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REPORT ON DIGITAL STRATEGY ANALYSIS: THE UNIVERSITY OF CAPE COAST AND THE UNIVERSITY OF EDUCATION, WINNEBA

Background

Ghana's Digital Vision for National Development and Education (2003-2015)

The creation of an ICT policy in 2003 demonstrates Ghana's ambition to join the information and communication technology-driven economies of the world. Ghana ICT for Accelerated Development, or ICT4AD, was the official strategy (The Republic of Ghana, 2003). Through an ICT-driven agenda, the Policy was supported by the desire to ensure the survival of the nation and its citizens in the fields of national, human, economic, and social growth. As a result, the Policy concentrated on developing an environment that would be favourable for operationalizing ICTs for national development, supporting, among other things, economic activity, service provision, human resource development, and better educational delivery. The focus of its implementation was on the 14 sectors that are referred to as the ICT4AD pillars of Ghana. ICT in education, one of the pillars, is highlighted for the sake of this article's focus (GOG, 2003).

The ICT4AD's policy on ICT in Education recognized "the challenges of the social and economic pressures of a youthful population; the challenges of turning the youthful population into an asset for development as well as the challenges of a limited human resource capacity characterized by low professional, technical, and managerial manpower base of the country" as the foundations upon which Ghana should integrate ICTs into all areas of its education. As a result, the ICT in Education Policy was created in 2008 and then revised in 2015 using the ICT in Education from ICT4AD as the reference point (MOE, 2008; MOE, 2015).

The 2008 policy statement outlining Ghana's ICT in Education Policy sought to change education by incorporating digital tools and resources into all facets of educational delivery. The three pillars of ICT in education were highlighted as three important aspects of the policy:

- Utilizing ICTs as tools for teaching and learning: The policy sought to incorporate ICTs as effective tools in the teaching and learning process, enabling their use in educational activities.

- Integrating ICTs as a medium for teaching and learning: ICTs were envisioned to play a vital role in facilitating teaching and learning across various subjects and disciplines.
- Providing career opportunities through ICT in schools: The policy aimed to establish pathways for students to pursue careers related to ICT, recognizing its potential for employment and professional growth.

In contrast to the three themes of the ICT4AD Policy, 2003, the ICT in Education Policy, 2015 expanded on these dimensions and introduced seven subject areas. The 2015 policy's seven designated thematic areas are as follows:

- Education Management: Focuses on the role of the Ministry/Agencies and Educational Institutions in managing and implementing ICT initiatives within the education system.
- Capacity Building: Emphasizes the importance of developing the necessary skills and competencies among teachers, administrators, and other stakeholders to effectively utilize ICTs in education.
- Infrastructure, E-readiness, and Equitable Access: Highlights the need for adequate ICT infrastructure, connectivity, and ensuring equitable access to digital resources for all educational institutions.
- Incorporating ICTs into the Curriculum: Aims to integrate ICTs into the curriculum across subjects and grade levels, enabling students to develop digital literacy and utilize technology for learning.
- Content Development: Focuses on the creation and availability of high-quality digital content and educational resources that align with the curriculum and support effective teaching and learning.
- Technical Support, Maintenance, and Sustainability: Addresses the importance of providing ongoing technical support, maintenance, and ensuring the sustainability of ICT infrastructure and initiatives.
- Monitoring and Evaluation: Highlights the need for systematic monitoring and evaluation of ICT in education initiatives to assess their effectiveness and make informed decisions for improvement.

Compared to the earlier three aspects described in the 2008 policy 2015, these seven theme areas in the 2015 policy show an extended and comprehensive approach to integrating ICTs in education (MOE, 2008; MOE, 2015).

The policy provisions are discussed in depth later on in this text. Different institutions have developed ICT in education strategies and action plans based on the ICT in Education Policy. Consequently, outlining the boundaries within which Regional/Metropolitan/Municipal/District Educational Offices (Local policy implementation plan) or Institutional ICT policies (at the Tertiary level - institutional ICT Policy) might be formulated. Since the ICT4AD's establishment, significant progress has been made in the digitalization of tertiary level educational activities and services.

It is important to consider the past in order to determine how much the policy has impacted Ghana's educational system. Universities currently offer faculty and registered students' free access to Wi-Fi at the tertiary level. To encourage e-learning and the management of student records, approximately thirteen colleges run free Wi-Fi systems within their buildings with the help of the World Bank (Ghana News Agency, 2021). For instance, at the University of Ghana, instructors and students can use the free Wi-Fi network to connect to the internet while conducting classes on the Sakai e-learning platform.

The Moodle e-learning platform has also been set up at the University of Cape Coast, with additional portals for instructors and students. The University also offers access to management information systems (MIS) and pay slip data via an electronic portal. Users of the e-learning platform (UCC LMS) have zero-rated data plans, enabling cost-free internet access. Additionally, eduroam provides instructors and students with access to data for e-learning activities. In more than 100 countries, eduroam offers simple, quick, and safe connectivity from tens of thousands of hotspots. Additionally, the MIS platform lets students to select rooms in residence halls, verify their admission and registration status, results, and more.

Similar to this, Kwame Nkrumah University of Science and Technology has made use of its Wi-Fi network to set up a virtual classroom and e-learning portal as well as a student app called AIM where students may, among other things, check their registration status and exam results.

Unfortunately, there are still difficulties notwithstanding this positive perception of ICTs at the higher level of the educational system. Because of the emphasis on university education, digitalization in the education sector only benefits a select few, leaving the vast majority of students in pre-tertiary education in the dark. Even at the tertiary level, there are valid concerns about reliable electricity, access to computers, particularly for students from economically

disadvantaged backgrounds, and inequity. This is especially true in light of a recent policy that requires all colleges of education in the nation to have internet connectivity, which is provided by private vendors and paid for by students. As a result, there are fundamental concerns with ICT in Education in the context of Ghana that demand consideration.

Success Stories and Challenges of the ICT for National Development and Education in Ghana

Ghana wants to increase and broaden its network connectivity and enhance the delivery of online education, according to International Trade Administration (International Trade Administration, 2022). This demonstrates that digital maturity is a national development priority.

Ghana's digital development is one of the best-performing industries in the Sub-Saharan Africa Region, according to the World Bank (The World Bank, 2022), and it experienced an average economic growth rate of 19% per year between 2014 and 2020. Ghana is currently one of Sub-Saharan Africa's digital leaders (The World Bank, 2019). To further accelerate Ghana's digital transformation, key bottlenecks were identified in a 2020 Digital Economy diagnostic, according to Kpessa-Whyte and Dzisah's 2022 study, "Digitalisation of Basic Services in Ghana: State of Policies in Action and Lesson for Progress."

Concerns regarding Ghana's digitalization are present in the ICT used in the educational system there. Despite Ghana's significant educational reforms, according to a recent study by Mugisha et al. (2021), "there are still a number of obstacles that prevent quality teaching and learning." These difficulties include a lack of infrastructure, human resources, and ICT skills. The transition from traditional to new teaching approaches is also met with resistance by teacher educators (p. 56). Research has uncovered additional information regarding the difficulties of digitalization. Obiri-Yeboah et al. (2013) investigated the difficulty of using ICTs in Ghana's tertiary education system. The study found that digital tools and resources are accessible at the postsecondary level of education in Ghana. The issue is that colleges have struggled to adequately incorporate these tools into research, teaching, and learning. They also noted that the reliability of the power supply and internet connectivity have an impact on how much ICT can be used in teaching and learning. One of the paper's conclusions was that staff and students were reluctant to employ ICTs for instructional practices. This is clear given that the paper's last recommendation was for stakeholders to make financial investments to facilitate the use of the necessary digital tools and resources.

Asamoah et al., (2022), who concentrated on the use of ICTs for teaching and learning in public schools in Ghana, raise some of the same issues that were discussed in the discussion that just ended. There was evidence that teachers view the use of ICTs for their professional practices favourably, among other findings. Despite this optimistic stance, ICT integration has not been accomplished. The lack of support for instructors to do so is the cause. The issue of expanding internet connection points in schools remains a challenge. Although there is some indication that there are digital tools and resources in schools, the report found that not all teachers have access to these for their professional job. In a different setting, Tagoe (2012) investigated how tertiary students view their education. The study found that the majority of students have very good computer skills. Through virtual learning environments, this proficiency is advancing their academics. However, it was intriguing to see that the results showed that the students preferred mixed-modal learning scenarios over fully online mode. Once more, it is understandable because the survey found that internet access is difficult and recommended assistance with digital skill development and support. The kids wouldn't be fully reliant on the Internet in this scenario for their academic endeavours. The paper's conclusion about the necessity of developing support systems to enhance female students' digital literacy was an intriguing one. Gender is a determinant in technological acceptability, according to literature that has been written based on later findings (Goswami & Dutta, 2016). The following section of this report attempts to project where Ghana's educational strategy for the years 2018 through 2030 would stand with regard to addressing the aforementioned concerns of digitalization. The Education Strategic Plan (ESP) for the period of 2018 to 2030 highlighted several unique educational restrictions that need mentioning since they are either directly or indirectly related to institutional ICT policy objectives. As follows: The parity index for tertiary completion rates between individuals from the poorest and richest income quintiles is 0.06; discrepancies in distant education: There are significant regional and income differences in completion at the tertiary level. Pupil-teacher ratios are much higher than the norms recommended by the National Council for Tertiary Education (NCTE), and less than 40% of lecturers have terminal qualifications, a statistic that varies significantly across universities (Edu). Enrolments in open and distance learning courses has increased for some institutions, such as the University of Cape Coast, but has decreased for others, such as the University of Education Winneba.

