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)

Ghana's vision to become part of the global Information Communication Technology-driven economies is evidenced by the development of an ICT policy in 2003. The policy was Ghana ICT for Accelerated Development -ICT4AD (The Republic of Ghana, 2003). The Policy was underpinned by the motivation for the survival of the country and its people in the areas of national, human, economic and social development among hinges through an ICT-driven agenda. Consequently, the Policy focused on creating a conducive setting for operationalising ICTs for national development, supporting economic activities, services provision, human resource development, and improving educational delivery among others. In its implementation, the focus was on 14 areas that are described as the pillars of Ghana's ICT4AD. For the sake of the scope of this article, ICT in education which is one of the pillars is highlighted (GOG, 2003).

The policy statement of ICT in Education as stated in the ICT4AD acknowledged "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 bases upon which Ghana should incorporate ICTs into all spheres of its education system (GOG, 2003, p. 33). Consequently, With the ICT in Education from ICT4AD as the reference point, ICT in Education Policy was developed in 2008 and subsequently revised in 2015 (MOE, 2008; MOE, 2015).

Ghana's ICT in Education Policy, outlined in the 2008 policy document, aimed to revolutionize education by integrating digital technologies and resources across all aspects of educational delivery. The policy emphasized three key dimensions, referred to as the pillars of ICT in education:

- 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.

However, the ICT in Education Policy, 2015expanded on these dimensions and introduced seven thematic areas, in contrast to the three themes of the ICT4AD Policy, 2003. The seven thematic areas specified in the 2015 policy 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.

These seven thematic areas in the 2015 policy reflect an expanded and comprehensive approach to integrating ICTs in education compared to the earlier three dimensions outlined in the 2008 policy 2015 (MOE, 2008; MOE, 2015).

Later in this document detailed discussion of the policy provisions is provided. From ICT in Education Policy, various institutions' ICT in education strategies and action plans have been drawn. Thus, defining the parameters within which Institutional ICT policies (at the Tertiary level - institutional ICT Policy), or with the Regional/Metropolitan/Municipal/District Educational Offices (Local policy

implementation plan) could be formulated., Since the inception of the ICT4AD, giant strides had been made around the digitalisation of educational activities and services at the tertiary level.

It is worth looking back to assess the extent to which the policy has influenced the educational landscape in Ghana. Presently, at the tertiary education level, universities provide open access to Wi-Fi for registered students and faculty. With the support of the World Bank, about thirteen universities operate free Wi-Fi systems in their institutions to promote e-learning and the administration of student records (Ghana News Agency, 2021). For instance, at the University of Ghana, students and faculty can conduct classes on an e-learning platform known as Sakai, with access to the internet through the free Wi-Fi network.

The University of Cape Coast has also put in place the Moodle e-learning platform with added portals for lecturers and students. Payslip information - known as the Xpay and Management Information Systems (MIS) is also available on an electronic platform at the University. Students and faculty who use the e-learning platform (UCC LMS) have data cost zero rated allowing for free internet usage. Additionally, students and faculty have access to eduroam for access to data which facilitates e-learning activities. eduroam provides simple, easy, secure connectivity from thousands of hotspots across more than 100 countries. Furthermore, the MIS platform enables students to check admission and registration status, and their results, as well as choose rooms in halls of residence.

Similarly, Kwame Nkrumah University of Science and Technology has taken advantage of the Wi-Fi system and has put in place an E-learning and virtual classroom portal in addition to a student app called AIM, where students can check their registration status and results among others.

Unfortunately, this positive image of ICTs at the tertiary level of the education system is not devoid of challenges. The focus on tertiary education means that digitalisation in the education sector only serves the interest of a privileged few, with the large majority at the pre-tertiary level completely underserved. Even at the tertiary level, there are legitimate concerns about reliable electricity, access to computer devices especially for students from economically poor backgrounds, and inequity, especially considering a recent policy to have internet connectivity in the Colleges of Education in the country which is supplied by private vendors paid for by students. Thus, fundamentally there are issues about ICT in Education in the Ghana context that requires attention.

