDI-ASU, 2021).

The 21st century skills perceived to be most important for educators include critical thinking; creativity; mindset; adaptation process of instructional practice; professional development and the importance of organizational support; formulation of good policies for educational system, teacher professional development, instructional resourcing and social equity; critical friendship; teamwork; encouraging international collaborations; and ensuring that learning management system features are in sync with learning strategies and goals. This ecosystem is supported by an infrastructure framework depicted in Figure 2.

Figure 2

Instructional Digital Framework

Source: Adapted from MCF eLearning Initiative Tier 3 Workshop Presentation (UDI-ASU, 2021).

Digital infrastructure provides an enabling environment for e-learning to thrive. Through literature review, the author posits that a combination of digitally equipped teaching spaces and virtual learning environment tools supported by pedagogically appropriate tools has the potential to enhance student learning and the quality of the student experience (Sailin and Mahmor, 2018). In this specific holistic view, flipped classroom approach along with virtual learning environment and resources seamless and well-integrated would satisfy many educators and students in a modern university (Morris, 2019). It was also noted that, digital fluency, technical skills and factors affecting the adoption of technology which include perceived ease of use and usefulness could easily become barriers for the educator and learner. Exploring the potential of learning technologies could offer participatory, active networked and personalized online learning experience with the capabilities to deliver value to learners at all levels and with differing needs.

E-learning policy development

According to a study that sought to elicit experiences in e-learning policy development in the tertiary sector across several countries, e-learning policy development in countries involves three main stages (Brown et al., 2007):

Stage 1: Government acts to make e-learning possible.

Stage 2: Government works towards integrating learning into the education system.

Stage 3: Transformation enabled by e-learning is observed in the nature and operation of the tertiary institution and the tertiary system.

Contrary to the studied international trend, most public universities in Ghana developed e-learning strategies independently to facilitate their respective distance education strategic goals. At the height of the COVID-19 pandemic and the attendant shutdown of public universities followed by unprepared transition to online teaching and learning, enabled by inadequate information and communication technology infrastructure to continue academic work resulted in the government responding to the situation by acting in ways to make e-learning possible through policy directions to better enable the integration of e-learning into a predominantly face-to-face mode of teaching institutions. With some vague statements on e-learning, the institutions that independently exploited e-learning strategies including those who did not (Awidi, 2008; Isaac & Hallow, 2013; Isaacs & Hollow, 2012), are taking steps to institute formal e-learning policies post the COVID-19 pandemic. A study of e-learning policy in higher educational institutions in South Africa shows that guiding policy frameworks for online learning is an emerging field (Czerniewicz, 2007). A review of all articles reviewed in higher institutions of South Africa revealed that none was devoted to exploring e-learning policy (Letseka and Pitsoe, 2018). Similar scenarios exist in other African countries including Ghana where the focus seems to be on how ICTs are being used for pedagogy within a loose policy framework.

Policy analysis

Policy analysis is perceived by policy analysts to facilitate the acquisition of better insights as it relates to policymaking and policy implementation. Wildavsky (1979) defines policy analysis as "an applied sub-field whose content cannot be determined by disciplinary boundaries but by whatever appears appropriate to the circumstances of the time and the nature of the problem." This suggests that policy analysts use multiple approaches to understand policy issues of interest.

The Stagist Approach Model used in policy analysis is favored by scholars in the field of policy analysis. Kulac and Ozgur (2017) posit that "it is possible to claim that the stages model

is one of the most efficient, comprehensive, systematic, practical, functional, and beneficial model/frameworks in public policy analysis" despite criticism from other scholars. The stages model which was originally described by Laswell (1956) in seven stages in its current form was reformulated and developed by Eger II and Marlowe (2006). The five stages expressed in the stages model in its current form are agenda setting, formulation, legitimation, implementation, and evaluation as illustrated in Figure 3.

Figure 3

Stages model-policy cycle
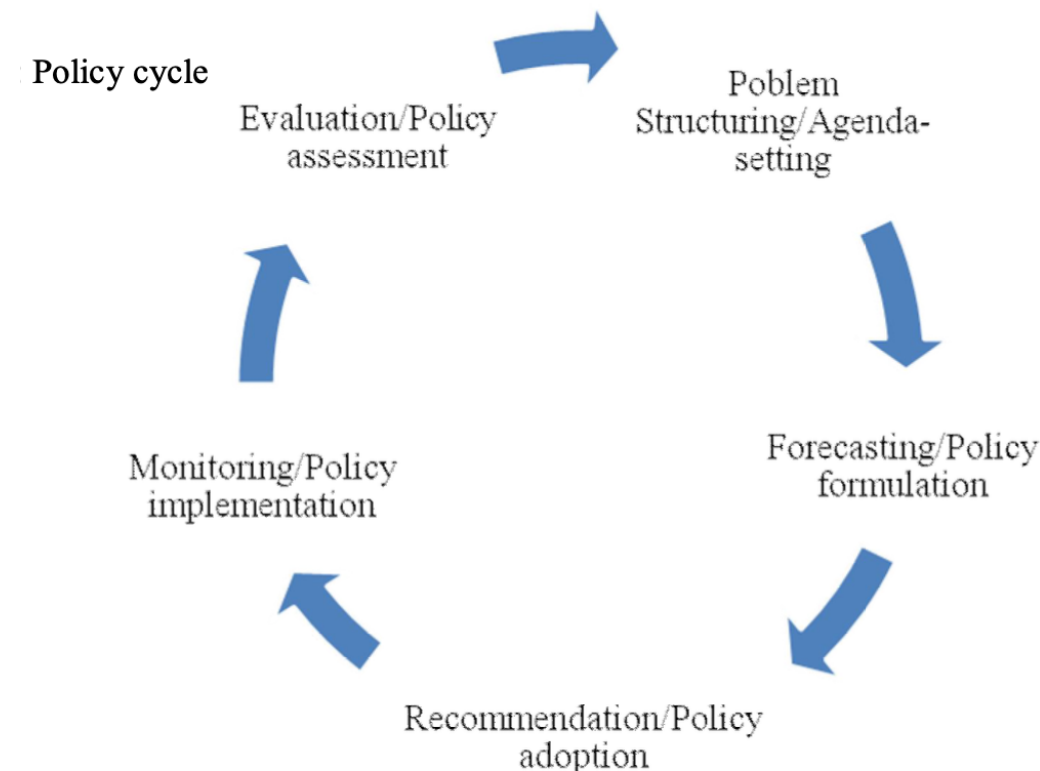
Source: Adapted as used by Okem (2010)

Theoretical/Conceptual Framework

      This research is hinged on the equivalency theory that online learners and traditional face-to-face conventional campus-based students have fundamentally different environments/experiences in which to learn but must aim towards achieving equivalent learning

outcomes. Using a pragmatist approach, mixed methods will be used to collect qualitative and quantitative data to unravel all the research gaps identified. Data collected will be codified and grouped into established categories and integrated into the theoretical foundations underlying this research.

Research Design

Research Methods and Modes of Analysis

Area of study.

This research was conducted at the Kwame Nkrumah University of Science and Technology, Kumasi. The choice of this public university was because of its existing experience with online teaching and learning.

Sampling

Qualitative Sampling. The target population of the research was both lecturers and students at KNUST who had used the online platform (VClass) for teaching and learning purposes. The participants were selected using purposive sampling to meet the following criteria: (a) female lecturers who have been teaching for over five years and have had an experience with the online teaching and learning platform; (b) male lecturers who have been teaching for over five years and have had an experience with the online teaching and learning platform; (c) students who have had an experience with the online teaching and learning platform; (d) Provosts of Colleges and (d) e-learning support staff who assist/facilitate online teaching. A total of 19 participants provided qualitative data for this research. In selecting lecturers to be part of this study, we ensured that we targeted participants of different gender and with different experiences. Of the five lecturers, two were females. A focused group discussion was conducted with seven final year undergraduate students. We selected level 400 students because the researchers' sought respondents who were present in school during the pre-and-post COVID-19 pandemic in Ghana. The research team reasoned that these students would have diverse and in-depth experiences with online learning and could contribute appropriately to answering the questions and sharing their experiences. One support staff at the KNUST e-learning center was selected to share his experiences regarding the facilitation of online teaching and learning with both lecturers and students. To comment on the existing online   institutional policy and standards in place to enhance e-learning, the research team interviewed the Director of the University's Information Technology Center, the Registrar of the E-Learning Directorate and the College Librarian of the College of Science, KNUST.

Quantitative Sampling. For the quantitative data, we used a convenience sampling approach. We relied on convenience sampling because the quantitative data was administered online and relied on the availability and willingness of respondents. An e-consent form was shared widely on the university's WhatsApp and Telegram pages and institutional emails asking both students and lecturers of their willingness to fill be part of the study. While convenience sampling is not appropriate for some quantitative research, the focus of our research, which does not seek to generalize but rather to identify key issues of interest and recommendations, meant that convenience sampling as described above served our purpose. A total of 73 staff teaching staff ((total staff = 664) filled completely and submitted the e-questionnaire instrument.

Data Collection

Qualitative and quantitative data were collected for this study. Data collection took place over a period of three months.

Qualitative Data Collection. Semi-structured interviews were used to collect data from participants. All interviews were carried out in the offices of the various participants and lasted for about 30 to 45 minutes per respondent. The interview explored participants' experiences with online teaching and learning, the challenges they have faced in teaching or learning within online environments, and the improvements in standards and regulations that they would recommend for the university to make in improving online teaching and learning. Using the qualitative approach allowed participants to express themselves freely and share their in-depth experiences. The interview guide was modified during the interview and included themes that emerged from previous interviews but were not included in the initial interview guide that was developed.

Quantitative Data Collection. Quantitative data was collected using e-questionnaires. In designing the questionnaire, we relied on the Quality Matters Rubrics for online teaching and learning as a guide. The researchers developed a Likert-type scale questions that assessed knowledge of standards, perceptions about existing standards, and recommendations for additional standards to the KNUST's e-learning platform. The e-questionnaire was subsequently shared with all university staff who consented to be part of the respondents. Reminders in the form of USSD messages were sent to registered respondents to submit fill and submit the questionnaire.