In another setting, it is noted that the tertiary sector is also in charge of preparing Ghana's teachers. But the industry struggles with poor quality, major disparities, and a lack of adequate supply. Although enrolment in higher institutions as well as their number have grown over

time, the Gross Enrolment Ratio (GER) is still low, hovering around 16% in 2015–16, and overall enrolment is close to 422,000. Nearly 50% of all tertiary institutions are private, although only 19% of students enrol in them, according to the MOE. Additionally, 27% of institutions are public COEs. Less than 50% of the necessary resources are present in the majority of laboratories and lecture halls, and institutions only have half the ICT they need. According to enrolment levels, in 2015–16, just 5% of students were enrolled at the master's degree level and less than 0.5% were enrolled at the PhD level (Education Strategic Plan 2018–2030, 2015). The Educational Strategic Plan's guiding principles of access and equity, quality, relevance, efficiency and effectiveness, and sustainability serve as the window of hope that inspires intervention planning. These concepts serve as the foundation for the formulation of the following strategic goals and their definitions:

1. Increase access to elementary and secondary education and support for high-quality instruction.
2. Strengthen the acquisition of skills through competency-based learning. Create avenues and opportunities for non-illiterate youth to obtain non-formal education as well.
3. Provide inclusive educational opportunities for the weak and the challenged.
4. Promoting efficient managed and delivered educational management and funding while offering world-class tertiary education that is equally accessible.

To this purpose, the Institutional ICT Policy should be designed using ESP as a foundation or as a guide, just as every sub-sector of the education system should.

Rationale

The target and context of this intended policy analysis are two universities in Ghana: The University of Cape Coast and the University of Education, Winneba. They are one of the country's best tertiary institutions, conducting teaching and learning initiatives aimed at meeting Ghana's human capital requirements. The two institutions have a great deal in common academically, both in terms of the programs they provide and how they are delivered, as well as their shared commitment to being active participants in Ghana's ICT4AD agenda as partners and stakeholders. The result is that both Universities have created their ICT Policies (DICTS, 2023; Yidana et al., 2019). The ICT4AD, ICT in Education Policy, and ESP should all be implemented with the same goal at all Ghanaian universities, which should also guide the creation of new policies. In contrast to successfully planning and implementing the policy's objectives, developing an ICT policy is a separate effort. Exploring some of the industry's

greatest practices as well as its most pressing issues is crucial to this paper's development. The following section of the essay demonstrates the benefits of ICT in education as well as the associated difficulties.

It is necessary for institutional or governmental activities to fully understand the issue and design effective solutions in the few cases of ICT in the education sector that have been studied in Ghana. Both the University of Cape Coast (UCC) and the University of Education, Winneba (UEW) have identified a number of barriers that prevent the effective use of ICT in teaching and learning. These barriers can be seen in the staff's level of preparedness for digital innovation in teaching and learning, the availability and adoption of technology, and creative pedagogical techniques. As a result, a project consortium made up of the institutions of Cape Coast and the University of Education, Winneba in Ghana, as well as the Universities of Tampere, Finland, and Tallinn University, Estonia, is working to encourage the use of ICT in teaching and learning in Ghanaian institutions. As a result, this paper aims to conduct an ICT policy analysis for UCC and UEW in relation to the ICT in Education policy of the Ghanaian government and other institutional policies with the goal of offering details and suggestions about the creation of an ICT Maturity Strategy and interventions in the institutions. In order to facilitate the long-term adoption of ICT in Ghanaian universities, this study tries to examine the important concerns that are involved. The purpose of this essay is to: 1. Examine Ghana's ICT in Education policy.

2. Examine the ICT strategy of particular institutions outside of Ghana.

3. Compare and contrast UCC's and UEW's institutional ICT strategies.

4. Outline which goals of the university policy have been met, which have fallen by the wayside, and which are still unmet.

Literature Insights into Digital Transformation in Higher Education

The four structural changes that (Vial, 2019) recommends for digital transformation planning are organizational structures, organizational culture, leadership, employee roles, and skills. Focus areas demonstrate that efforts to improve digital teaching and learning involve more than just technology. Furthermore, conclusions are drawn from the study of Kraus et al. (2021) advanced drivers that should be taken into account while designing ICT Policies or strategies. They are: i) the institutional digital transformation vision should be a shared one, and everyone in the organization needs to be aware of it; ii) the norms, values, and culture of the organization need to be built or redirected towards the digital transformation vision; iii)

decision-making regarding the transformation should be data-driven and with consideration of using the data to enhance actors' satisfaction in the process; and iv) collaboration in the organization is essential.

We also consider what an institutional ICT policy ought to accomplish in terms of advancing digital teaching and learning or the digital transformation of the educational system. We draw inspiration from the University of Ulster's ICT policy (Ulster University, 2022). ICT policies should promote openness and access to digital tools and resources within the institution while also supporting teaching and learning. The Policy must address how new methods will be explored and how efficient resource usage may be encouraged or ensured. Whatever resources and tools are put in place should be simple to use. The Policy should also allow players to come up with unique ideas in place of the status quo, while yet operating in a way that keeps the entire process user- (human) focused and with communication opportunities. Once more, the Policy should provide the framework for achieving the institutional goals. This links digital resources and tools to the pertinent fields and topics for problem-solving. The Policy should also make a difference in the context of resolving current situations by offering avenues for external cooperation and partnership. Last but not least, everything that has been mentioned should be done with the intention of empowering instructors and students in a setting of digital safety and trust.

The pursuit of institutional ICT policy is centred on digital transformation for teaching and learning in higher education institutions. We summarize the literature insights and explain the ICT requirements for present and future practices using Martin and Xie's work from 2022. Digital learning technologies, instructional modes, personnel and support services, organizational and planning policies' instructor development, learner development, and partnerships are the variables responsible for the insights. The specifics of what should be taken into account in the quest for institutional digital teaching and learning are presented in Table 1.

Table 1: ICT Policy Themes, policy implementation and evidence markers (Contents of the table were extracted from the works of Martin and Xie, 2022)

Digital Strategy Policy themes	Implementation evidence markers	Description and Functions
Digital Learning Technologies	Learning Management System	The institutional environment for teaching and learning, a repository for teaching and learning resources; learning assessment, forum and communication.
	Synchronous technologies	Real-time teaching and learning; Synchronous applications with functionalities for audio, video, chat/text, sharing, breakout rooms and provision of interactive teaching and learning scenarios.
	Multimedia applications	For leaner engagements in audio, video and other interactive functions; creating content and sharing; using multi-media applications.
	Collaboration applications	A web or cloud-based application for word processing, presentations, and social interactions for peers and teachers.
	Cloud-based technologies	Virtual repositories for storage are accessible every and at any time. Usage is not limited to school computers or servers etc.
	Emerging technologies	Enabling innovation in teaching and learning – artificial intelligence (AI), extended reality (XR), Augmented Reality (AR), virtual reality (VR), and learning analytics for decision making
Instructional Modalities	On-campus technology-enhanced	Technology-enhanced teaching and learning modes conducted in person (face-to-face) in a defined learning space
	Hybrid/Blended Learning	Combines in-person and online, facilitated by digital tools and resources/infrastructure.
	Asynchronous online	Teaching and learning modes are characterised by no real-time meetings; teaching and learning activities and resources are stored for later access.
	Synchronous online	Real-time teaching and learning mode; instant interactivity and feedback available.

	Bichronous online	A combination of Asynchronous and Synchronous teaching and learning modes; with students joining from anywhere and operating in which mode is convenient.
	Hyflex	Enhanced flexibility in the choice of study mode; in-person and online learning spaces provided (like hybrid/blended) in the same classroom, but students select made with reference to their personal needs and day-to-day situations.
Personnel and Support services	Instructional designers	Support teachers for digital teaching and learning design
	Technology support specialist	Support teachers in addressing technical issues regarding digital teaching and learning
	Academic and student support services	Support for students to register, identify and access digital services
	Incentives and recognition	Appreciation and acknowledgement for faculties and individuals making strides in integrating technology; and digital teaching and learning pedagogical innovations.
Organisational and planning policies	Policies and standards	Defined digital teaching and learning standards as shared vision or procedures (teaching loads, assessment, course enrolment etc)
	Strategic Planning	Relating resources to targeted strategic actions; and providing the needed resources)
	Funding models	Explore sustainable funding avenues and models internally and externally.
	Equitable learning opportunities	Provide resources to promote digital inclusion - accessibility, internet connectivity, software and hardware to support student usage
Instructor development	Pedagogical and technological skills	Provision for professional ICT pedagogical skills, training opportunities, and lifelong learning on technology integration in specialities.
	Faculty beliefs	Supporting the evolution of teacher beliefs in Digital teaching and learning

	Accessibility	Training faculty to prepare for inclusive digital teaching and learning practices, meeting the needs of learners with various impairments and disabilities.
	Intellectual property rights and copyrights	Training faculty to build competence in handling issues relating to intellectual property rights and copyright of their materials and that of others
Learner development	Computers and internet access	Accessibility to digital tools and resources put in place for learners. Access should be a principal consideration before digital teaching and learning pursuance
	Time management and self-regulation	Digital teaching and learning come with flexibility and time managements skills for learners. Training learners to development time management skills and metacognition skills; for self-regulated learning.
	Instructional content and people	Student learning should occur in multi-learning fronts and sources, text, audio, video. After lecture podcast and discussions, engage in peer discussions or with teacher or other resource persons – all in flexible digital learning environments.
	Help	Within digital environment help should be available (helpdesk)
	Community building	Conditions for students and instructors to instant help when needed. Digital tools and resources, and helpdesk provision are essential.
Partnership	Collaboration with other universities	Strengthen digital teaching and learning pursuits by collaborating with other institutions; pursue global collaboration.
	Collaboration with other professionals	Pursue support in professional organisations that are leaders in digital teaching and learning training. Institutional facilitation should be considered to support training, workshops and access to resources.
	Collaboration with industry	Cooperate with industries to obtain support for the provision of digital tools and resources (e.g software and hardware), promote digital innovation in the University.