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

According to International Trade Administration (International Trade Administration, 2022), Ghana seeks to improve and expand its network connectivity and improve online education delivery. This is evidence of the presence of a national development focus on digital maturity.

According to the World Bank (The World Bank, 2022), in terms of economic pursuits, Ghana's digital development is one of the best-performing sectors in the Sub-Saharan Africa Region and grew economically on average by 19 % per year between 2014 and 2020. Today, Ghana is among the digital leaders in Sub-Saharan Africa (The World Bank, 2019). However, a Digital Economy diagnostic conducted in 2020 identified key bottlenecks that need to be removed to further accelerate Ghana's digital transformation as observed by Kpessa-Whyte and Dzisah, 2022; based in their study "Digitalisation of Basic Services in Ghana: State of Policies in Action and Lesson for Progress.

ICT in Ghana's educational system has its share of concerns about digitalisation in Ghana. A recent study, by Mugisha et al., (2021) noted the successful educational reforms in Ghana notwithstanding, "there are still several challenges that hinder quality teaching and learning. These challenges include inadequate ICT skills as well as infrastructure and human resources. In addition, teacher educators are resistant to change from conventional to modern methods of teaching" (p. 56). Further insight into the digitalization challenges has been identified by research. Obiri-Yeboah et al., (2013) explored the challenge of ICTs at the tertiary education level in Ghana. The study confirmed that at the tertiary level of Ghana's education, there is an availability of digital tools and resources. However, the challenge is that the universities have not been able to fully integrate these tools into teaching and learning and research. They also identified that internet connectivity and power supply tend to be unreliable and influence how much ICT could be integrated into teaching and learning. One of the findings of the paper was the unwillingness of staff and students to use ICTs for pedagogical practices. This is well understood, as the final call by the paper was the need for stakeholders to invest in supporting the usage of digital tools and resources required.

Some of the issues raised in the immediate past discourse are shared by Asamoah et al., (2022). who focused on the use of ICTs for teaching and learning in public schools in Ghana. Among other findings, the was an indication that teachers have a positive perception of the use of ICTs for their professional practices. Despite this positive posture, ICT integration is not attained. The reason is that there is no support for teachers to do so. The challenge of the need for the expansion of internet access points in schools is persistent. Even though there are pieces of evidence of digital tools and resources in schools, the paper established that not all teachers are equipped with digital tools and resources for professional work. In another context, Tagoe, (2012) researched the perceptions tertiary students hold about their learning. The study confirmed that most students have excellent computer skills. This competence is enhancing their studies via virtual learning environments. However, it was interesting to note that in the findings, the students indicated that they prefer mixed-mode learning scenarios as opposed to completely online mode. Again, it could be understood as the study observed that internet access is a challenge and called for support in digital skills training and support. In such a situation, the students would not be relying upon the Internet completely for their academic pursuits. An interesting takeaway

from the paper was the need to create support mechanisms to improve the digital skills of female students. Based on the later findings, there is literature supporting that gender is a factor in technology acceptance (Goswami & Dutta, 2016). In the ensuing section, this current paper tries to project the position of Ghana's Educational Strategy 2018-2030 in finding answers to the already mentioned digitalisation challenges. The 2018 - 2030 Education Strategic Plan (ESP) identified specific limitations in education which are worth listing since they directly or indirectly relate to institutional ICT policy pursuits. They are: wide income and regional disparities in completion at the tertiary level; the parity index for completion rates at the tertiary level between those from the poorest and richest income quintiles is 0.06; disparities in distance education: Enrolment in open and distance learning courses has increased for some institutions (e.g. the University of Cape Coast) but has declined for others (e.g. University of Education Winneba), and, challenges with Pupil-Teacher ratios. ; 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 substantially across universities (Education Strategic Plan 2018-2030, 2015)