Ethical consideration

All participants were asked to give consent prior to the data collection. For the qualitative data, all participants gave their consent for researchers to audio record. The researchers assured participants of their anonymity in data collection and publication of reports.

Data Analysis

Qualitative Data Analysis. The qualitative audios were all transcribed verbatim. The transcripts were then organized based on the main objectives of the research as the initial organizing frameworks. The organized transcripts were read thoroughly. Key ideas, recommendations and suggestions from participants were represented by words/phrases. These words or phrases, representing emerging ideas from the transcripts, were treated as codes for the purpose of data analysis. For instance, words and phrases like 'tolerance', 'clear explanation of online regulations', 'self-control', were some of the codes used. Similar codes were put together to form themes. For instance, patience was used as a theme to represent the codes of tolerance, self-control, and clear explanation of regulations. These themes became the main discussion points for the presentation of the qualitative data.

Quantitative Data Analysis. Univariate analysis was used to analyze socio-demographic characteristics as well as the College of Affiliation of participants. Frequency tables and histograms were used in this regard. We calculated the mean scores of the Likert-type scale items and presented them as findings.

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Research Findings

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In this section, we present our research findings. We first discuss results from the quantitative data and then the qualitative findings.

Quantitative results presentation

Demographic characteristics of respondents.

This section, which was designed to seek the personal information (gender, age, rank, and years of work experience at KNUST, and college) of the respondents comprises the presentation and interpretation of the survey results from the quantitative data. The interpretation of the data was based on the findings underpinning the research questions that guided the entire research.

In total, 73 respondents who are academic senior members from various academic Departments of the university participated in the survey (Table 1.0). Out of the total number of respondents, 56 (76.7%) were males and 17 (23.3%) were females. This data reflected the gender dynamics in the university as there are more males as senior members compared to females. With respect to age, the highest proportion of respondents (57.5%) belonged to the 35-49 age group. We argue that this year group's familiarity with the internet informed their larger proportion in the sample. Respondents over 50 years in Ghana are often late adopters of technology and may have felt reluctant to engage with the e-questionnaire that was designed for this study. This may explain the observed demographic characteristic in the data. In terms of rank, most of the respondents are at the lecturer level, with 49.3% of the respondents occupying this position. This was followed by senior lecturers (27.4%), professors (13.7%), and assistant lecturers (9.6%). Furthermore, majority of the respondents had more than six years of working experience, with 52.1% of the respondents falling within this category suggesting that most of the respondents were highly experienced.

In terms of representation across the various colleges, the analysis revealed that 37% of the respondents were from the College of Humanities and Social Sciences, followed by the College of Agriculture and Natural Resources (23%) and the College of Engineering (16%). Since different disciplines and programmes may have different challenges and needs for teaching and learning online, these statistics are important in that they may help us contextualize some of our findings from the Likert-type scale data. Table 1 shows the distribution of the respondents across the six colleges currently at KNUST.

Table 1: *Profile of respondents' characteristics*

Variable	Frequency (73)	Percentage
Gender		
Male	56	76.7
Female	17	23.3
Age		
30-34	11	15.1
35-49	42	57.5
50-54	6	8.2
55-59	5	6.8

>60	9	12.3
Rank		
Lecturer	36	49.3
Assistant Lecturer	7	9.6
Senior Lecturer	20	27.4
Professor	10	13.7
Years of work experience		
1-3	25	34.2
4-6	10	13.7
>6	38	52.1

Source: Field survey, 2023

Respondents' perceptions of the current state of KNUST online teaching and learning frameworks

The researchers assessed the perception of lecturers of the various statements. Their perceptions were evaluated on a six-point Likert-type scale where 1= Very Poor, 2= Poor, 3= Satisfactory, 4= Good, 5= Very Good, and 6= Excellent. Table 2 illustrates the respondents' perceptions of the current state of guidelines/standards regulating KNUST's online teaching and learning.

Firstly, regarding the strength of the linkages between research and online content development to enhance learning outcomes online, the respondents on average agreed that it was excellent (mean score of 3.7), with most of the responses falling within the satisfactory, good, very good, and excellent categories. However, it is worth noting that there is a sizable proportion of respondent who perceive the linkages between research and online content development to be poor or very poor. Furthermore, the respondents generally agreed that students are involved in evaluating quality online engagement and are encouraged to provide useful and constructive feedback after online sessions. This mean score of 3.5 indicates that the perception of the facilitators or lecturers at KNUST towards this statement is generally positive. While 27.4% and 38.4% of the responses fell within the satisfactory and good categories respectively, there were also a significant proportion of responses in the "poor" and "very poor" categories, indicating that there may be some concerns or challenges.

Similarly, concerning the effectiveness and appropriateness of rewards given to students who play an active role in fostering quality online teaching, the respondents generally agreed it was satisfactory (mean score= 2.9). Most of the responses fell within the poor and very poor categories, suggesting that KNUST does not have a robust policy in place for rewarding students who contribute to the quality of online teaching and learning. This could be problematic, as it may incentivize students who actively participate in online teaching and learning. As such, it is essential to prioritize the development of more effective reward mechanisms for students who contribute to the quality of online teaching. By doing so, KNUST can further enhance the quality of its online programs and foster a more engaging and effective learning environment for its students. Additionally, it is noteworthy that KNUST lecturers/facilitators have a good understanding of how to use student feedback to enhance their online teaching and have access to professional development opportunities to improve their skillsets, as indicated by a mean score of 3.5. However, there may still be room for improvement in terms of providing more support and resources for lecturers to improve their online pedagogical skills.

The mean score of 3.4 for the statement, "each lecturer can easily adapt and implement the online teaching and learning framework while maintaining consistency in the KNUST virtual environment," indicates that the perception of KNUST facilitators/lecturers towards this statement is generally positive. Most responses fell within the "satisfactory" and "good" categories, indicating that there has been significant improvement in this area. However, responses in the "poor" and "very poor" categories indicate that KNUST may still need to engage key stakeholders (lecturers, and facilitators) in contextualizing frameworks that support KNUST's workspace.

Concerning the availability of a specific, well-functioning unit dedicated to quality online teaching with a clear mandate, responsibilities, and resources, most lecturers expressed a positive perception, with a mean score of 4.0, indicating a high level of agreement. Regarding the statement, the quality online teaching unit promotes research, develops an evidence base of what works, and provides pedagogical resources' most responses were in affirmation, as evidenced by the mean score of 3.7. and null for a very poor response, suggesting a good performance in this area.

On the effectiveness of the dissemination of effectual practices across KNUST and the provision of professional development by the quality online teaching unit, the mean response of 3.9 elucidates a high agreement with this statement. Most responses towed towards the positive

with very few respondents affirming otherwise, as evidenced by a poor perception score of 5.5 and a null very poor perception score.

Regarding the extent of engagement of the quality online teaching unit across Departments and disciplines and their promotion of cross-fertilization of best online practices, the mean perception score indicates, it is satisfactory. However, the perception scores for very poor and poor were quite significant, suggesting the dire need to put in frameworks that promote cross-fertilization of best online practices.

Furthermore, the mean score of 3.5 for the statement "KNUST online support services are fully integrated into the teaching and learning framework" suggests that the respondents have a generally positive view of the integration of KNUST's online support services into the teaching and learning framework. Specifically, the mean score falls in the "good" range, indicating that while the online support services may not be viewed as "very good," or "excellent" they are still considered to be adequate. Also, the respondents generally had a positive view of the clarity and comprehensiveness of instructions and guidelines for expected standards during live online lectures. It indicates that the lecturers perceive that the instructions and guidelines are adequate and meet their needs, but it still needs to be enhanced as a significant proportion of the respondents rated the clarity of instructions and guidelines as "very poor" or "poor" (26% and 17.8%, respectively).

On the existence of clear instructions or policies for lecturers to follow when designing online assignments and assessments, the responses indicate that respondents hold a neutral perception of the statement. Although the mean score of 3.2 indicates a generally satisfactory perception, the percentage breakdown suggests that there is scope for enhancing the clarity of instructions and policies for designing online assignments and assessments. Therefore, it would be prudent to undertake a thorough review and refinement of the existing instructions and policies to further optimize their efficacy and enhance the visibility of such systems at all administrative levels (Departments, Faculties, and Colleges) within the institution.

Regarding the availability of materials and resources for lecturers to draw upon when designing course objectives and core tasks, the mean score of 3 suggests a neutral perception among respondents. Responses were distributed across the spectrum of categories, with the majority falling within "satisfactory" and "good", indicating the existence of helpful resources. However, a notable proportion of responses were categorized as "poor" or "very poor", indicating a potential need for improvement in this area. Overall, there is a consensus among the lecturers regarding the availability of clear guidelines for designing online learning materials that cater for the specific requirements of virtual audiences. Evidenced by the mean score of

3.3, suggesting a relatively positive perception of the statement. Most of the respondents expressed satisfaction with the current situation, with the "satisfactory" and "good" categories making up a significant proportion of the responses.

The mean score of 3.4 indicates the existence of materials and resources that are available to lecturers for designing course objectives and core tasks. The responses were primarily positive, with most respondents falling within the "satisfactory" and "good" categories, implying that the resources provided are adequate. The statement "clear instructions are available for lecturers to design online learning materials that cater to the needs of virtual audiences" obtained a mean score of 3.3. The percentage breakdown reveals that 2.7% of the respondents had a "very poor" perception of the instructions, while 23.3% rated it as "poor." On the other hand, 31.5% of the respondents had a "satisfactory" perception, while 30.1% and 12.3% rated the instructions as "good" and "very good," respectively. There were no respondents who gave an "excellent" rating to the existing instructions. This suggests that there are adequate materials and resources available for lecturers to draw on in this regard.

According to the survey results, the mean score for the statement "copyright and ethical issues for online lectures are clear, specified, and accessible to all lecturers" was 3.3, indicating a moderately positive perception of the senior members towards this statement. The majority of responses fell within the "satisfactory" and "good" categories, which accounted for 31.5% and 30.1% respectively. However, a relatively high percentage of respondents (34.2%) rated this statement as "poor", suggesting that there may be some shortcomings in addressing these issues within the KNUST virtual environment. Furthermore, the percentages for the "very poor" and "excellent" categories were 0% and 11% respectively, indicating that there is no significant dissatisfaction or strong agreement towards the clarity and accessibility of copyright and ethical issues for online lectures. However, the relatively high percentage of respondents rating this statement as "poor" calls for attention and improvement in ensuring that clear, specified, and accessible guidelines are provided to all lecturers in the KNUST virtual environment.