Methodology

In order to explore and analyse the policies, a descriptive design technique was adopted. With document analysis as the primary task, the methodology was more qualitative in nature. The UNESCO policy manual (UNESCO, 2013) served as the study's direction. Based on the listed features, a thorough analysis was conducted. They assisted and directed the decision-making for the document analysis:

1. National policy, constitutional mandates, and the steps leading to the policy statement's announcement are the sources of policy direction.
2. Policy statement: The overarching statement focuses on the topic or industry on which the policy is based. The policy objectives are created as a result of this.
3. Policy objectives: These outline the desired, attainable effects of the policy. It involves establishing objectives and identifying key areas for implementation. These are the measurable actions that can be used to demonstrate the achievement of the policy. Policy strategies are created with this in mind.
4. Policy strategies: These determine the path the policy will take during planning and execution. It makes clear the priorities linked to the policy's objectives. displays the potential actions and the responsibilities involved with them. Planning is the last step.
5. Policy plan: Determines how the policy will be implemented, taking into account the activities, timeline, resources, staff, funding, and other factors.

Implementing the analysis process

The purpose of this work (documents) is to analyse the policy objectives and strategies of UCC and UEW, the main subjects, as well as those of other international institutions that contribute to the accomplishment of higher-level goals (strategic goals and general goals), as well as the tools available to measure and assess the relationships between these goals. Goal trees help us understand how various goals are related to one another and how some goals contribute to the accomplishment of other goals. The logical framework matrix (the table) offers the chance to evaluate both vertical coherence (whether either result logically contributes to the achievement of direct goals, whether the achievement of a direct goal logically leads to broader goals, etc.) and horizontal coherence (whether the indicators match the goals, whether all relevant external factors or assumptions have been taken into account). This provides the opportunity to map and assess the logical relationships and mutual dependency of goals and potential solution paths, or intervention logic. It also enables us to

learn about the outside elements that are crucial preconditions for reaching the objectives (Eraut, 1982). The methodology used for the analysis is shown in Figure 1.

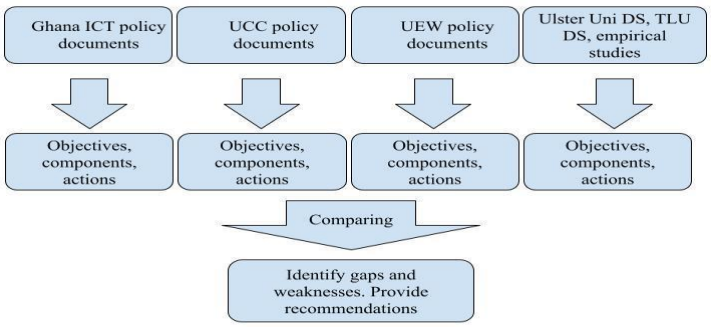

Figure 1. Framework for Institutional ICT in Education Policy Analysis

Policy Analysis

In the sections that follow, we will examine each institution's ICT policies and digital strategies. The goal is to look at those documents' contents from the angles shown in Fig 1 in order to better understand them. The ICT policies of UCC and UEW from Ghana are two of the four institutional documents examined. Ulster University in the United Kingdom and Tallinn University in Estonia are the other two.

A. Ghana's ICT in Education Policy (2015)

From MoE, 2015, the goal of the Policy is *"To enable all Ghanaians including teachers and learners in either the formal, informal and non-formal systems to use ICT tools and resources to develop requisite skills and knowledge needed to be active participants in the global knowledge economy at all times"*. Consequently, seven thematic areas were established to operationalise the attainment of the Policy objectives associated with themes. The seven thematic areas are:

1. Education Management – Ministry / Agencies and Educational Institutions
2. Capacity Building with emphasis on Teacher development.
3. Infrastructure, E-readiness and Equitable Access
4. Incorporating ICT into the curriculum
5. Content Development
6. Technical Support, Maintenance, Funding and Sustainability
7. Monitoring and Evaluation.

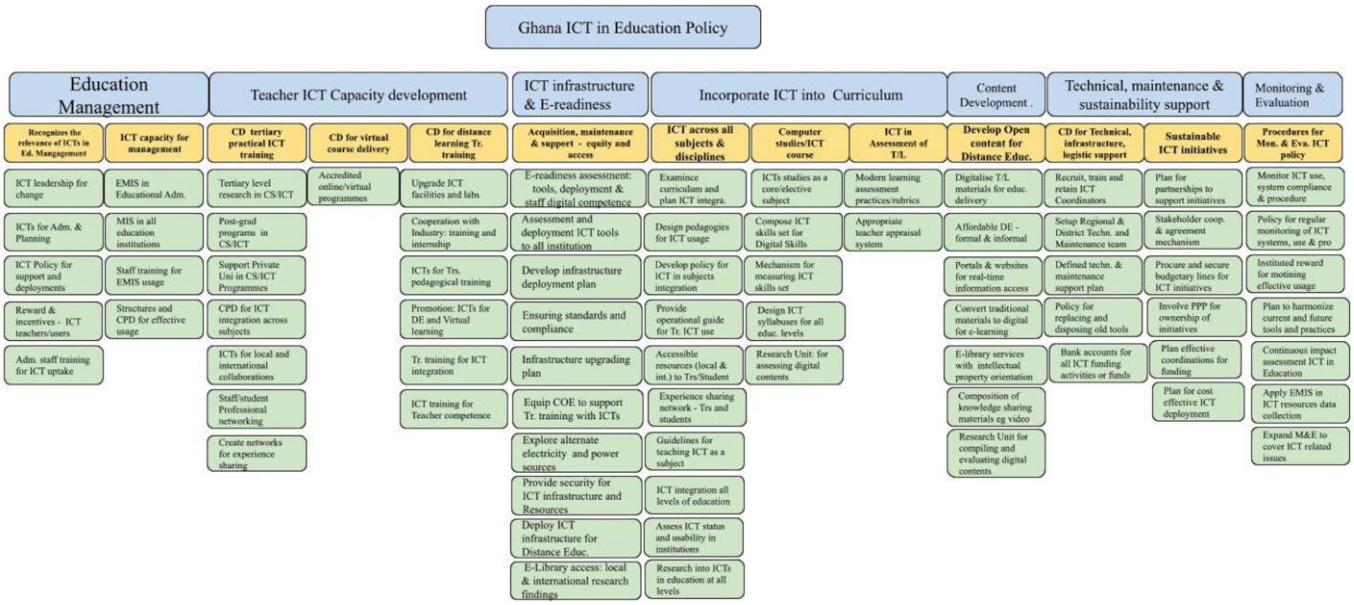

Figure 2: Schema for Ghana's ICT in Education Policy, extracted from (MoE, 2015)

The institutional ICT Policy design and analysis may encompass seven (7) different subject areas, as inferred from Figure 2. The policy actualized thirteen (13) strategic dimensions. The lesson here is that institutional ICT Policy is about more than just technology. Infrastructure and logistics, the institution as a system, human actors, capacity building, procedures, change management, educational excellence, monitoring, evaluation, and support (technical, professional, etc.) were all included in the strategic focuses.

B. Ulster University Digital Strategy 2018/19-2022/23

Ulster University's Digital Strategy for 2018/19-2022/23, provides insight into information for ICT policy analysis. Like all policies or strategies there is a vision but what is significant is the considerations that led to the vision. These are the emerging issues or trends, and the guiding principles of the institution. The respective contents of the strategy are identified as follows:

The imperatives of the strategy of Ulster University are enumerated as follows:

- developing a digital-first approach to systems and services, supported by the necessary technology and infrastructure.

- enabling smart and strategic decision-making with the appropriate data input; and
- helping to attract and retain students and guide the University's academic offerings.
- in world-class research and education.

Emerging trends: This focuses on the current and future indicators that will impact the university; and has to do with:

- Student's demand engaging, purposeful and visual communication.
- Using audio and video feedback
- Focus on student engagement and outcomes informed by data and learning analytics.
- Increased security threats and privacy concerns.
- The university is facing expanded global competition and engagement.
- Financial pressures mean that digital solutions need to be timely, innovative and efficient, reducing duplication and delivering within budget.

Vision: Ulster University's vision is to Empower people through digital affordances. The guiding principles for the vision are defined in the ensuing list.

Guiding principles:

- supporting learning & teaching and research.
- Focus on open architectures and open data.
- Be innovative in our solutions, aiming for efficiencies,
- for simplification and ease of use for existing processes
- strategic partnerships
- reduce our impact on the environment.
- to become a trusted partner

Strategic themes

Ulster University's Policy has six (6) thematic areas of focus, with 28 strategic directions. A detailed list of the thematic areas is provided in Figure 3.