In another context, it is observed that the tertiary sub-sector is also responsible for training Ghana's teaching profession. However, the sector faces challenges in terms of limited provision, severe inequities, and low quality. Whilst both the number of tertiary institutions, and enrolment in such institutions, have increased over time, the Gross Enrolment Ratio (GER) remains low, at about 16% in 2015/16, and total enrolment is approximately 422,000. Private tertiary institutions under the MOE make up almost half the total number of total tertiary institutions, but only 19% of enrolment. Twenty-seven per cent of institutions are also public COEs. Most laboratories and lecture halls are ill-equipped, having less than 50% of the required materials, and institutions have less than 50% of their ICT requirements. In terms of levels of enrolment, in 2015/16, less than 0.5% of enrolment was at PhD level and only 5% was at the master's degree level (Education Strategic Plan 2018-2030, 2015). The window of hope that leads to intervention planning is based on the guided principles of the Educational Strategic Plan; these are access and equity, quality, relevance, efficiency and effectiveness and sustainability. With these principles as the backdrop, strategic goals are formulated, and defined as follows:

1. Provide and improve basic and senior high school education access and promote quality education.
2. Consolidate skills development through competency-based learning. Also, create modalities and openings for access to non-formal education for non-illiterate youth.
3. Make room for inclusive education for the vulnerable and the challenged.
4. Providing world-class and equitably accessed tertiary education and promoting effective managed and delivered educational management and funding.

To this end, every sub-sector of the education system should have a strategic goal that is based on or guided by ESP enumerated; the same goes for the design of the Institutional ICT Policy.

Rationale

The University of Cape Coast and the University of Education, Winneba – both located in Ghana, are the focus and settings of this intended policy analysis. They are among the top-class tertiary institutions in the country engaged in teaching and learning activities intended to address the human capital needs in Ghana. The two universities share many academic similarities in terms of the programmes, the mode in which the programmes are run, and the desire to function as strong partners and stakeholders in the implementation of the ICT4AD agenda in Ghana. Consequently, both Universities have developed their ICT Policies (DICTS, 2023; Yidana et al., 2019). Like all other universities in Ghana, the vision to implement the ICT4AD, ICT in Education Policy and the ESP, should inform the policy designs and implementation. Developing an ICT policy is an activity that is different from successfully planning and implementing the policy objectives. Regarding this paper, exploring some of the best practices and challenges regarding the subject matter is very essential. The ensuing section of the paper showcases the positive works of ICT in education and the related challenges.

In the few cases reviewed regarding ICT in the education sector in Ghana, there is a need for governmental or institutional-level actions to comprehend the situation and plan authentic interventions. The University of Cape Coast (UCC) and the University of Education, Winneba (UEW) have also identified various challenges inhibiting factors to successful ICT in teaching in learning. These inhibitors are found in the dimensions of innovative pedagogical practices, technology availability and uptake, and staff readiness for digital innovation in teaching and learning. Consequently, a four-member project consortium - the University of Cape Coast and the University of Education, Winneba in Ghana; University of Tampere, Finland and Tallinn University, Estonia - are working together to support ICT in teaching and learning in the universities in Ghana. Accordingly, this paper seeks to conduct an ICT policy analysis for UCC and UEW, vis-à-vis Ghana government's ICT in Education policy and other institutional policies with the object of providing information and recommendations about ICT Maturity Strategy development and interventions in the institutions. This paper attempts to explore the critical issues relevant to supporting the sustainable uptake of ICT in universities in Ghana. Consequently, the objectives of this paper are to:

1. Explore Ghana's ICT in Education policy.
2. Explore ICT strategies of selected institutions outside Ghana.
3. Analyse the institutional ICT policies of UCC and UEW.
4. Showcase, which university policy objectives have been successfully covered and which ones are relegated to the background and which ones are missing.

Literature Insights into Digital Transformation in Higher Education

In planning for digital transformation, (Vial, 2019) advocates for 4 structural changes for Digital transformation, namely, Organisational structures, Organisational culture, Leadership, Employee roles

and Skills. Practically, focus areas show that digital teaching and learning pursuits are not only about technology. In addition, inferences are made from the work of Kraus et al., (2021) advanced drivers which should be considered in ICT Policies or strategies design. They are, i) the vision of institutional digital transformation should be a shared one, and everybody in the organisation needs to be aware of it; the organisations' norms, ii) values and culture have to be built or re-directed 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; iv) collaboration in the organisation is essential; v) adequate provision should be made for resources provision and possibly relocation; vi) provide a medium for networking among actors; vii) ideate organizational pursuit for adaptation and change; viii) strive to make organisational capacity dynamic; ix) promote competence for ICT integration into professional practices; x) presence of leadership for the digital transformation and essential, and, xi) the organisation create affordances for co-creation by actors, sectors, units and departments etc.