The results further suggest that there are clear instructions provided for student/learner behavior during offline (asynchronous) sessions with a mean score of 3.1. The responses were distributed across various categories with the highest percentage of responses (34.2%) falling in the "satisfactory" category, followed by 28.8% in the "poor" category and 26% in the "good" category. While a small percentage (2.7%) of respondents found the instructions to be "very poor," and 8.2% found them to be "excellent," indicating the need for improvement in certain areas. It can be further inferred from the results that the learners are provided with a flexible submission format during online sessions with a mean score of 3.9, which is considered good.

The data indicate that the majority of respondents rated the statement positively with responses falling within the "good" and "very good" categories, comprising 46.6% of the total responses. On the other hand, 25.9% of the responses indicated a "satisfactory" perception, while only 13.7% of the respondents had a negative perception, which is relatively low. Overall, the results suggest that learners have a favorable perception of the availability of a variety of submission formats during online sessions.

The statement, "Learners have the opportunity to engage in online lectures and interactions using various mediums of interaction (text, audio, video, visual)", garnered a mean score of 4, indicating that it is rated as "good" by the respondents. Specifically, 32.9% of the respondents rated it as "satisfactory," and 23.3% rated it as "very good." Moreover, 11% of the respondents rated it as "excellent," while the same percentage of respondents rated it as "very poor. The high mean score indicates that learners have ample opportunities to engage in online lectures and interactions using different mediums of interaction such as text, audio, video, and visual aids.

Table 2: *Respondents' responses to perception statements*

Statements	Scale	(%)	Mean Perception
Linkages between research and online content development are strong and are used to enhance learning outcomes online.	Very Poor	2.7	
	Poor	12.3	
	Satisfactory	30.1	3.7
	Good	27.4	
	Very Good	26.0	
	Excellent	1.4	
Students are involved in evaluating quality online engagement and are encouraged to provide useful and constructive feedback after online sessions.	Very Poor	5.5	
	Poor	12.3	
	Satisfactory	27.4	3.5
	Good	38.4	
	Very Good	13.7	
	Excellent	2.7	
Students who play an active role in fostering quality online teaching are appropriately rewarded.	Very Poor	15.1	
	Poor	30.1	
	Satisfactory	20.5	2.9

	Good	17.8	
	Very Good	12.3	
	Excellent	4.1	
Lecturers know how to use student feedback to improve their online teaching or can access professional development to learn how.	Very Poor	4.1	
	Poor	17.8	3.5
	Satisfactory	34.2	
	Good	21.9	
	Very Good	16.4	
	Excellent	5.5	
Each lecturer can easily adapt and implement the online teaching and learning framework while maintaining consistency in the KNUST virtual environment.	Very Poor	8.2	
	Poor	13.7	
	Satisfactory	34.2	3.4
	Good	21.9	
	Very Good	19.2	
	Excellent	2.7	
There is a specific, well-functioning unit dedicated to quality online teaching, with a clear mandate, responsibilities, and resources.	Very Poor	1.4	
	Poor	9.6	
	Satisfactory	17.8	4.1
	Good	31.5	
	Very Good	26.0	
	Excellent	13.7	
The quality online teaching unit promotes research, develops an evidence base of what works, and provides pedagogical resources.	Very Poor	--	
	Poor	13.7	
	Satisfactory	31.5	3.7
	Good	30.1	
	Very Good	23.3	
	Excellent	1.4	
The quality online teaching unit disseminates effective practices across KNUST and provides professional development.	Very Poor	--	
	Poor	5.5	
	Satisfactory	34.2	3.9

	Good	28.8	
	Very Good	24.7	
	Excellent	6.8	
The quality online teaching unit is fully engaged across Departments and disciplines and promotes cross-fertilisation of best online practices.	Very Poor	5.5	
	Poor	24.7	
	Satisfactory	27.4	3.2
	Good	26.0	
	Very Good	15.1	
	Excellent	1.4	
KNUST online support services are fully integrated into the teaching and learning framework	Very Poor	5.5	
	Poor	13.7	
	Satisfactory	30.1	3.5
	Good	31.5	
	Very Good	15.1	
	Excellent	4.1	
There exist clear instructions and guidelines regarding expected standards for lecturers during live online lectures	Very Poor	8.2	
	Poor	17.8	
	Satisfactory	28.8	3.3
	Good	26.0	
	Very Good	19.2	
	Excellent	---	
There exist clear instructions or policies for lecturers to follow in designing on-line assignments and assessments.	Very Poor	4.1	
	Poor	16.4	
	Satisfactory	27.4	3.2
	Good	38.4	
	Very Good	11.0	
	Excellent	2.7	
There exist materials and resources for lecturers to draw on in designing course objectives and core tasks	Very Poor	5.5	
	Poor	19.2	
	Satisfactory	27.4	3.4

	Good	37.0	
	Very Good	8.2	
	Excellent	2.7	
There exist clear instructions for lecturers in designing slides and learning materials that are appropriate for online audiences	Very Poor	2.7	
	Poor	23.3	
	Satisfactory	31.5	3.3
	Good	30.1	
	Very Good	12.3	
	Excellent	---	
Copyright and ethical issues for online lectures are clear, specified, and accessible to all lecturers	Very Poor	4.1	
	Poor	34.2	
	Satisfactory	21.9	3.3
	Good	28.8	
	Very Good	11.0	
	Excellent	---	
There exist clear instructions for student/learner behavior during offline (asynchronous) sessions.	Very Poor	2.7	
	Poor	28.8	
	Satisfactory	34.2	3.1
	Good	26.0	
	Very Good	8.2	
	Excellent	---	
There exist clear instructions and sanctions for learner misconduct during online sessions	Very Poor	9.6	
	Poor	41.1	
	Satisfactory	24.7	2.7
	Good	20.5	
	Very Good	4.1	
	Excellent	---	

Learners have the opportunity to submit assignments in different formats during online sessions	Very Poor	---	
	Poor	12.3	
	Satisfactory	27.4	3.9
	Good	27.4	
	Very Good	19.2	
	Excellent	13.7	
Learners have the opportunity to engage in online lectures and interactions using various mediums of interaction (text, audio, video, visual)	Very Poor	---	
	Poor	11.0	
	Satisfactory	21.9	4.0
	Good	32.9	
	Very Good	23.3	
	Excellent	11.0	

Standards, skills, and qualities required for online teaching and learning.

In the quest to assess standards, skillsets, and qualities needed for accomplishing quality online teaching and learning, the researchers used key standardized indicators to evaluate the perceptions of respondents (Figures 4 – 6). Figure 4 shows that respondents rated facilitator discipline and clarity in delivery as major standards required during online teaching. In assessing how discipline in online teaching must be adhered to during online facilitation, the majority of the respondents indicated the dire need to engage students on the rules of engagement of each session (Figure 5). The respondents acknowledged the role KNUST plays in ensuring that there are periodic educational/training sessions organized for both lecturers and students (Figure 6). It was, however, observed that little was being done currently to track adherence to standards.

Figure 4

Distribution of standards (code of conduct, ethics, norms) lecturers must uphold.
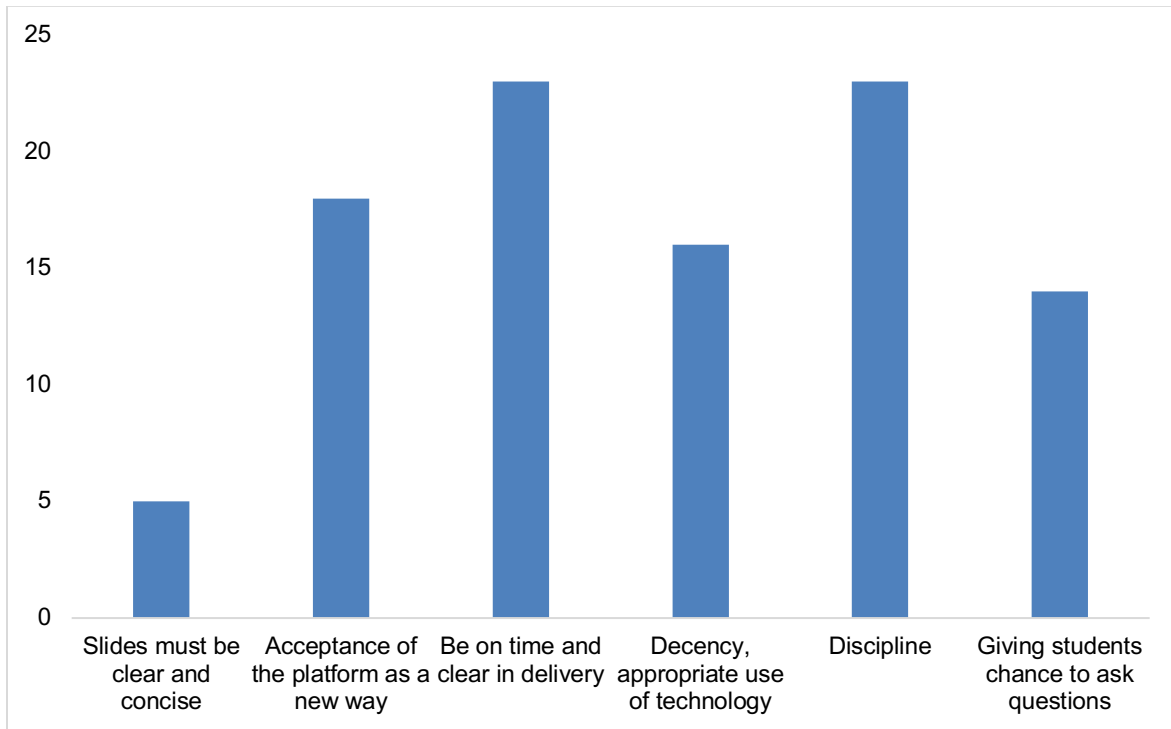
Figure 5