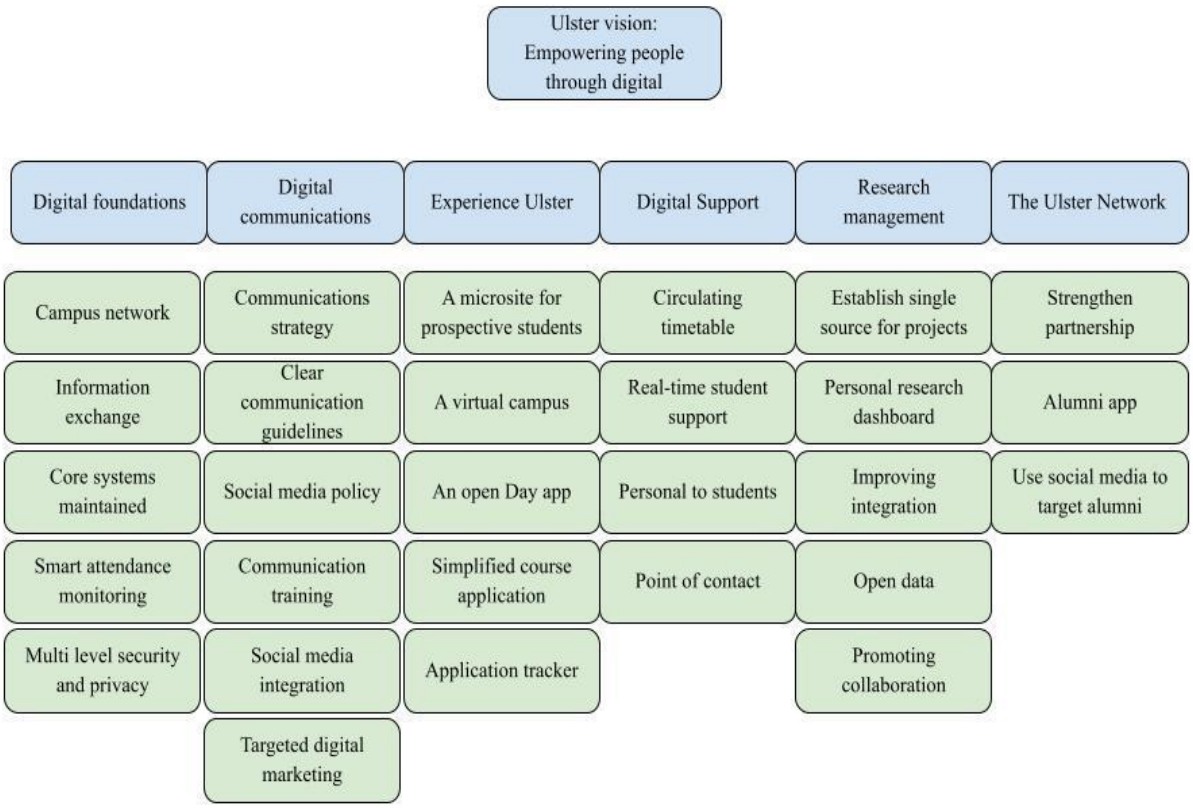

Figure 3. Schema for Ulster University's digital strategy, from (Ulster University, 2022)

1. **Digital Foundations**:

Policy Objective: to create the right technical and operational infrastructure across the University.

Strategic focus:

- campus network
- information exchange
- core systems maintained.
- training in social media
- smart attendance monitoring
- multi-level security and privacy

Benefits for all stakeholders are identified.

2. **Digital Communications**

Policy Objective: to improve both internal and external communications across the University by delivering a comprehensive digital communications strategy with accompanying communications guidelines.

Strategic focus:

- digital communications strategy for internal and external communications
- Clear digital communication and channel guidelines for staff
- Social media policy and guidance
- Communications training
- Integrate social media.
- Introduce targeted digital marketing.

Benefits for all stakeholders are identified.

3. **Experience Ulster**

Policy objective: The theme should supplement existing "pre-arrival" programmes, such as school visits.

Strategic focus

- A microsite for prospective students
- A virtual campus tour and interactive content
- A course and motivation navigator
- An Open Day app that guides attendees around the university,
- Simplified course application process
- Application tracker and targeted communications

4. **Digital Support:**

Policy objective: to digitally support students throughout their studies at Ulster University. To create a digital study support resource for current students that helps them through university life by providing a single point of access to important tools and information.

Strategic focus:

- circulating timetable information for all students
- An accessible area for real-time student support and feedback
- Personal to students with information relevant to them
- point of contact

Benefits for all stakeholders are identified.

5. **Research Management**:

Policy objective: develop Research and Impact portfolio to create comprehensive research.
A resource that enables academic staff to record their research and understand its impact.

Strategic focus:

- Establish a single source for research projects.
- A personal research dashboard
- Connecting researchers
- Improving integration of staff
- Addressing the issue of open data
- Promoting research collaboration

Benefits for all stakeholders are identified.

6. **The Ulster Network:**

***Policy objective*:** Improve external partnerships and the alumni experience.

Strategic focus:

- Establish and strengthen partnerships.
- An alumni app linked to social media profiles,
- Use social media to target alumni.

Further insights:

The strategy also provides the metrics that will be used to gauge its effectiveness. Every strategic goal area has a set of benchmarks that it uses to gauge its progress. For instance, academic performance is gauged by rising NSS scores, student satisfaction ratings, and TEF scores. Baseline, transitional, and strategic levels are used to categorize all of the listed activities. This provides a clear perspective of the order in which various neighbourhood tasks

must be completed. Prior to transitional or strategic operations, baseline activities must be established. The plan also identifies the requirement for a project management office, which would oversee the entire undertaking and ensure that roles were clearly defined. Estimated costs for the desired development are also included in the strategy.
It is unusual to include alumni responsibilities in the creation of policies. The policy is essentially human value driven because it outlines how each thematic focus will help both students and teachers.

C. Tallinn University Learning Strategy

The need for the strategy:

Changes in the organization of work lead to new positions (data manager, analyst, educational technologist, educational designer), cross-disciplinary cooperation of teaching staff and students, attention to the balance between work and private life, the growth of digital competence of employees and students, flexibility and quick response to external changes.

The digital infrastructure becomes more interoperable, safer, and centrally managed, and its development is directly related to the strategic development of the university's core processes. In the development of the digital infrastructure, more attention is paid to the privacy and ethics of users, and the share of digital services that are outsourced and integrated into the university's digital ecosystem is increasing. In addition to the modernization of the digital infrastructure, the digital competence of employees and students must be ensured for the development of digital learning and the implementation of the digital revolution in the university.
In addition to the modernization of the digital infrastructure, the digital competence of employees and students must be ensured for the development of digital learning and the implementation of the digital revolution in the university.

The European Commission recommends using the DigCompEdu model (European Commission, 2016), which focuses on pedagogical skills in teaching in a digitally enriched environment, as a framework for teachers' digital competence.
The new Digital Education Action Plan of the European Union (Digital Education Action Plan 2021-2027 (European Commission, 2020) defines two major goals:

1) Support the development of a well-functioning digital education (European Commission, 2016) system, incl. digital infrastructure and network connections the ability to plan and manage the digital development of organizations' digital competence of teachers, lecturers and trainers high-quality digital learning software, user-friendly and secure digital learning environments.

2) To design the necessary skills and capabilities for the digital revolution and basic digital competence for every citizen at a young age, incl. information literacy, combating misinformation, computer science, and understanding new technologies (e.g., artificial intelligence). in-depth and professional IT skills that ensure a more balanced inclusion of women in IT-related studies and career paths.

The aims:

Big goals for 2025:

- a well-functioning, user-centrically developed and interoperable ecosystem of digital learning e-services
- faculty members' and students' capacity and ability to participate in high-quality digital education.
- data-based management of digital learning innovation at university, institute and curriculum level
- expanding the accessibility and flexibility of higher education to different target groups
- becoming a leader in digital learning research and development

Principles that guide the planning and financing of development activities:

- openness (including learning software licenses, software architecture, and learning processes/practices)
- professionalism (including digital competence of teaching staff)
- unity (including central services and support)
- quality (including educational material and process, monitoring, learning analytics, and innovation)

- strategic partnership and cooperation in the development of digital learning with various parties (including the private and public sectors, other universities, and schools)
- user-centeredness, agility, experimentation, security and ethics in the development of digital learning services
- internationalization and exchange of best practices in different networks
- in the sustainability of innovation, reducing the interruption culture resulting from project orientation.

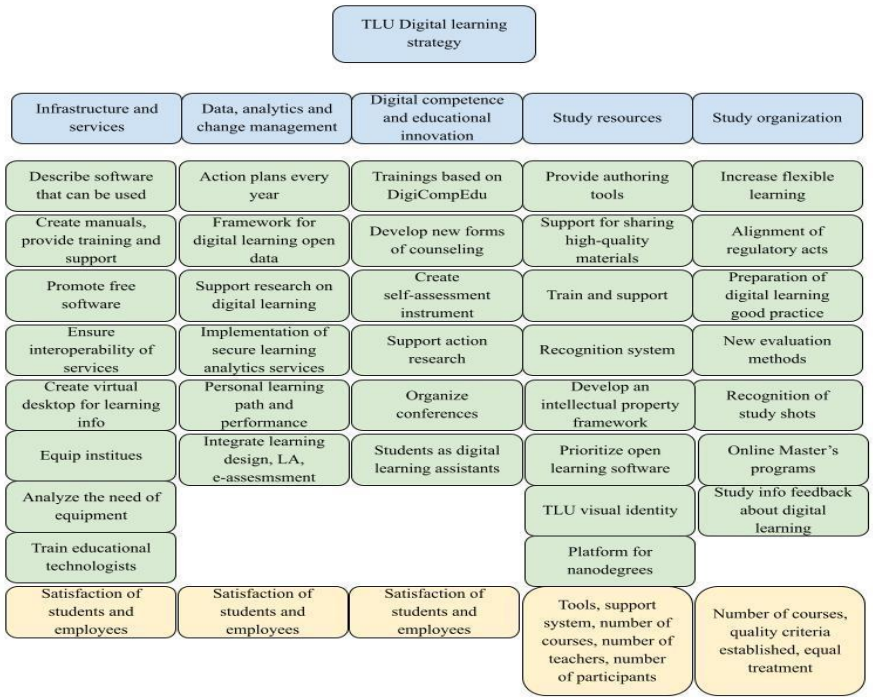

Figure 4. Schema of Tallinn University Digital Strategy from (Tallinn University, 2014)

1. **Infrastructure and services**

Purpose: to ensure that students and lecturers are assured that the hardware and software supporting the educational activities they carry out and the network connection work faultlessly, are interoperable and are accessible, they have support persons who can support them in the preparation and implementation of the study if necessary.