We additionally look at what an institutional ICT policy should do by way of promoting digital teaching and learning or digital transformation in education. We take a cue from the ICT policy of the University of Ulster (Ulster University, 2022). ICT policies should support teaching and learning and provide the needed structures for the provision of openness and access to digital tools and resources in the institution. The Policy will have to how innovative practices will be pursued and how efficient utilization of resources could be promoted or guaranteed. Whatever tools and resources are in place should be user-friendly, and used with ease. Additionally, the Policy should give room for actors to ideate for new and novel activities instead of the status quo and still operate such that the entire process is a user (human) focussed one; and with affordance for them to communicate. Again, the Policy should offer the basis for the institutional goals to be attained. This relates the digital tools and resources to the relevant areas and subjects for problem-solving. Furthermore, the Policy should provide modalities for external cooperation and partnership and make an impact in the context of solving prevailing situations. Finally, all that have been enumerated be done in the spirit of empowering teachers and students in an environment of digital safety and trust.

Digital transformation for teaching and learning in higher education institutions is the overarching focus of institutional ICT policies pursuit. We use the work of Martin and Xie, (2022), to summarise the literature insights to outline the ICT requirements for current and future practices. The factors accounting for the insights are Digital Learning Technologies; Instructional Modalities; Personnel and Support Services; Organisational and Planning policies' Instructor development; Learner Development, and, Partnership. Table 1 presents the details of what should be considered in the quest for institutional digital teaching and learning.

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 comes 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

A descriptive design approach was used in conducting the exploration and analysis of the policies. The methodology was more of a qualitative activity; with the focus being document analysis. The study was guided by the UNESCO policy manual (UNESCO, 2013). The analysis was thought through based on the enumerated characteristics. They guided and supported the thinking processes for conducting the document analysis:

1. Source of Policy direction: national policy, constitutional requirements and the leads to the declaration of the policy Statement.
2. Policy statement: The broad statement focuses on the sector or issue around which the policy is being built. This leads to the development of the policy objectives.
3. Policy objectives: This specifies the expected achievable outcomes of the policy. It is about setting goals and defining the focal points for implementation. These are the measurable activities from which the pieces of evidence of policy attainment could be showcased. With this in place, policy strategies are drawn.
4. Policy strategies: This sets the direction of the policy for planning and implementation. It clarifies the priorities associated with the objectives of the policy. Showcases the possible actions and the duties associated with them. The final phase is planning.
5. Policy plan: Sets the implementation path of the policy, taking into consideration actions, schedule, resources, personnel, funds, procurements etc.

Operationalising the analysis process

The goal of this work (documents) is to analyse policy goals and strategies of UCC and UEW as the principal subject and other international institution policies that help to achieve higher-level goals (strategic goals and general goals) and what indicators exist to help measure and evaluate these relationships between goals. Goal trees allow us to assess how different goals are related to each other, and what is the contribution of some goals to the achievement of other goals. The logical framework matrix (the table) provides an opportunity to assess both vertical coherence (either result logically contributes to the achievement of direct goals, whether the achievement of a direct goal leads logically to broader goals, etc.); as well as horizontal coherence (do the indicators match the goals, whether all relevant external factors or assumptions have been considered. This gives the possibility to map and evaluate the logical connections and mutual dependence of goals and solution paths that is, intervention logic. It also allows us to find out the external factors that are important prerequisites for achieving the goals (Eraut, 1982). Figure 1 shows the methodological framework adopted for the analysis.