Distribution of how to ensure discipline and self-regulation
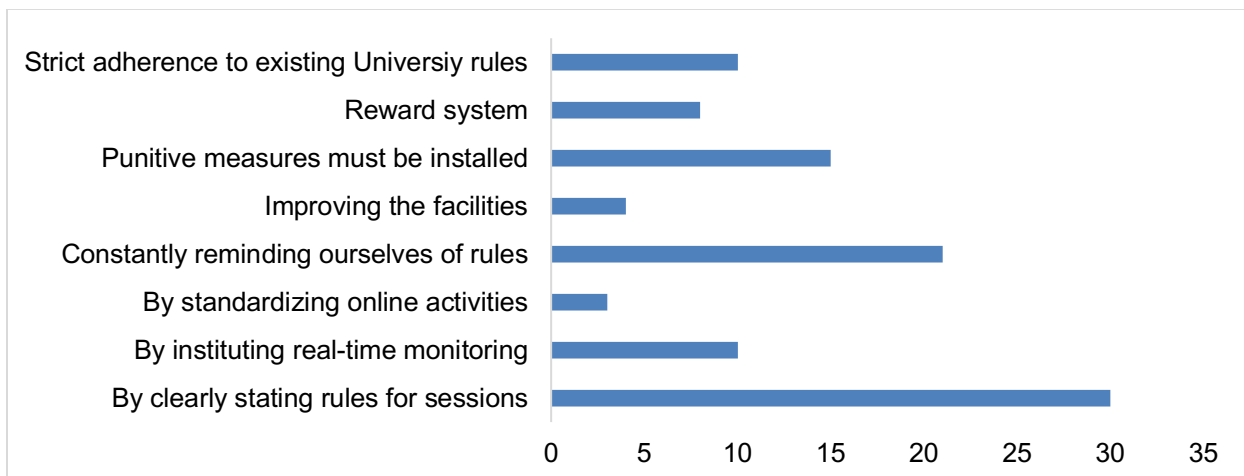
Figure 6

Distribution of how the university ensures adherence of both lecturers and students
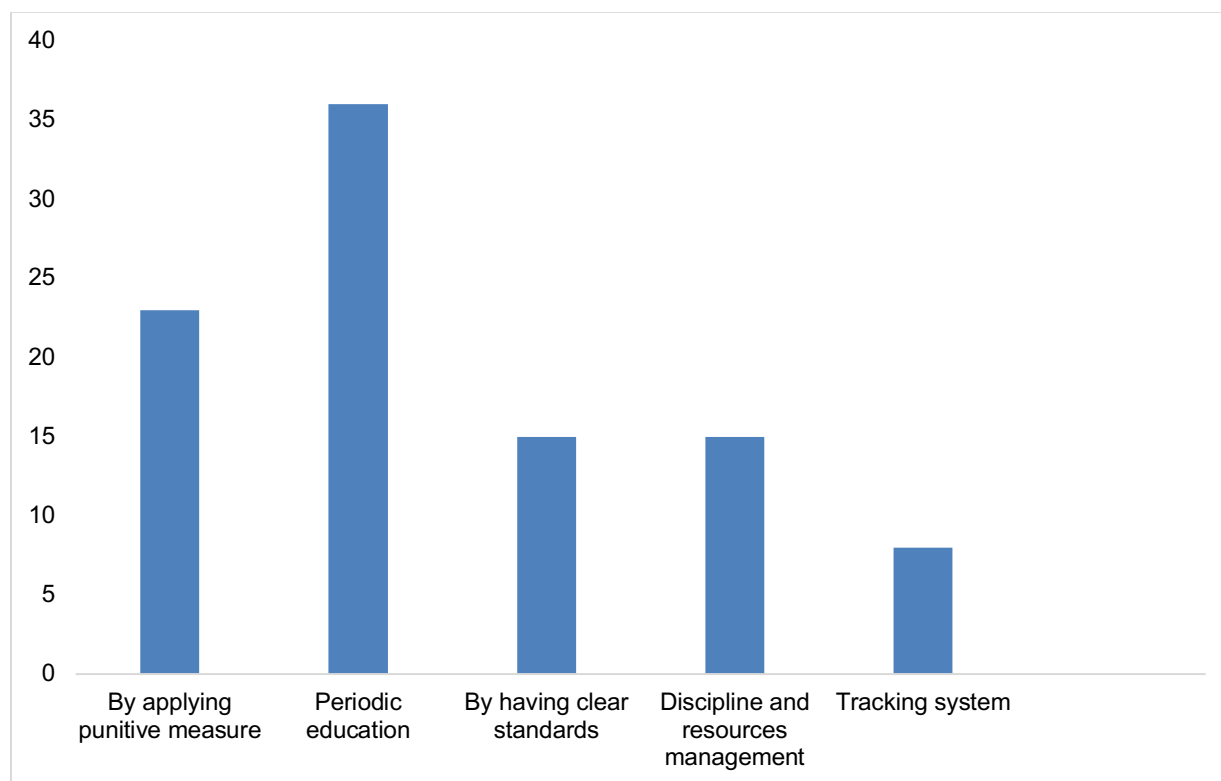
Presentation of qualitative results

Respondents' perceptions of online teaching and learning

The quantitative results indicated that although the responses on expected standards for assignments and assessments as well as teaching and learning were statistically favourable, the percentages for poor and very poor were very high. We explored these standards further using the qualitative data. We engaged lecturers, students, e-learning support staff and information technology experts regarding the qualities and standards that both learners and facilitators must bring online. We used these discussions to begin the formulation of clearer standards and requirements that could be adopted to improve the teaching and learning within online environments at KNUST. In the following sections, we present the qualities and ethical standards that participants felt were important for both learners and students to bring into online teaching and learning environments.

Patience is a quality for teaching online. One of the qualities highlighted by students was patience on the part of facilitators during online delivery. Students who were interviewed emphasized that, because the online learning environment takes away some presence and authority from the lecturer, students often do not behave accordingly. As a result, lecturers who are not tolerant or patient often become angry and cancel the class, which ends up affecting the rest of the students:

> *I think the most important one is patience. We understand you are working with students and not all will be cooperative. I think they should be patient when addressing students in a virtual environment…for example, we were having a class, and a student was misbehaving. So, we were all muted. But this same student will log out and log in again just to disturb the class. So, you could detect from the lecturer's voice that he was very furious and wanted to punish him, but the student was just not being cooperative. So out of frustration, he had to reschedule the class for another time. It was very disrespectful and cost us dearly because the lecturer didn't have the patience to cover that topic again*. (FP6, Learner)

Here, the student bemoans the lost lecture. The argument, as reiterated by other students in the focus group, is that patience is an important quality that online lecturers and facilitators must possess.

In terms of patience, one of the lecturers interviewed PJ explains it by emphasizing the need for co-lecturers to take time off and take students through the rules and regulations. He explains that lecturers must give students the benefit of the doubt and tolerate some level of deviance within online space:

> "*The first thing is to send a prompt or a caution because sometimes they are unaware of their actions and inactions. But if these actions persist for some time, it means that it is deliberate, and that the person must be delisted from the activity*." (PJ, Lecturer)

While PJ acknowledges the need for facilitators to give students the benefit of the doubt and provide clarity regarding what students can and cannot do during online interaction, he also suggests that there must be a limit to which facilitators must accommodate the behavior of learners.

Making delivery interactive and engaging. As part of our discussion, all stakeholders emphasized that lecturers and facilitators of online teaching must possess the skill of

engagement, to be able to deliver content in a way that facilitates discussion and interaction and that keeps the learners engaged and interested in the learning process. This skill was emphasized by both learners and lecturers as important. In her explanation, PE, a female associate professor in social work, emphasizes the importance of group-based activities in facilitating online learning and suggests it as an important skill required for lecturers and facilitators. She explains,

> *Yeah, so because it's online, you have to do more activities. If you do more activities, it means they will have to pay more attention. I actually like the online lecture irrespective of the fact that it's a large class, I like that a lot because I let them do a lot of group work online, so you have to stay wide awake because somewhere in the middle, we'd have group work. I'll split students into groups and give them five minutes to come up with an answer. So that's how it goes for me. So, in Zoom, you can group and do automatic grouping, depending on the numbers. If the class size is small, I do the grouping manually but if they are a lot I don't. So, while you're in groups working, I just join and move to another to see what they are doing. So, you cannot decide not to participate, because you don't know when I will join. Sometimes for smaller classes, I award marks to individuals who actively participate in a group.*

In her explanation, she highlights some specific skills that allow for interaction, including the ability to develop and use break-out rooms, the grouping of the students using the learning management system, and the ability to move from group to group while the learners are having discussions or group activities. Similar to her argument, the learners who took part in the focus group discussion indicated how a lecturer's lack of interactive ability hinders the learning experience and makes online learning tedious. Some of the skills the students highlight include an ability to share screens, restrict access for difficult students, and present content interactively:

> *I feel like some lecturers do not know how to navigate the app, so it makes sessions boring. So, for example, if you are having an online lecture, you should know how to share your screen for students to know what you are doing so that they can participate, and use basic sections of the apps i.e. chat, turning on the caption button, etc. to interact effectively.* (FP7, Learner)

I don't know if I can use the word assertive. but for me, if you're having an online class and you read to me, I will not listen. Not everything should be from the slide. You should be well prepared and come up with interesting examples. (FP5, Learner)

Please I think some lecturers come online unprepared. They just read the slides, they do not give better explanations and examples. They just end the class and schedule another one. The moderator in this case the lecturer must have the ability to make the conversations interactive. Communication skills is also very important. (FP8, Learner)

…the moderator should make the students stay active and participate. For example, there was this lecture we had via Zoom and the lecturer made us identify ourselves by using our names so that from time to time she could mention anyone's name to answer a question. So, with something like this, if she calls you and you don't answer, she knows you were not paying attention, or something is wrong. (FP3, Learner)

… The lecturer should know how to hold the pivot of the conversation to make the students alert. So maybe before the class starts, he/she could explain to students how interactive the class. This could help prepare the student for all class sessions. (FP4, Learner)

From the above quotations, it is clear that a facilitator's ability to be interactive within online learning environments is important. Both learners and lecturers emphasize it as an important skill for lecturers in teaching online. The implication for policy is evident: lecturers/facilitators must be taught the various skills that they can use to enhance engagement and interaction within online learning environments.