Activities:

- Describe the software and services that are supported by the university and that can be used by the faculty. Create manuals and provide training and support in their use. If possible, prefer and promote free software (e.g., Google services, which are available to all members of the university) and ensure the interoperability of services.

- To improve interoperability between digital learning e-services, to create a virtual desktop for students and teaching staff that automatically gathers learning information.
- Develop guidelines and rules for the introduction, use, and financing of paid software and services and the provision of user support centrally.
- Equip the centres (institutes) with portable audio-visual equipment (cameras, microphones, etc.) that can be used during distance and online learning.
- Analyse the need (number of rooms) and equip the auditoriums/meeting rooms with stationary audio-visual equipment. Develop a rule for the use of these rooms (advantage for booking if there is a need to use equipment).
- To train educational technologists in centres (institutes) who, in addition to their main work, can support lecturers if necessary (develop a system to motivate/remunerate them and form an active development community).
- Provide instructions for using equipment and services.
- Performance indicators: satisfaction of students and employees with infrastructure and services

2. Data, analytics and change management

Purpose: To ensure secure and private collection, storage and use (including comparison) of data necessary for analysis and decision-making in the context of digital learning development and performance analysis

Activities:

- self-assessment and action plans of the institutes' digital learning development every year
- to create a technical, legal and pedagogical framework for digital learning open data
- to support applied research supporting digital learning (e.g., learning analytics).
- development, testing and gradual implementation of privacy-preserving and secure learning analytics services (including data desks)
- to enrich the feedback collected by student and employee surveys with automated data collection, based on this to create a monitoring system of student participation in learning, personal learning paths and performance at the level of the university, institute and curriculum.
- integrate course learning design, learning analytics and e-assessment services.

3. Digital competence and educational innovation

Purpose: to ensure the systematic and sustainable development of the digital competence and educational innovation capacity of university employees and students, to introduce evidence-based self-assessment of digital competence and higher education didactics into the certification requirements of teaching staff and to ensure suitable assessment tools for this purpose

Activities:

- develop training based on the DigCompEdu model on the digital competencies of teachers, higher education didactics and educational innovation.
- to develop new forms of counselling on the topic of digital competencies and educational innovation by the educational technologists of the e-learning centre and institutes.
- create an online digital competence self-assessment instrument and instructional materials for teaching staff and students; include the evaluation of digital competencies in the attestation requirements of teaching staff.
- to support academic staff's action research for testing innovative digital learning methods.
- to create a platform, formats and motivational system for sharing best practices and experiences among teaching staff.
- to organize experience cafes once a semester to recognize the best in digital learning, a digital learning day in autumn and an educational innovation conference in March.
- to support the launch of a network of institutes' digital learning support persons, training of support persons and exchange of experiences.
- to develop a solution for implementing students as digital learning assistants.

4. Study material

Purpose: to ensure that every teacher can choose a suitable learning environment and authoring tools for creating high-quality open learning content and conducting the learning process.

Activities:

- to provide authoring tools and a repository for the creation of digital learning materials centrally supported by TLU.
- support for creating and sharing interactive and high-quality digital learning materials.
- train and support lecturers in creating their e-courses and conducting teaching using digital tools (e-learning centre, e-learning support persons and technology laboratories in institutes) create a quality framework for TU e-courses and digital learning materials and a corresponding evaluation system.
- regularly recognize the best e-courses, digital learning materials and best digital learning practices.
- develop an intellectual property framework, licensing recommendations and enforcement.
- popularization, prioritization and sharing of open-learning software and open-learning practices.
- TU visual identity for the educational material created here.
- create a platform and methodology for providing learning opportunities and nano degrees.

Performance indicators

- authoring tools for creating digital learning materials are available to teaching staff.
- teaching staff can create and use a digital learning environment to carry out the learning process.
- a functioning support system for training and the use of digital tools has been created for employees.
- the total number of e-courses and digital learning materials that meet the quality parameters.
- the number of teaching staff who have created high-quality digital learning materials and e-courses.
- participation in the e-course quality mark competition by TU lecturers
- number of lecturers who participated in advanced training.

5. Study organization

Purpose: to ensure a flexible, resource-efficient and learner-centred learning organization using digital learning

Activities:

- increasing the proportion of subjects offering integrated learning and flexible learning (including different types of e-support in statistics), while maintaining the quality of education
- Alignment of the university's regulatory acts (e.g., labour relations rules, study organization rules, lesson plan preparation principles and workload calculation) with the needs of digital learning
- preparation of a document on good practices of digital learning
- introduction of new evaluation methods, including defending joint final projects in several subjects
- registration, teaching and recognition of units smaller than the subject (study shots)
- enabling innovative digital formats as an alternative to the traditional thesis
- 100% online master's programs in foreign languages
- Digital learning topics are also included in the ÕIS (University staff/student portal) feedback questionnaires.

Performance indicators

- An increase in the proportion of curricula and subjects offering integrated learning.
- common curriculum quality criteria have been established.
- equal treatment of students is guaranteed.
- Budget for implementing the strategy.

Conclusion: The strategy has a strong focus on the satisfaction of the human actors of the institution. Technology is seen as a driver for the attainment of this and all other objectives.

D. UCC ICT Policy

The University's aim and mission are to provide everyone with an equitable chance to receive high-quality higher education that adheres to worldwide educational standards. The Directorate of Information and Communication Technology Services (DICTS) is in charge of the Policy.
The Directorate has purchased, modified, installed, and operated equipment for its four divisions: i) Network and Infrastructure, ii) Management and Information Systems, iii) ICT Training and Support, and iii) E-learning and Knowledge Management, in order to build a

strong and secure ICT infrastructure that ensures data integrity and affordably provides top-notch secured communication services.

The Policy intends to establish and offer a framework that will allow ICT to assist UCC in attaining its development objectives by providing safe, accessible, and universal ICT services and access to information and communication resources that will boost global production and productivity competitiveness.

Principles:

- Providing an ICT legal framework for university community members and key stakeholders.
- Creating a general awareness and potential of ICT as a tool for sustainable development and empowerment of students and staff.
- Developing a culture of lifetime learning to maximise the existing potential of students and staff and accelerate innovation to develop a campus knowledge-based system.
- Make available ICT services in all areas and implement a cost-effective ICT infrastructure.
- Reducing administrative costs and improving the quality of services through ICT application.

Information Management System

To provide a centralised information management system for the compilation of ICT issues within the University community to ensure effective governance of ICT infrastructure.

- Procure legal ICT resources to ensure a robust ICT infrastructure.
- Develop a reliable ICT infrastructure across various faculties, departments and other sectors that are compatible and adhere to the same operational protocols.
- Implement typical robust security architecture and ensure strict adherence, compliance and management.
- Create an apparent dichotomy between authorised and unauthorised access to system accessibility, availability, data transfers and use of data (data integrity).
- Create a monitoring and evaluation system for the compilation, evaluation and analysis of ICT-related issues.

- Create an efficient work schedule to ensure ICT staff are always at the post for round-the-clock system availability and accessibility.

Network Infrastructure

- Acquire, install, integrate and facilitate the upgrade and scheduled maintenance of the fibre cables to ensure the backbone of the University's Network Architecture is adequate.
- Create a segmentation of the network system based on demand to avoid congestion on the infrastructure to ensure optimal use, security, monitoring and maintenance of the subnetwork infrastructure of the backbone.
- Integrate high-grade servers and storage systems to ensure fast access to information and its dissemination to meet various demands of the University Community.
- Enhance the capability of the ICT system for its concurrent deployment and use to ensure e-learning management systems used by faculties and sections of the University are augmented by teaching and learning processes.
- Enhance the capability of the ICT system for deployment to ensure effective management and administration of operations.
- Create an interlinked network with all University external campuses to ensure equitable access and availability of services to all users.
- Assimilate the backbone system into the global network infrastructure based on established protocols, i.e., internet protocol (IP), the African Network Infrastructure Information Centre (AFRINIC), an International Corporation of Assigned Names and Numbers (ICANN) and other domain name services systems.
- Acquire applications and accessories that are compatible and interoperable with the network infrastructure.
- Develop and maintain an up-to-date network infrastructure as the blueprint for the University's investment in ICT.