Training the voice. Some of the stakeholders indicated that lecturers need to master the skill of communicating effectively using their voices and to find ways of making their voices suitable for the online learning environment. P6, one of the learners, explains that: "*you find it too difficult to hear when lecturers are speaking…the communication skills they need to develop, I think one of them should be voice audibility*". For P6, it is important for lecturers to be aware of how their voice translates through technology. In line with this, it may be relevant for lecturers to record and listen to themselves before they go online for an online lecture. PJ, one of the lecturers interviewed, argued in the context of communication skills. For him, voice audibility is only one part of the several communication skills that lecturers must develop when they are teaching online:

Facilitators should practice the art and skill of communication, knowing when to speak, and how and why they should speak. Facilitators should have collaborative skills, work as a team, share views, and integrate ideas. Finally, facilitators should have online managerial skills to have full control of all the activities that take place online. (PJ, Lecturer)

These are all part of quality standards that the respondents argue must be upheld when lecturers are teaching online.

Ethical standards. Researchers also explored some ethical standards utilized by lecturers to uphold effective online teaching and learning. These standards are known to impact teaching and learning in ways that benefit both facilitators and students and help reach the said purpose of the online learning platform. After several discussions, participants noted that respect, freedom of expression, cultural diversity, maintaining appropriate sexual relationships, feedback, and cultural awareness are among the few standards that can promote the effectiveness of online teaching and learning if lecturers adhere to them.

For instance, PJ indicated that:

"Facilitators must be guided by principles in relation to ethical standards. The first is Autonomy, in the sense that lecturers must allow students to have some freedom to express themselves. This ensures mutually beneficial information generation and sharing. Another thing is, facilitators, should give feedback to students after an engagement, what we call grades when tasks are completed so they know their level of competence and revise how they do things. Lecturers should avoid embarrassing students when they make mistakes. Facilitators should also embrace diversity in culture and be willing to show and demand respect during online engagements. Learners should not be judged based on their ethical, sexual, or racial background. Equal respect must be given to everyone."

The quotation from PJ contains key essential ethical standards that facilitate online teaching and learning. PJ also mentioned how cultural intelligence can enhance the effectiveness of online education, stating that:

"There is something called online etiquette, knowing how to behave, what to say, and how to say things on the online platform with respect. Avoiding the sexist and racial comments. Students must also draw a clear difference between the varied social media platforms and the online teaching platform."

In addition to the above, some of the respondents gave specific recommendations regarding ethics for online learning. One of the participants, ET, an e-learning staff of KNUST gave some specific recommendations in this regard.

Both lecturers and students are expected to.
1. *Exhibit appropriate behaviors.*
   - *Avoid racist comments/ stereotyping.*
   - *Avoid derogatory comments.*
2. *Respect for fellow students.*
   - *Students are to respect their fellow students both in words and actions.*
3. *Avoid sexually explicit conversations.*
   - *This distracts the audience.*
   - *Makes people feel uncomfortable.*
4. *Privacy and confidentiality   ty.*
   - *Respect the rights of each person.*
   - *Avoid sharing information without consent.*
5. *Timely and consistent participation.*
   - *Be present at all times.*
   - *Communicate when they face difficulties.*
6. *Practice academic honesty.*
   - *Always make references.*
   - *Always make citations.*

   Enforcement: Some of the learners suggested that students and student leaders must play a role in maintaining and upholding standards within online environments. They argue that especially in relation to the standards that students are expected to uphold, student leaders can play an important role in ensuring that the standards are upheld. P6 argues:

   Some level of authority must be given to class leaders to be able to check the lecturer. For example, if a lecturer or facilitator goes off for 30 minutes in an hour class, that 30 minutes needs to be accounted for. In this case, class leaders will go a long way in enduring that set standards are adhered to by all facilitators and lecturers.

For PJ, one of the lecturers interviewed, the facilitators together with student leaders should act as enforcers of standards. When asked about who should enforce these rules he responded:

Facilitators enforce them with students and when it goes beyond capacity, it can be referred to external institutional authorities such as departmental heads, program coordinators, and so on in the bureaucratic hierarchy.

KNUST's commitment to supporting online teaching and learning – perception of key stakeholders.

For this section, we engaged persons in management positions about existing policies in KNUST that could be drawn on and adapted to improve online teaching and learning. We interviewed management-level staff of the University's Information Technology Services (UITS), Library and the E-Learning centre about their perception on KNUST's e-learning policies, ethics and standards for e-learning, the commitment of KNUST and management to support e-learning and the infrastructure support that exist to promote e-Learning. We also examined the challenges that these institutional leaders foresee and which recommendations they make towards promoting stronger eLearning infrastructure at KNUST.

KNUST online teaching and learning policies. One key question discussed with the members of management was whether the university had policies to guide teaching and learning online. The participants indicated that there exist draft policies/frameworks for online teaching and learning of all forms in the University. *The E-learning policy and the ICT policy were indicated in this regard.*

> *Currently, the policy I know of is the draft E-learning policy and the ICT-policy which is a subset of the E-learning policy. The ICT policy caters for logistics like IT materials, tools, and facilities needed to facilitate online teaching and learning (Management member, UITS).*

> *So, for online delivery, the policies that are readily available are the teaching and learning policy of the University, the draft e-learning policy, and distance learning frameworks. I think the University also has a policy that guides online delivery at KNUST. I think these are the basic policies but of course, there are sub-policies of the University (Management member, E-Learning).*

The two policies are distinguished by their focus. While the ICT policy focuses on guidelines for setting up the key infrastructure needed to promote online teaching and learning, the draft E-learning policy emphasizes the direct delivery of content online. These two policies are independent but complementary. While these officers are quite conversant with the existence of

the policies, our study did not examine the extent to which these policies are known by the staff and the extent to which the policies are implemented. Nonetheless, we feel that the existence of these policies creates a good platform for us to build on to further strengthen teaching and learning online at KNUST.

Importantly, participants reveal that these policies emerge from a broader consultation between the university's management and the staff of the university:

> *When it comes to policy formulation, there is board consultation. The draft e-learning policy for example was submitted to constituted board for consideration. Members of the board constituted all major actors within the online space. After thorough consideration by the board, it was forwarded to the planning and resources units for further consideration before finally to the academic board for consideration, approval, and ratification. In conclusion, all key stakeholders depending on the policy are always actively involved in the promulgation of guidelines or policies (Management Member, E-Learning)*

These broad consultations for policy formulation are important as they will enhance the uptake of these policies and improve implementation.

Alignment of KNUST's online education guidelines with its mission and vision. While the existence of policies is important, it is equally important to ensure that there is a sync between an institution's vision and mission and what happens online, in terms of teaching and learning. Consequently, we asked participants to comment on how the university's vision is advanced through high quality online educational guidelines. All participants agree that online teaching and learning sits well with the university's strategic mandate as a science and technology institution, as well as with the University's specific vision and mission:

> *…So, right now the guidelines align perfectly with the universities mission and vision, which is to advance knowledge, provide quality teaching and engage in scientific research. Now, in case of any occurrence like covid-19, the University can continue without necessarily opening physically (Management member, UITS).*

> *Every one of the existing policies draws its mandate from the overall university mandate or the University's core values and mission so there's a linkage (Management member, E-Learning).*

The preceding quotations emphasize the sync between the university's core mandate and the existing guidelines for teaching and learning online and further indicates the university's preparedness to continue executing its mandate even in case of future pandemics. Two respondents from the Management the University's Information Technology Unit, and another from the university's e-learning unit further buttressed as follows:

> Well, first, there is a completely new directorate in charge of E-learning. The Directorate has been well-resourced with several studios that have been created for lesson delivery, recording of videos, online support staff, etc.

> The commitment is there to ensure that all online teaching and learning both for distance learners and regular students are functioning well.

From the quotations above, participants revealed two important information: that the university's vision and mission make quality online teaching and learning a necessity rather than a luxury, one of the paths through which the university can reach its goals. A second important information is that in addition to recognizing the need for online instruction, the university and its management are committed (ideological and infrastructural) to promoting quality online education. The commitment of the university relates to promoting both the idea and attitude required for e-learning as well as building the requisite infrastructure for e-learning:

> Well, as a university, we are significantly expanding our internet bandwidth purchases, so we are getting a much bigger band and looking to access the internet at all levels. So, we are expanding the Wi-Fi for students and all staff all over campus to have access to very high-speed internet. And we are also looking at students outside campus, within a 40-kilometer radius. It's a work in progress so, in terms of challenges with bandwidth, we are significantly increasing our capacity to make that available (Management Member, UITS).

The narrative that the university is constantly looking at ways to improve infrastructure and enhance student access to the internet, even outside campus demonstrates the commitment of the university to promoting online teaching and learning.

Guidelines regulating online conduct of learners and facilitators. There are several stakeholders in online learning. Two of these key stakeholders (learners and facilitators) interact frequently. To regulate the teaching and learning that take place online, the conduct of facilitators and learners must be guided by specific standards. Here, we explore with

participants which standards, regulations and codes exist to guide the conduct of online teaching and learning at KNUST. One of the management members of the UITS explains in relation to attendance and participation:

> *…I am honestly not sure whether the draft e-learning policy covers class attendance, but the policy should be able to attend to these things. Whatever is done online is recorded, I know at some point in time, we were asked to provide not just class attendance for students but for lecturers as well which was then used to generate a report on the visual learning platform/environment to improve it, increase participation and improve capacity. With the submission of assignments, the lecturer in charge sets up assignments online, timelines, deadlines for submission of assignments, etc. are all outlined. What is however not certain is whether a policy exists for the submission of assignments in the KNUST learning management system (Management Member, UITS).*

From the quotation above, it is evident that the attendance of both learners and facilitators is important to the university, leading to measures that check attendance. Although the respondent indicates that submission of assignments and related deadlines are catered for in the university's learning management system, it was not clear how this is enforced. The following management member from the E-Learning center suggests that tracking attendance and submission should be disaggregated based on whether the students are regular students or distance learners:

> *For example, if you take class attendance, looking at distance learning students who have some facilitation both online and face-face, there are guidelines which run it. Students attend 50% of their facilitation online and 50% in-person. On the other hand, if you take regular programmes, some of our end-of-semester assessments are done purely online. Comparing the regular and distance programmes, the difference is that, with regular, not everybody uses the online platform for examination, exercises, etc. Albeit, when it comes to distance learning programmes, almost everyone uses the the institutional learning management system which makes it easier to measure and track class attendance and submission of assignments. (Management Member, E-Learning).*

> ***Support services and infrastructure available to students.*** As part of our discussion with the Management staff, we examined the level of support available to learners and facilitators to enhance their interaction online. Participants explained that there exist library facilities to support online learning; there is a dedicated e-learning center and there are trained

staff to help provide counselling and support students navigate their journey within online environments.