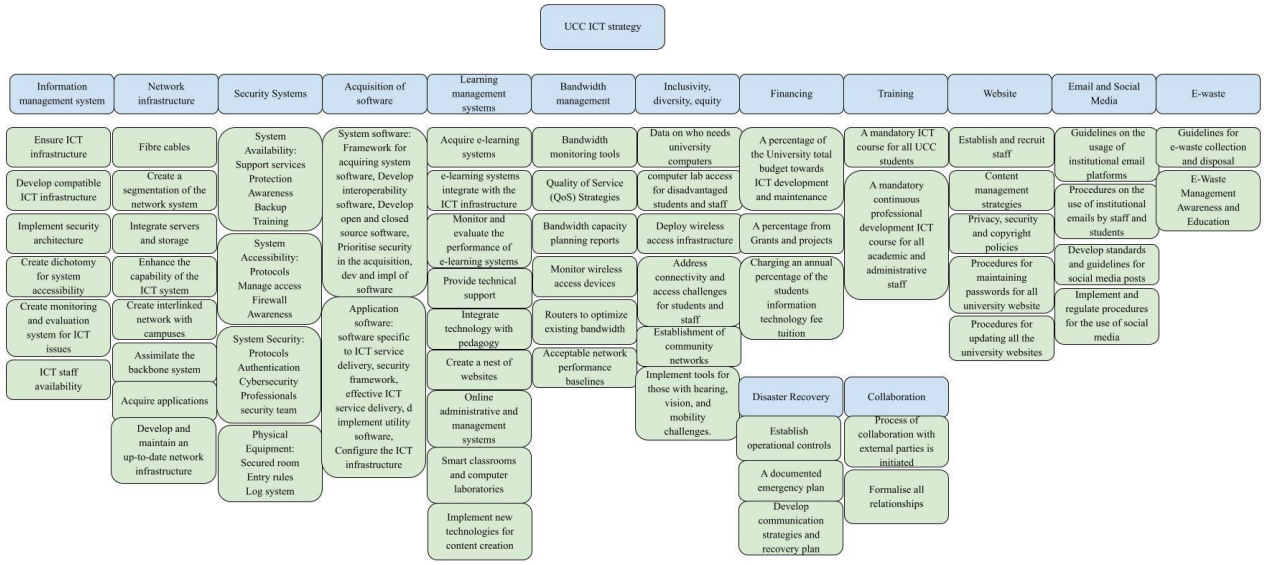

Figure 5. Schema of the University of Cape Coast ICT Policy from (DICTS, 2023)

Security Systems

a) System availability

- Obtain technology support services for academic activities, management and administrative work to ensure that the University community can use or obtain fast technology support services.
- Protect University's network infrastructure to ensure resilience and stability in the system.
- Create awareness of security threats and educate the University community on how to protect their workstations.
- Create measures to ensure minimal downtimes on technology support services to ensure students and staff will always have access to ICT services.
- Create a direct correlation between security, performance and service availability. Develop sustainable measures that ensure the uptime of the entire ICT to provide services during its usage.
- Liaise with the Data Centre to create a robust real-time backup system to ensure automatic failover.
- Implement Geo-Redundancy systems to ensure the distribution of mission-critical infrastructure across data centres in different locations.
- Improve and update the ICT infrastructure to ensure the provision of excellent support services to members of the University community.

- Create a routine training service for technical staff to ensure up-to-date knowledge of system availability.

System Accessibility

- Create a security protocol to ensure only authorised users access the requested services.
- Create a domain control system to manage access to resources in line with established security protocols.
- Segment network infrastructure to handle different service requirements and enable concurrent usage.
- Create a robust and up-to-date firewall system to monitor inbound and outbound data and deny access.
- Develop a management system that ensures that resources are segmented according to the University's hierarchical protocols.
- Create a legal framework to deal with violations and impersonations.
- Create an awareness programme on system usability, rules and regulations. Ensure all established security protocols are implemented and complied with.
- Develop a password framework to guide the University Community members on using the ICT services.

System Security

- Establish a security protocol for ICT installation, implementation, integration, monitoring and evaluation of the entire ICT service infrastructure.
- Ensure that all installed equipment and application and future purchases are compatible and interoperable with the established security protocols.
- Create an authentication framework to guide the development of a unified password structure for the University.
- Develop a cybersecurity architecture for cloud computing, internet usage, intranet systems and other applications that depend heavily on external networks.
- Create a security structure based on established protocols to form part of the broader requirements for acquiring the University's future technologies.
- Liaise with internal system security professionals to monitor, evaluate, prevent, and mitigate security breaches that may arise from vulnerabilities in computer systems.

- Ensure that the security architecture includes information security, network security, cyber security, critical infrastructure security, application security, network security, cloud security, Internet of Things (IoT) security, mobile security and future security updates.

Physical equipment

- Create a secured room to install and use system equipment such as servers, routers, switches, access points, etc.
- Ensure enforcement and compliance with authorised entry rules for the server room.
- Collaborate with the University Security Section to provide physical protection around sensitive ICT installations and offices.
- Create a log system of acquisition, request, installation and repair to ensure movements of ICT equipment are monitored.

Development/Acquisition of Software - software for operational efficiency of ICT services, academic work, and administrative and management tasks

The same continues with all the strategy points.

- The main effort is in ensuring baseline services and maintenance of the services. Less attention is paid to digital learning and research guidelines. This is important as without the baseline actions there will be no transition activities.
- Lack of targeting the use of technology for teaching and learning. How these activities should be supported and implemented.
- To improve the staff and students' digital competence, TLU’s digital learning strategy could be used as an example.
- There are some unclear activities such as using social media, but this lacks specific activities and aims to describe what is the need and goal for it.
- For communication and social media use, Ulster University Strategy could be used as an example.
- There is no specific timeline for when these strategy activities should be met.
- There is no indication of measures or indicators of how the strategy execution would be assessed nor when.
- There is no clear budget calculation.

- There is no clear division of responsibilities.

E. University of Education, Winneba ICT policies analysis

The ICT Policy of the University of Education is aiming to:

- Provide guidelines and standards to guide users and decision-makers in the development.
- and use of ICT Resources.
- Ensure that ICT resources are used efficiently and appropriately in support of teaching,
- learning, research and administrative functions of the University.
- Ensure that ICT resources are secured and protected against abuse, damage, loss or theft.

The policy is the guidelines and set of rules for the use of ICT resources. The policy themes are divided into sixteen sub-policies referred to in this current document as thematic areas:

1. Enterprise Systems Policy
2. Computing Supported Products (Standards for Computers and Related Technology)
3. Acceptable Use of Computing and Electronic Resources Policy
4. Security of Networks and Networked Data Policy
5. Data Classification Policy
6. Computer Systems Backup Procedure
7. Wireless Communication Policy
8. ICT Management & Maintenance Policy
9. Learning Management Use Policy
10. Electronic Records Retention Policy
11. ICT Systems Accessibility Policy
12. Pornography and ICT Facilities Policies
13. Computer Inventory and Equipment Replacement Policy
14. Electronic Copyright Ownership and Use Policy
15. Distance Education and Online Learning Policy
16. ICT Use and Gender Equity Policy

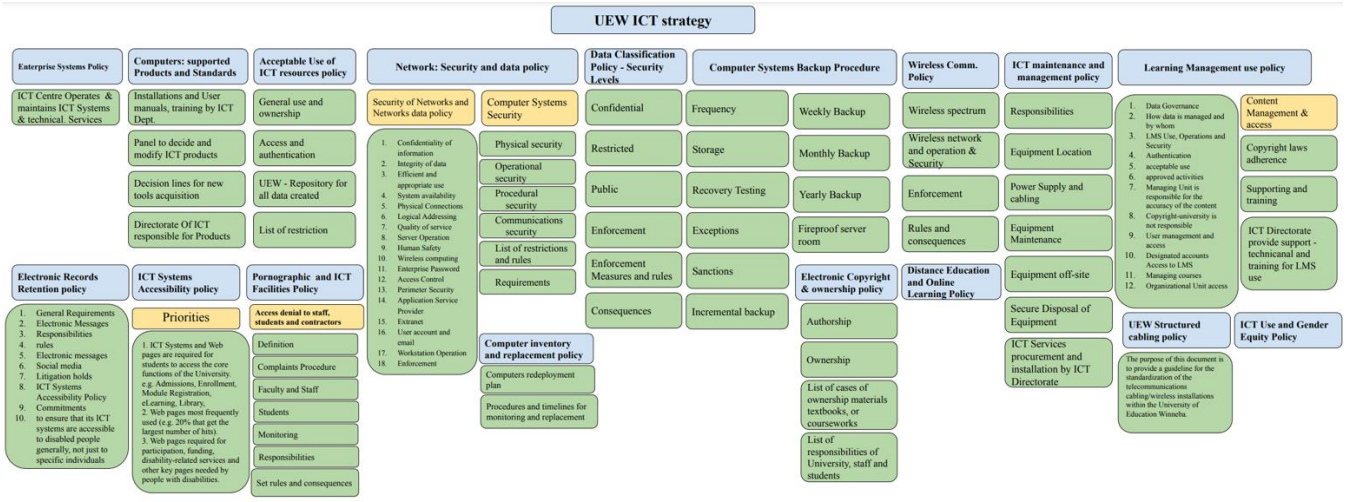

Figure 6. Schema of University of Education ICT Policy

1. **Enterprise Systems Policy**

This part states that UEW enterprise systems will be operated and maintained by ICT Technical Operations and Services Centre.

2. Computing Supported Products (Standards for Computers and Related Technology)

- Supported Products, the Department of Information and Communication Technology will provide installation, user manuals, training, consultation, maintenance and repair services for supported products.
- Additions to Supported Products List. A review panel shall be appointed by the Head of the Department, Information and Communications Technology for modifications and additions to the list of supported products.
- Decision line on how to acquire new tools.
- Responsibility. Directorate of Information and Communication Technology

3. Acceptable Use of Computing and Electronic Resources Policy

- General Use and Ownership
- Access when authenticated.
- All data created or received for work purposes and contained in university electronic files, servers, or e-mail depositories are public records.
- List of restrictions

4. Security of Networks and Networked Data Policy To protect the integrity of the campus network and any data stored there, users must adhere to the Security of Networks and Networked Data Policy.