Library facilities that support online students' learning at KNUST. In terms of existing library resources, participants indicate that the various university libraries are well-equipped to support online education. One librarian who was interviewed as part of this research elaborates on existing library facilities to support online teaching and learning:

> …Librarians are available for quick assistance via chat and in-depth research consultations via Zoom and more… KNUST Library databases provide students access to scholarly articles, news, magazines, primary sources, e-books, images, and more. So, there is also what we call ocl.KNUST.com and the library's website. The ocl.knust.edu.gh.com is the off-campus library access where all the journals can be found. It only requires a student to login and connect to receive the best document to facilitate their education and training (Librarian).

The provision of e-books, online databases and access to relevant reading material digitally is important and can facilitate teaching and learning online. Regarding emotional support available to students, one of the management members from the E-learning Department explain:

> The e-learning center and the counseling unit mostly do a lot of counseling online services, run podcasts, webinars, and things to support students in terms of how they learn and offer counseling services. Of course, there are counseling policies, they may also have a way of supporting us (Management Member, E-Learning).

From the preceding, the university has both infrastructural and human resources that support the teaching and learning that take place within online environments. These infrastructural and human resources are set up and work in sync with the university's strategic mandate and provide   the necessary support for both facilitators and learners to excel in teaching and learning online.

Discussion

E-learning policies have been known to drive changes within higher education (De Freitas and Oliver, 2005). These policies have become a requirement due to the surge in e-learning across higher educational institutions, especially in Africa. Whereas universities are trying to bridge geographical barriers with respect to education, there is a need for stringent measures to be put in place to moderate e-learning and help deal with any challenges which

may arise. Although e-learning provides flexibility, the effectiveness of learning, and other increased benefits, these may not be possible without metrics to ensure engagement, quality control, and learner satisfaction.

We evaluated the extent to which policies available in KNUST facilitate online teaching, learning and content development. The experiences of staff and students were solicited with respect to e-learning policy development and implementation. The role of students in shaping e-learning cannot be overemphasized. Students, who are also major stakeholders in e-learning ought to be involved in the process. However, in the case of KNUST, not much research has been undertaken using technology acceptance models to determine the perceptions of students towards online learning. There is the need for in-depth research to assess and determine the linkages between perceived ease of use, usefulness, and the behavioral intention of students to use e-learning platforms. Such strategies, together with other student feedback channels can help faculty and management better shape existing policies to streamline online activities.

The non-existence of promulgated standards for student evaluation and effective feedback strategies has contributed negatively to student involvement and demotivation. According to Vasilyera et al. (2008), feedback systems could either enhance learning or lead to student dropout depending on how they are structured. Jara and Mellar (2010) describe feedback from students as a central strategy for monitoring and quality control. The role of feedback in pedagogical systems have been broadly explored in face-to-face systems than e-learning. In the case of KNUST, feedback collection strategies such as interviews, questionnaires, and informal discussions could be leveraged to ensure quality assurance and continuous improvement of online learning. A feedback module could be established in the e-learning environment to streamline feedback generation and reward systems for students. Also, the timing for feedback should be considered since immediate feedback has been shown to have more positive effects than delayed feedback (Lou et al., 2003).

Feedback can be sought at various times within the semester, at the beginning, middle and the end. Quantified learner experiences can help improve instruction delivery and contribute towards shaping e-learning policies. Our research sheds light on the absence of robust systems for rewarding students who contribute to quality learning. Non-monetary incentives can be categorized into tangible and non-tangible incentives (Schildberg & Wagner, 2020). Souvenirs, certificates, and badges could be classified as tangible incentives whereas granting rights and privileges are non-tangible. Rewards in monetary and non-monetary forms could be instituted to motivate student feedback generation. Certificates of recognition, badges and souvenirs can serve as intrinsic and extrinsic motivation and could leave lasting emotional impressions on the

students. Monetary incentives could be used to a lesser extent since it is difficult to scale up and could lead to future problems.

Our research corroborates other researchers that e-learning is still in its infancy in Africa and the issue of untrained lecturers and limited infrastructure persist (Makokha & Mutisya, 2016; Table,2011). Similar patterns were observed by Kasse and Balunywa (2013) who assessed e-learning implementation in two high ranking universities in Uganda. The current e-learning "struggles" are not peculiar to Ghana but a seemingly Africa wide issue and that of other developing countries. The best e-learning systems require heavy investment in infrastructure and human capital at the initial stages. Results from the study indicate that most of the staff have not received training on instructional design and handling of e-learning platforms. However, in KNUST, the MasterCard Foundation and ASU partnership has facilitated the training of skilled personnel in instructional design and performance improvement. These personnel can serve as trainers of trainers to accelerate the teaching of e-learning best practices across the university.

There should be inter-departmental e-learning based activities to promote knowledge sharing of best practices. Each College in KNUST had e-learning representatives on the e-learning training by Mastercard Foundation. These reps could serve as focal points to facilitate the promotion of e-learning across the university. Although the university has an e-learning center with dedicated staff, more trained personnel need to be employed to understudy the pedagogical and technological needs of lecturers and students to be able to design modular teaching packages. Measures need to be put in place to identify potential barriers and how to deal with them. Typically, issues that may arise include lecturers' resistance to change since they have been accustomed to face-to-face teaching. Moreover, security and privacy need to be enhanced.

Through the e-learning center, management of KNUST provides good online support for e-learning activities. The dedicated e-learning center has trained instructional designers and facilitators to assist in the smooth operations of the center. However, the center could benefit from more staff and infrastructure such as state-of-the-art e-learning studios. Brown et al., (2007) propose a roadmap to policy development and implementation with governments being at the forefront. With respect to physical infrastructure, there should be consolidated efforts between the government and the university to bridge the infrastructure deficit.

There should be inter-university collaborations to ensure continuous professional development and funding opportunities could be made available to support such research initiatives. E-learning policy development and implementation are being spearheaded in the

Asia-Pacific region (Kong et al, 2014). However, currently, there exist e-learning policy gaps in Ghana which need to be bridged (Tanye, 2017). A national policy can provide a uniform platform to steer the affairs of universities in Ghana by incorporating the necessary checks and balances. Cultural backgrounds could influence the goals and approaches to e-learning policy development (Kong et al, 2014). In KNUST, there is the need to focus on a culture-sensitive approach to derive policy frameworks for KNUST and Ghana as a country, by leveraging on stakeholder input based on our study and other research works. A nationwide monitoring body needs to be established to ensure compliance with policy requirements.

Stakeholders in the e-learning platform need to have a clear understanding of expectations. There should be clearly marked channels of communication and policy documents need to be publicly accessible. From the study, lecturers agree on the existence of some instructions and standards for online teaching, but the institution does not have a policy document which is binding on its members. The proposed policy documents must focus on various aspects of online learning such as privacy, student's rights, code of conduct, intellectual property, technical support, assessment, accessibility among others.

There must be uniformity with respect to content authority technologies, how information will be stored and disseminated, available infrastructure, assessment strategies and responsibilities of stakeholders. The institution of the above stated measures would address the concerns of both students and lecturers and provide avenues to deal with any emerging issues. The policy document needs to project feasible and realistic expectations so as not to be seen as over-ambitious and just about big words (Welle-Strand and Thune, 2003).

It is evident that existing materials and resources in KNUST cannot support the stakeholder population in the online environment. Although respondents classified existing resources as helpful, they are quite limited. Moreover, a smaller section of the respondents described the resources as of poor quality. Measures would have to be instituted to ensure continuous refinement of resources and their adaptation in online environments.

Resources should be usable and optimized to maximize learning outcomes. Strategies such as heuristic evaluation could be used to identify usability problems and their levels of severity (Davids and Chikte, 2013). To obtain a balance of quality and cost control, some open-source educational platforms and tools can be adopted by KNUST. Management needs to consider blending low- and high-tech resources in the face of current constraints. Research should be conducted to uncover the features that drive students' acceptance and usage of e-learning resources (Bringman-Rodenbarger & Hortsch, 2020). There should be capitalization on mobile technology for dissemination of resources due to the proliferation of mobile phones.

Resources ought to be presented in web and mobile compatible formats to cater for different technological devices.

Synchronous and asynchronous resources and communication tools can be used to enrich learning, sustain dialog, and foster a sense of community (Obasa et al, 2013). Video conferencing, chat and instant messaging, blogs, web repositories, forums and application sharing tools need to be utilized to provide exceptional delivery of e-learning. Continuous training of stakeholders on when and how to effectively access and utilize the resources should be encouraged. All the resources to be uploaded onto e-learning platforms must be checked to ensure adherence to accessibility principles. Video-based resources should be used in moderation, bearing in mind the high cost of internet data services in Ghana.

The success or otherwise of online learning depends largely on acceptance by stakeholders. As such, stakeholder engagement is crucial and should be leveraged to ensure effective implementation of e-learning. There is the need for critical examination of success factors, challenges, and theories from the perspective of the stakeholders (Snigdha and Pattnail, 2020). A multi-stakeholder approach needs to be utilized to study the nature of technology adoption (Ansong et al., 2017). Frequent information and brainstorming sessions should be organized for staff of the university who are involved in e-learning activities to solicit views on feasible ways of implementing e-learning, while being guided by policies.