- Unacceptable Use
- Prohibited System and Network Activities
- Prohibited E-mail/Electronic Messaging and Communications Activities
- Enforcement

Security of Networks and Networked Data Policy

- Confidentiality of information
- Integrity of data
- Efficient and appropriate use
- System availability
- Physical Connections
- Logical Addressing
- Quality of service
- Server Operation
- Human Safety
- Wireless computing
- Enterprise Password
- Access Control
- Perimeter Security
- Application Service Provider
- Extranet
- User account and email
- Workstation Operation
- Enforcement

Computer system security

- Physical security
- Operational security
- Procedural security
- Communications security

- List of restrictions and rules
- Requirements

5. Data Classification Policy Security levels

- Confidential
- Restricted
- Public
- Enforcement
- Enforcement measures and rules
- Consequences

6. Computer Systems Backup Procedure

- Frequency
- Storage
- Recovery Testing
- Exceptions
- Sanctions
- Incremental backup
- Weekly backup
- Monthly backup
- Yearly backup
- Fireproof server room

7. Wireless Communication Policy

- The wireless Spectrum
- Wireless Network Operation and Security
- Enforcement
- Rules and consequences

8. ICT Management & Maintenance Policy

- Responsibilities
- Equipment Location
- Power Supplies and Cabling

- Equipment Maintenance
- Equipment Off-Site
- Secure Disposal of equipment
- Monitoring Arrangements
- The managing unit and/or Directorate of ICT Services will ensure that any authorized software and hardware purchased by UEW is taken care of by the Directorate of ICT Services. If software or hardware is interfering with UEW, it will be removed from the UEW system. Depending on the severity of the problem, the Directorate of ICT Services may confiscate such hardware or remotely delete such an application, especially if permission was not requested prior to the installation.

9. Learning Management System Use Policy

- Data Governance
- How data is managed and by whom
- LMS Use, Operations and Security
- Authentication
- Acceptable use
- Approved activities
- The managing Unit is responsible for the accuracy of the content
- Copyright-university is not responsible
- User management and access
- Designated accounts
- Access to LMS
- Managing courses
- Organizational Unit access

Content management and access

- Copyright materials must adhere to guidelines.
- Support and training
- The managing unit and Directorate of ICT Services shall designate technical support to assist with LMS support and training for faculty and students.
- System Maintenance

10. Electronic Records Retention Policy

- General Requirements
- Electronic Messages
- Responsibilities
- rules
- Electronic messages
- Social media
- Litigation holds.
- ICT Systems Accessibility Policy
- Commitments
- to ensure that its ICT systems are accessible to disabled people generally, not just to specific individuals.

11. ICT Systems Accessibility Policy

Priorities

1. ICT Systems and Web pages are required for students to access the core functions of the University. e.g., Admissions, Enrolment, Module Registration, eLearning, Library,
2. Web pages most frequently used (e.g., 20% that get the largest number of hits).
3. Web pages required for participation, funding, disability-related services and other key pages needed by people with disabilities.

12. Pornography and ICT Facilities Policies

The University aims to prevent its staff, students, visitors and contractors from having unnecessary contact with pornographic material accessed through information and communication technologies (ICT).

- Definition
- Complaints Procedure
- Faculty/Staff
- Students
- Monitoring
- Responsibilities
- Set of rules and consequences

13. Computer Inventory and Equipment Replacement Policy

Plan for the redeployment of computers.

List of procedures and timelines for monitoring replacement needs.

14. Electronic Copyright Ownership and Use Policy

- Authorship
- Ownership
- List of different cases of ownership of materials, textbooks, and coursework
- List of responsibilities of university, staff and students

15. UEW Structured Cabling Policy and Guidelines The purpose of this document is to provide a guideline for the standardization of the telecommunications cabling/wireless installations within the University of Education Winneba.

Extracted thematic considerations for ICT Policy Analysis

In order to analyse the ICT Policies of the University of Cape Coast and the University of Education based on shared indicators, the literature (Martin & Xie, 2022), the Tallinn University Digital Learning Strategy (Tallinn University, 2021), the Ulster University Digital Strategy (Ulster University, 2022), and Ghana's ICT in Education Policy (MoE, 2015) were examined. The term "Human Actors - focused institutional digital strategy indicators" was created to group together twenty (20) thematic topics. Making digital teaching and learning gratifying and advantageous to all other supporting staff in the institutions, on the one hand, and to instructors and students on the other, was the main focus in developing those topic areas. Table 2 displays the extracted parameters.

Table 2: Human Actors - focused institutional digital strategy indicators

Thematic Areas	Description of the theme(s)
Thematic Area 1:	Infrastructure, technical system and digital learning technologies
Thematic Area 2:	Educational Management and Administration (ICT leadership and Technical Lead)
Thematic Area 3:	Regulations, Operational Guides (technical and professional/pedagogical guides/handbooks)
Thematic Area 4:	Training for ICT uptake and digital culture formation (with gender equity/inclusion considerations)
Thematic Area 5:	Support structure for ICT uptake
Thematic Area 6:	ICT in Curriculum and discipline (specialities) Integration
Thematic Area 7:	Professional Development in ICTs for practice Staff/Development for Metacognition Skills (Students)
Thematic Area 8:	Partnership Development (Local and International agenda)
Thematic Area 9:	ICT in/for Research and Development
Thematic Area 10:	ICT and Instructional Modalities and emerging practices/approaches
Thematic Area 11:	ICTs learning assessments and staff appraisal; learning analytics and EMID
Thematic Area 12:	ICT in Networking Local and International (staff and students)
Thematic Area 13:	Content Creation for DE, Online or Self-regulated activities (Student benefits)
Thematic Area 14:	Safety and security; online well-being (staff and students focussed)
Thematic Area 15:	Rewards, benefits and student satisfaction agenda

Thematic Area 16:	ICT is knowledge share - community problem-solving (University knowledge transfer community improvement)
Thematic Area 17:	Sustainable initiatives (Funding strategy; Public Private relations/collaboration plan)
Thematic Area 18:	Experience Institution - Alumina and current student apps/environments
Thematic Area 19:	Feedback and help structure
Thematic Area 20:	Smart and digital lifestyle readiness plan

Result and Discussion

The outcomes of the institutional ICT Policy analysis of UCC and UEW are presented in this portion of the publication. The conclusions are drawn utilizing the criteria developed from the matrix of the Tallinn University Digital learning strategy, Ulster University's digital strategy, Ghana's ICT in Education Policy, and relevant literature on digital transformation in education. The aforementioned parameters are listed in Table 2. The discussion that follows provides a summary of UCC and UEW's situation as well as recommendations.

1. **Overview of The University of Cape Coast ICT Strategy Focus**

Table 2. UCC ICT Policy Overview

Focus areas	Description of the theme(s)	Addressed	Needs attention
Thematic Area 1:	Infrastructure, technical system and digital learning technologies	√	
Thematic Area 2:	Educational Management and Administration (ICT leadership and Technical Lead)	√	
Thematic Area 3:	Regulations, Operational Guides (technical and professional/pedagogical guides/handbooks)	√	

Thematic Area 4:	Training for ICT uptake and digital culture formation	√	
Thematic Area 5:	Support structure for ICT uptake	√	
Thematic Area 6:	ICT in Curriculum and discipline (specialities) Integration		√
Thematic Area 7:	Professional Development in ICTs for practice Staff/Development for Metacognition Skills (Students)		√
Thematic Area 8:	Partnership Development (Local and International agenda)	√	
Thematic Area 9:	ICT in/for Research and Development		√
Thematic Area 10:	ICT and Instructional Modalities and emerging practices/approaches		√
Thematic Area 11:	ICTs learning assessments and staff appraisal; learning analytics and EMIS		√
Thematic Area 12:	ICT in Networking Local and International (staff and students)	√	
Thematic Area 13:	Content Creation for DE, Online or Self-regulated activities, open-access and copy(property) right (Student - teacher benefits)		√
Thematic Area 14:	Safety and security; online well-being (staff and students focussed)	√	
Thematic Area 15:	Rewards, benefits and student satisfaction agenda		√
Thematic Area 16:	ICT is knowledge share - community problem-solving (University knowledge transfer community improvement)	√	
Thematic Area 17:	Sustainable initiatives (Funding strategy; Public Private relations/collaboration plan	√	
Thematic Area 18:	Experience Institution - Alumni and current student apps/environments		√
Thematic Area 19:	Feedback and help structure		√

Thematic Area 20:	Smart and digital lifestyle readiness plan	√

It can be seen from Table 2 and Figure 5 that the ICT Policy of UCC placed a major emphasis on technical systems, infrastructure, and ICT applications and products inside the University. The policy also emphasizes academic honesty, upholding internet decorum, and supporting students with disabilities.

The benefits and satisfaction that human actors derive from digital teaching and learning are also mentioned, but they are not well delineated. Training and support are also mentioned. The authors of this article predict that students and certain faculty members will underuse resources for research, teaching, and learning in such a circumstance.