KNUST has policies with respect to copyright and ethical issues but the extent to which they are applicable to e-learning systems has not been fully established. The survey responses emphasized the need to revisit ethics and intellectual property issues. Academic dishonesty is dominant in online learning environments, which tend to be tempting (Bušíková and Melicheríková, 2013). Little education has been done with respect to ethical conduct in online learning at KNUST. In the face of sophisticated artificial intelligence (AI) tools that can generate content, students need to be educated on academic fraud and dishonesty, and adequate sanctions must be in place to serve as deterrence. Stakeholders must be educated on equal learning opportunities irrespective of race, ideology, gender, or disability.

Personalization on e-learning platforms could be beneficial but also potentially harmful when there is a breach of ethical standards (Ashman et al, 2014). AI has made intrusion into people's lives a "normal" activity and to personalize learning systems, privacy of students and lecturers may be breached. According to Husain and Budiyantara (2020), students' ability to control their privacy significantly influences their behavioural intention to use e-learning systems, which directly determines the success of e-learning. There must be a conscious effort to protect the confidentiality of data and the personal information of students collected online

needs to be stored and used for only its intended purposes. A privacy policy is necessary to clearly state the kind of data to be collected. Instructors must create a privacy enabled environment for learners even in the era of knowledge sharing.

Conclusion

Prior to Covid-19, the KNUST's focus was on traditional face-to-face instruction delivery. Post Covid-19, KNUST has transformed instruction delivery into blended mode (70% face-to-face and 30% online). The initial stages were burdened with challenges due to internet connectivity issues, limited resources, resistance to change and inadequate training. Fortunately, through numerous training sessions, faculty and students have come to accept and appreciate the benefits of online teaching and learning. The time is ripe for KNUST to move a step further in its eLearning drive. A promogulated policy document incorporating all the concerns, suggestions, and recommendations needs to be developed to serve as a guide for online teaching and learning. The university has benefitted immensely from Mastercard Foundation with respect to e-learning through the e-learning initiative, infrastructure acquisition, and training sessions. These programs have directly benefitted staff and students and have contributed to the delivery of high-quality online instruction. Through this support, KNUST is gradually taking its position among the best universities in terms of e-learning and being placed adequately to mentor other institutions.

While these developments are important for KNUST, they remain localized. Our argument is that it is important that KNUST works collaboratively with key stakeholders in Ghana to develop a national policy to guide the delivery of instruction online. This could be achieved through inter-university collaborations that emphasize the sharing of best practices across different institutions, and engagements around context specific challenges. The relevance of this approach will be to bridge the e-learning policy gaps that exist in Ghana. A national policy can provide a uniform platform to steer the affairs of universities in Ghana by incorporating the necessary checks and balances and the learned experiences from different institutions across the country. To enhance and promote the adoption of this policy, it is important that a monitoring infrastructure is put in place. A nationwide monitoring body, comprising different stakeholders will help ensure compliance with policy requirements.

While these policies, infrastructure and enforcement mechanisms are being put in place, researchers should continue to produce context specific knowledge to inform the continuous development of e-learning in Ghana. In-depth research on the linkages between perceived ease of use, usefulness, and the behavioral intention of Ghanaian students to use e-learning

platforms will improve the design and development of systems and content for online delivery. Again, continuous research on context specific best practices regarding instructor presence strategies could prove relevant to the development of e-learning in Ghana. Finally, we argue that intentional effort and resources must be invested into the adaption of emerging technologies to suit the learning and teaching needs as well as the learning and teaching demands of Ghanaian learners and facilitators.

Recommendations

The authors propose that the findings of this study could be used as a model for KNUST's affiliate institutions and other sister Universities in the sub-region and suggest the following recommendations which could be used to further strengthen e-Learning activities in KNUST.

- The development of KNUST's e-learning policy document needs to be accelerated. The promulgation of the policy will act as a springboard to conduct institutionalized reviews/audit for all eLearning activities. An institutionalized E-learning policy will further strengthen KNUST's commitment to major stakeholders that online education is a viable alternative mode of delivery to the traditional in-person mode of delivery.
- Effective feedback strategies need to be instituted to propel student involvement and motivation in online learning. Proper orientation on online teaching and learning for newly admitted students and faculty is required for proper integration into the virtual learning environment.
- There should be inter-departmental e-learning-based activities to promote knowledge sharing of best practices.
- KNUST could benefit from the establishment of more state-of-the-art e-learning studios to be able to serve the students and staff.
- There is a need to train more instructional designers to propel ongoing efforts aimed at standardizing e-learning activities at KNUST.
- KNUST is well positioned to lead inter-university collaborations to ensure continuous professional development of affiliate institutions in Ghana and the sub-region.
- More funding opportunities are needed to delve further into e-learning opportunities at KNUST.
- Further research is further required to ascertain how institutional policies promote online student success and retention.

Research Contributions and Limitations

Our research presents a unique perspective on the state of e-learning on KNUST campus. The knowledge generated contributes to build a pool of knowledge about the state of eLearning across Africa in general. Below we present specific explanations outlining how our research contributes to the four thematic areas of e-learning. Subsequently, we reflect on the challenges faced and how these impose specific limitations on our results and the conclusions that we can possibly claim from this study.

Alignment to the Four Thematic Areas of the Mastercard Foundation Scholars Program e-Learning Initiative

This research reveals interesting information about an important component of education globally. While the contribution of our research can be broad and varied, we present these contributions around the four thematic areas of the e-Learning Initiative.

1.Ecosystem Design

In our role as e-learning champions, the knowledge and experience gathered from this research would be disseminated among staff and faculty at KNUST and its affiliate institutions in addition to the partners institutions in the Mastercard Foundation Scholars network to facilitate the development of a community of practice. We seek to collaborate with other affiliate universities to share ideas and support sister institutions in their quest to research and develop similar policies. Effective and inclusive delivery of learning outcomes to students and learners which would result in an enhance learning experience akin to the face-to-face experience should sit at the heart of our online teaching and learning strategies and policy development.

2. Knowledge mobilization and Training

The findings from this study would add to existing knowledge and policymaking in building resilient and robust systems to support online/hybrid teaching and learning. Insights gleaned would be used to improve capacity building efforts undertaken by universities in the sub-region and beyond which would ensure that learning outcomes are delivered effectively to leaners and learning experience is enhanced in the virtual space. The use of feedback from students and continued investment in digital infrastructure to enable more effective online learning cannot be over emphasized.

3. Scaling

As the university continues to build the capacity of its staff and faculty to deploy more fully online programs, these policy recommendations would better shape strategies to improve student engagement and ensure more inclusiveness in the development and delivery of instruction to students. The eLearning Champions and Instructional Designers at the eLearning Centre could share innovative ways to share these challenges during their capacity-building efforts.

4. Innovative Approaches to Monitoring, evaluation, and Research in the context of eLearning

As an institution, the study reveals that we need to invest in online monitoring and evaluation tools to help collect and analyze feedback from staff and students towards ensuring the effective delivery of learning outcomes. Existing policies and online tools are not well disseminated or effectively being used. To improve adoption and accessibility of online teaching and learning for both staff and students a conscious effort must be made to close perceived gaps. The University's Quality Assurance and Planning Office needs to work closely with the eLearning Centre towards deploying effective online quality assurance tools.

Contribution to e-Learning research, practice, policy

The institutionalization of findings and recommendations of this research would provide standard terms of reference for policymakers, administrators, instructors, and students within KNUST's e-learning environment. It would drive a positive change in online educational practice and ensure compliance hinged on codified institutional policies. The authors foresee a positive ripple effect of the proposed policy framework on the over 100 educational institutions affiliated with KNUST.

The proposed policy formulation of this research is thus aimed at augmenting the Government of Ghana's efforts at enhancing quality blended learning by contributing to future policy planning and contributing to the draft KNUST E-learning policy document. The data presented can be utilized by other researchers to examine the trends, relationships, and disparities in the formulation of e-learning policies. The findings further contribute towards Sustainable Development Goal 4 aimed at "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (United Nations, 2022). The proposed e-learning recommendations would enhance flexible but quality online education which matches

up with traditional face-to-face lectures at KNUST. Through the findings of the study, the researchers envision an environment where instructors and students have a clear idea of expectations and best practices in relation to online learning. The policy guidelines would have a direct impact on instructional design and pedagogical practices, which in turn, can positively motivate people to pursue tertiary education online (inclusion and sustainability).

Research Limitations

Although this study set out to interview a larger number of staff in different Departments, the industrial strike action embarked by the University Teachers Association of Ghana (UTAG), limited our access to a lot of the staff. After the industrial action was called off, the academic calendar changed, requiring both teaching and non-teaching staff to do more with little time over the academic year. Consequently, a lot of the staff we approached declined to be interviewed, citing their busy schedule. Hence, the number of participants in this study is a significant limitation to the wide application of the findings.

The above notwithstanding, the research team made a conscious effort to include in this study all key stakeholders in online teaching and learning. We believe that the diversity of our study population in addition to the depth of the information they provided mitigates some of the limitations that have been highlighted above.

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Appendices

Appendix I: Respondents' Consent Form

Project title: Enhancing institutional policies and frameworks for E-learning: A case study of the Kwame Nkrumah University of Science and Technology, Kumasi,

INFORMED CONSENT INFORMATION

Thank you for consenting to participate in this study. This form highlights the objectives of the study and provides a description of your participation and rights as a participant. The purpose of this study is to enhance the promulgation of effective online institutional policies, evaluate the extent to which existing policies facilitate learner-centered online teaching, learning, and content development, and identify which gaps exist in capacities and resources to develop sustainable policy frameworks to guide and support the delivery of effective learner-centered online teaching at KNUST.

The outcome of the study: the data from this study will be used to formulate policies and frameworks to guide teaching and learning within virtual environments at the Kwame Nkrumah University of Science and Technology, Kumasi. These policies/frameworks will be used to guide instructor-learner interaction within KNUST's online environment and thus ensure that online course content developed meets learners expected outcomes, learners are equally sure of the ethics and responsibilities that come with online learning and University management possesses the human resources needed to manage teaching and learning within virtual environments.

I guarantee that respondents' anonymity is fully assured and that your participation in this research is voluntary; and you have the right to revoke at any point of the study, for any reason, following which any corresponding data/information will be destroyed.

PARTICIPANT AGREEMENT

1. I confirm that I have read and understood the purpose of the above study and have had the

opportunity to ask questions regarding my participation.

2. I understand that my participation is voluntary and that I am free to revoke at any time, without giving any reason.

3. I agree that the information I give can become anonymous in academic papers.

………………………………   …………………………………   …………………………………

Name of participant   **Date**   **Signature**

……

Principal Investigator: Prof. N. Ewusi-Mensah/**Co-Principal Investigator:** Mr. Courage Julius Logah
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Appendix II: Research Instruments

Project topic: Enhancing institutional policies and frameworks for E-learning: A case study of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Dear Respondent,

This questionnaire is meant to solicit information from you about your KNUST's policies/frameworks in supporting e-learning. Your responses to the questions will help in no small way to assist KNUST to institutionalize codified policies for online teaching and learning to achieve the intended purposes for which virtual teaching and learning was established as an alternate mode to conventional mode. You are assured of confidentiality and anonymity as you fill this questionnaire.

Thank you for your cooperation.

Section A: Background Information
This section collects brief background information about you and your teaching experience. Kindly choose from the list of options provided the response that reflects you.
1. Which Department are you a member of? (Please indicate below)
   …………………………………………
   1. Gender

      1) Male

      2) Female

   3. Age range

      1) 30 years and below

      2) 30 – 34 years

      3) 35 – 49 years

      4) 50 – 54 years

      5) 55 – 59 years

      6) Above 60 years

   4. Years of work experience within KNUST

      1) 1-3 years

      2) 4-6 years

      3) 7 years or more

5. Rank
   1) Professor
   2) Senior Lecturer
   3) Lecturer
   4) Assistant Lecturer
   5) Part-Time Lecturer

SECTION B. Online Teaching Experiences

6. Linkages between research and online content development are strong and are used to enhance learning outcomes online.
    1) Very true
    2) True
    3) Somewhat true
    4) Neutral
    5) Somewhat untrue
    6) Untrue
    7) Very untrue
7. Students are involved in evaluating quality online engagement and are encouraged to provide useful and constructive feedback after online sessions.
    1) Very true
    2) True
    3) Somewhat true
    4) Neutral
    5) Somewhat untrue
    6) Untrue
    7) Very untrue
8. Students who play an active role in fostering quality online teaching are appropriately rewarded.
    1) Very true
    2) True
    3) Somewhat true
    4) Neutral
    5) Somewhat untrue
    6) Untrue
    7) Very untrue
9. Lecturers know how to use student feedback to improve their online teaching or can access professional development to learn how.
    1) Very true
    2) True
    3) Somewhat true
    4) Neutral
    5) Somewhat untrue
    6) Untrue
    7) Very untrue
10. Each lecturer can easily adapt and implement the online teaching and learning framework while maintaining consistency in the KNUST virtual environment.
    1) Very true
    2) True
    3) Somewhat true
    4) Neutral
    5) Somewhat untrue
    6) Untrue
    7) Very untrue

SECTION C: Online teaching and support and infrastructure

2. There is a specific, well-functioning unit dedicated to quality online teaching, with a clear mandate, responsibilities, and resources.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

3. The quality online teaching unit promotes research, develops an evidence base of what works, and provides pedagogical resources.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

4. The quality online teaching unit disseminates effective practices across KNUST and provides professional development.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

5. The quality online teaching unit is fully engaged across Departments and disciplines and promotes cross-fertilisation of best online practices.

   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

6. KNUST online support services are fully integrated into the teaching and learning framework.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

SECTION D: Standards for online teaching and learning

7. There exist clear instructions and guidelines regarding expected standards for lecturers during live online lectures.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

8. There exist clear instructions or policies for lecturers to follow in designing on-line assignments and assessments.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

9. There exist materials and resources for lecturers to draw on in designing course objectives and core tasks.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

10. There exist clear instructions for lecturers in designing slides and learning materials that are appropriate for online audiences.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

11. Copyright and ethical issues for online lectures are clear, specified, and accessible to all lecturers.
   1) Very true
   2) True
   3) Somewhat true
   4) Neutral
   5) Somewhat untrue
   6) Untrue
   7) Very untrue

12. There exist clear instructions for student or learner Behaviour within and during live (synchronous) online lectures.
   1) Very true
   2) True

3)   Somewhat true
4)   Neutral
5)   Somewhat untrue
6)   Untrue
7)   Very untrue

13. There exist clear instructions for student/learner behavior during offline (asynchronous) sessions.
1)   Very true
2)   True
3)   Somewhat true
4)   Neutral
5)   Somewhat untrue
6)   Untrue
7)   Very untrue

14. There exist clear instructions and sanctions for learner misconduct during online sessions.
1)   Very true
2)   True
3)   Somewhat true
4)   Neutral
5)   Somewhat untrue
6)   Untrue
7)   Very untrue

15. Learners have the opportunity to submit assignments in different formats during online sessions.
1)   Very true
2)   True
3)   Somewhat true
4)   Neutral
5)   Somewhat untrue
6)   Untrue
7)   Very untrue

16. Learners have the opportunity to engage in online lectures and interactions using various mediums of interaction (text, audio, video, visual)
1)   Very true
2)   True
3)   Somewhat true
4)   Neutral
5)   Somewhat untrue
6)   Untrue
7)   Very untrue

SECTION E: Recommendations for policy to guide online learning

In this section, we ask a few open-ended questions about the standards that KNUST must introduce in order to improve teaching and learning online. Please use the spaces provided for each question to provide your response. All responses are welcome.

1. Which standards (code of conduct, ethics, norms) must lecturers uphold during online lecturers?

....
....
....
....
....

2. Which standards (code of conduct, ethics, norms) must students uphold during online lecturers?
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3. How do we ensure discipline and self-regulation among students and teachers in online lecturers?
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4. How can the university ensure adherence of both lecturers and students to the standards that guide online teaching and learning?
....
....
....
....
....

Thank you for your participation.

Appendix III: In depth-interview guide for Faculty of KNUST.

Project topic: Enhancing institutional policies and frameworks for E-learning: A case study of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

Dear Respondent,

This interview seeks your thoughts and concerns about institutional policies and frameworks available at KNUST for E-learning and the institution's level of commitment students and faculty to succeed in a virtual ecosystem. The interview is part of a small grant research study being funded by the Arizona State University, USA under the Mastercard E-Learning institutional initiative.

We believe that you possess significant knowledge and experience that we can use to achieve our indicated goal. In this process, there are no right, and wrong answers and we encourage

you to share your ideas with us. In order to accurately reflect on your responses and to present your ideas, we would like to audio-record as well as take written notes of this interview. Only the researchers will have access to the audio files. Your details and identifiable information will not be included on the audio file. However, should you be uncomfortable with us recording, we are willing to take notes of the session and to write a full detailed report later after the interview.

Your responses will be treated confidentially and will be used for research purposes only. No person will be identified in any report. Thank you for accepting to respond to this interview. Your cooperation is greatly appreciated.

SECTION A: SETTING THE TONE

1. Please tell me about your teaching experience in this university.
2. How and in what ways have teaching and lecturer-student interactions changed over this period?
3. What do you think the role of technology in general is, in promoting learning?

SECTION B: TEACHING ONLINE

1. Tell us about your first online teaching experience.
2. In teaching online, what are some of the things you find easy and which things are difficult?
3. How do you ensure discipline and promote student engagement in on-line classrooms?
4. If there is to be a policy to guide online teaching and learning, what specific things will you recommend that the policy cover?
   Which rights and responsibilities must instructors and lecturers have on-line?
   Which rights and responsibilities must students have on-line?
   What role must the IT Department of the university play?

SECTION C: BUILDING CAPACITY

1. How would you assess your current online pedagogical skills?
1. What actions could be implemented within KNUST to significantly strengthen the online pedagogical skills of lecturers?
2. How can your students become encouraged to become more engaged and active learners to improve quality online teaching and learning?
3. How can lecturers be encouraged to draw actively and systematically on student feedback to improve quality online teaching?
4. What are the main obstacles to greater student engagement in fostering online teaching quality?
5. What benefits would KNUST gain by promoting quality online teaching and learning?

SECTION D: OVERCOMING CHALLENGES

1. Where are the biggest gaps in awareness of quality online teaching and learning and how could they be addressed?
1. What are the biggest obstacles to overcome in raising awareness of quality online teaching and learning?
2. How effectively do the current leadership arrangements serve to foster quality online teaching and learning?
1. What do you see to be the main challenges to effective, consistent implementation of KNUST's online teaching and learning framework across all Departments and disciplines?

Appendix IV: In-depth interview guide for principal innovators associated with E-learning at KNUST.

This interview seeks your thoughts and concerns about institutional policies and frameworks available at KNUST for E-learning and the institution's commitment to students and lecturers to succeed in a virtual ecosystem. The interview is part of a small grant research study being funded by the Arizona State University, USA under the Mastercard E-Learning institutional initiative. Your responses will be treated confidentially and will be used for research purposes only. No person will be identified in any report. Thank you for accepting to respond to this interview. Your cooperation is greatly appreciated.

1. What institutional policies are available for online delivery at KNUST?
   (i) In what ways does KNUST's online education guidelines align with its mission and vision?
(Probe: what practices would you say demonstrates KNUST's commitment to online teaching and learning?)

2. How do the institutional policies and frameworks relate to the under listed activities?
   i. Class attendance
   ii. Submission of assignments
   iii. Provision of prompt feedback from instructors and support staff
   iv. Development of instructional design
   v. Student participation in all online engagements
   vi. Access to internet connectivity
   vii. Student and staff support services.
(Probe: How are these policies different from the campus-based students?)

3. What policies/frameworks demonstrate KNUST's commitment in ensuring that student e-support services offered are adequate, appropriate, and timely?
4. What institutional policy exist in relation to academic counselling and advising programmes to support online-learning development and success.
5. What library facilities are available to support online students' learning at KNUST?
6. What challenges are associated with students' e-access to existing library facilities?
(Probe: How do you address such challenges?)

7. Are there policy guidelines that allow faculty, administrators, and students to participate in the decision-making process for online teaching and learning?
8. Who are the major stakeholders in the development and implementation of online learning in KNUST?