2. An Overview of the University of Education ICT Strategy Focus

Table 3. UEW ICT Policy Overview

Focus areas	**Description of the theme(s)**	**Addressed**	**Needs attention**
Thematic Area 1:	Infrastructure, technical system and digital learning technologies	√	
Thematic Area 2:	Educational Management and Administration (ICT leadership and Technical Lead)	√	
Thematic Area 3:	Regulations, Operational Guides (technical and professional/pedagogical guides/handbooks)		√
Thematic Area 4:	Training for ICT uptake and digital culture formation		√
Thematic Area 5:	Support structure for ICT uptake		√
Thematic Area 6:	ICT in Curriculum and discipline (specialities) Integration		√
Thematic Area 7:	Professional Development in ICTs for practice Staff/Development for Metacognition Skills (Students)		√

Thematic Area 8:	Partnership Development (Local and International agenda)		√
Thematic Area 9:	ICT in/for Research and Development		√
Thematic Area 10:	ICT and Instructional Modalities and emerging practices/approaches	√	
Thematic Area 11:	ICTs learning assessments and staff appraisal; learning analytics and EMID		√
Thematic Area 12:	ICT in Networking Local and International (staff and students)		√
Thematic Area 13:	Content Creation for DE, Online or Self-regulated activities, open-access and copy(property) right (Student - teacher benefits)	√	
Thematic Area 14:	Safety and security; online well-being (staff and students focussed)	√	
Thematic Area 15:	Rewards, benefits and student satisfaction agenda		√
Thematic Area 16:	ICT is knowledge share - community problem-solving (University knowledge transfer community improvement)		√
Thematic Area 17:	Sustainable initiatives (Funding strategy; Public Private relations/collaboration plan	√	
Thematic Area 18:	Experience Institution - Alumni and current student apps/environments		√
Thematic Area 19:	Feedback and help structure		√
Thematic Area 20:	Smart and digital lifestyle readiness plan		√

It can be seen from Table 3 and Figure 6 that the UEW Policy has a significant technical emphasis. UEW ICT seems more as a set of technical operational guidelines, in contrast to UCC where other areas of the university system's operations are being merged into the policy. In a nutshell, the policy lacks connections to the development of skilled digital teaching and learning capacity and is intended for the Technical ICT team's consumption. Training and assistance are addressed, but in order to satisfy and benefit the human players in

the university system, this needs to be further clarified with very specific measures. The policy is praised for tackling difficulties with e-waste, user online safety, and gender gap in ICT use.

Overview and recommendations for the strategies based on the Digital Learning transformation framework.

In the light of the forgone, and in the spirit of projecting digital teaching and learning based on emerging technologies and futuristics perspective of education we advance the following conversations:

Digital transformation is a process that involves significant changes to an entity's properties through the integration of information, computing, communication, and connectivity technologies (Vial, 2019a). This process requires a series of coordinated culture, workforce, and technology shifts to enable new educational and operating models, transforming an institution's operations, strategic directions, and value proposition (Grajek & Reinitz, 2019). In the context of digital learning in higher education, digital transformation leverages digital technologies to create major educational improvements, enhance learner and instructor experiences, and generate new instructional models through policies, planning, partnerships, and support (Martin & Xie, 2022). These definitions highlight the importance of embracing digital transformation as a means of improving organizational processes, strategic objectives, and educational outcomes through the integration of technology.

Based on the previous logic, component and action analysis of the different Universities' digital strategies, we propose some suggestions that could be further discussed to improve the UCC and UEW strategies. Aiming to develop both universities' strategies to transform their digital learning, the suggestions are based on the ICT policy implementation and evidence markers extracted from the works of Martin and Xie (2022).

Digital Learning Technologies

Digital transformation routes in digital technologies. In the educational process, digital tools are essential. To provide stable computing and authoring systems, UEW and UCC have both put out a significant baseline of practices and guidelines. Also, the next step would be to make sure that certain widely utilized digital teaching and learning technologies are in place.

Learning Management systems

Both universities have incorporated the theme of LMS systems into their strategies and policies. Starting with managing the data and ending with the copyright and authoring of the content which is uploaded to the systems.

Synchronous technologies, Multimedia applications, Collaborative applications, Cloud-based technologies, and Emerging technologies.

The universities' strategies have not focused much on the technologies that were previously mentioned. Both organizations leave this open. For example, UEW outlines a series of requirements that must be satisfied before introducing any new technologies. Every piece of software that is slated for implementation must work with the current setup. Both institutional strategies point to the necessity of routinely updating both the hard- and software-list and the policies. It is important to address the employment of cutting-edge technology like artificial intelligence in education.

Instructional Modality

It is evident from the strategy and policy documents that there are a variety of instructional modalities, including Face-to-Face (F2F), Hybrid/Blended, and Fully Online; however, it is unclear where the universities plan to concentrate their teaching due to the emerging technologies (such as Artificial Intelligence, Wearable Technologies in Education, etc.) that are changing the goals of teaching and learning in Higher Education Institutions. Six potential modalities are projected for debate holistically: hyflex, hybrid/blended, asynchronous online, synchronous online, bichronous online, and on-campus technology-enhanced. Which approach to take should be determined by the opportunities offered to students and the university, but should be supported by staff and student satisfaction. The technology-enhanced on-campus modality is the least digitalized modality and would be the most appropriate given that some students do not have their devices. The option to incorporate some course components online is provided by hybrid or blended learning methodologies. Online learning that is asynchronous gives students the freedom to decide when they complete their assignments. This would be appropriate if kids were working outside of school or had unequal access to the internet. enabling them to independently design their education in accordance with their abilities. In

order to participate in other modalities, you would need to be available online at a specified time. It's also crucial to remember that these modalities require varying levels of technology and pedagogical expertise from the teacher. The focus should guide the planning of the appropriate training and support.

Personnel and support service

Investments in personnel and support services would be necessary to transform teaching and learning to be more digital. The fundamental practices for staff development and upkeep for ICT services have been embraced by both universities. However, there are no concrete plans for the digital learning tools, support, or training (the LMS is the only exception).

Instructional designers may be useful if creating online learning curricula is the goal. They would support the planning and creation of efficient curricula for various modalities.

Academic support services - Resources and tools must be available to students. In order to be proficient in digital learning, students must also receive support and instruction. These are the areas targeted by the LMS theme in UEW and UCC policies. Although personnel support services are covered by university policies, it is unclear how this activity is set up inside different faculties, departments, and schools.

Employees who build their digital teaching materials and skills should have access to recognized programs, which will increase the adoption of professional practices. To determine the requirement for training and support, it should be planned to regularly check employee digital competency. One might use DigiCompEdu, OPEKA, etc. as examples. The Tallinn University Digital Learning Strategy, which places a particular emphasis on raising the digital competency of staff and students, has also been taken into consideration in this analysis. This could serve as an illustration when UEW and UCC are developing their digital learning strategies.

Organizational Policies and Planning

Both universities' ICT policies and strategies place a strong emphasis on equipment and technology. Many policies regarding various elements of technology use were included in the documents. Frequently, these actions and activities were more akin to a set of accepted norms and regulations than to crucial future objectives and goals. In their policies, neither of the universities had mentioned digital instruction. Determining a policy and strategy for digital teaching and learning that would place an emphasis on making decisions based on research is what we recommend doing as well. Standards for workload, enrolment, course evaluation, and

other factors should be added to the policies. The universities would profit from strategic planning on how to meet objectives for digital teaching and learning as well as how to gauge the strategy's efficacy and the funds allocated for it.

The topic of equity and access was taken up by both universities to guarantee that students could use equipment. Although the precise means of achieving these objectives was not specified, this might also be expanded in terms of access to software and internet connectivity.

Teacher Development

The institutions should carefully prepare how their staff and students will increase their digital literacy. Possibilities for skill development in integrating fresh content should be available. Reluctance could be shown toward these endeavours. Motivating the personnel to grow their expertise is crucial. Intellectual property rights must also be understood by the staff. The institution's policies might concentrate more on these problems. The UEW approach specifically targeted this issue, but the UCC strategy treated it as part of training for academic integrity and adherence to anti-plagiarism norms.

Development of learners

Making sure that students have access to computers and the internet, as well as the ability to learn in a variety of modalities, is crucial for the digital learning transformation to take place. The various modes of digital learning require diverse abilities from the students. For instance, some modes require students to be self-regulated learners who manage their time and learning. Additionally, students require access to a variety of content formats (text, video, and audio) as well as opportunities to connect with one another. As a result, it is advised to include the theme in any future learning strategies that aim to help students acquire the abilities they need to succeed in a digital learning environment.

Partnerships

The initiatives should also cover collaboration with other colleges, businesses, and organizations. Collaborations may strengthen and modernize online education. The partnership may also involve conducting digital education research. Although not with a focus on digital learning, the collaboration was addressed in the UCC plan. This subject was not covered by UEW.

The ICT policy of Ulster University was examined throughout this investigation. The creation of alliances and cooperative efforts with business and alumni are highlighted in this policy.

Attempting to foster a better connection between the academic community and society would attract more students. It might be advantageous to adopt certain potential topics from the strategy to enhance the partnerships portion of the policies.

Conclusion

The most significant baseline actions required to support digital learning and digital transformation in digital learning and teaching are covered in the policy and strategy documents of the University of Education, Winneba, and the University of Cape Coast. A clear goal, activities, timelines, budget, and share of responsibility are necessary components of a high-quality plan. The objectives and tasks of the UCC and UEW strategies are apparent, but it is not always clear when they must be accomplished. Furthermore, it is unclear how to determine whether the plan has been applied properly.

The next steps could be to:

1) set clear deadlines, budget estimation and share of responsibilities,
2) create digital teaching and learning strategies in addition to the existing ICT policies and strategies. These strategies could target seven themes: Digital Learning Technologies, Instructional Modality, Personnel and Support Services, Organizational Policies and Planning, Instructor Development, Learner Development and Partnership. As an example of what topics to focus on these seven topics Tallinn University Digital Learning Strategy analysis which was presented in this work could be used as an example to adapt for developing UCC and UEW digital learning strategies.

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