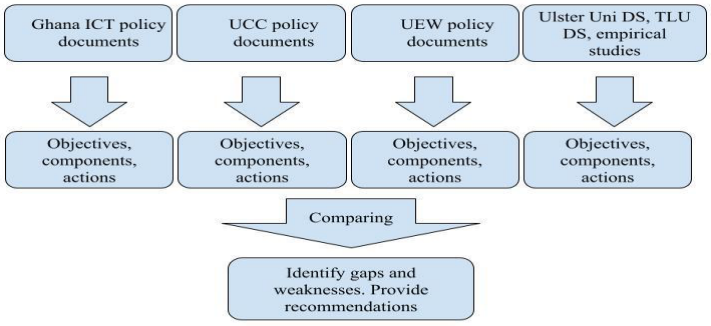

Figure 1. Framework for Institutional ICT in Education Policy Analysis

Policy Analysis

The ensuing sections explore the respective institutional Digital Strategies (ICT Policies). The focus is to examine the contents of those documents from the perspectives illustrated in Fig 1. Four institutional documents are explored, two from (the ICT policies of UCC and UEW) from Ghana, One from the United Kingdom (Ulster University) and another from Estonia (Tallinn University)

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.

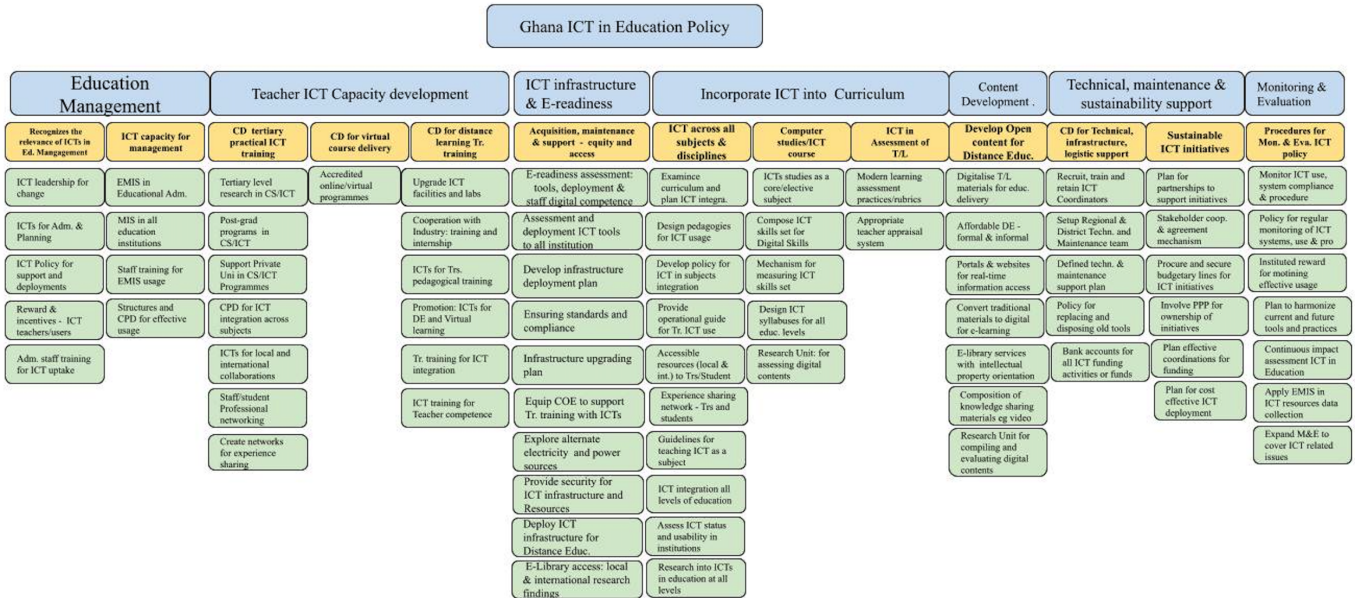

Figure 2: Schema for Ghana's ICT in Education Policy, extracted from (MoE, 2015)

Inference from Figure 2 indicates the institutional ICT Policy design and analysis could cover seven (7) thematic areas. Thirteen (13) strategic dimensions were realised in the policy. The takeaway is that institutional ICT Policy is not only about technology. Strategic focuses embraced Infrastructure and logistics, the institution as a system, human actors, capacity building, processes, change management, pedagogical excellence, monitoring, evaluation and support (technical, professional etc).

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:

- Students 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.

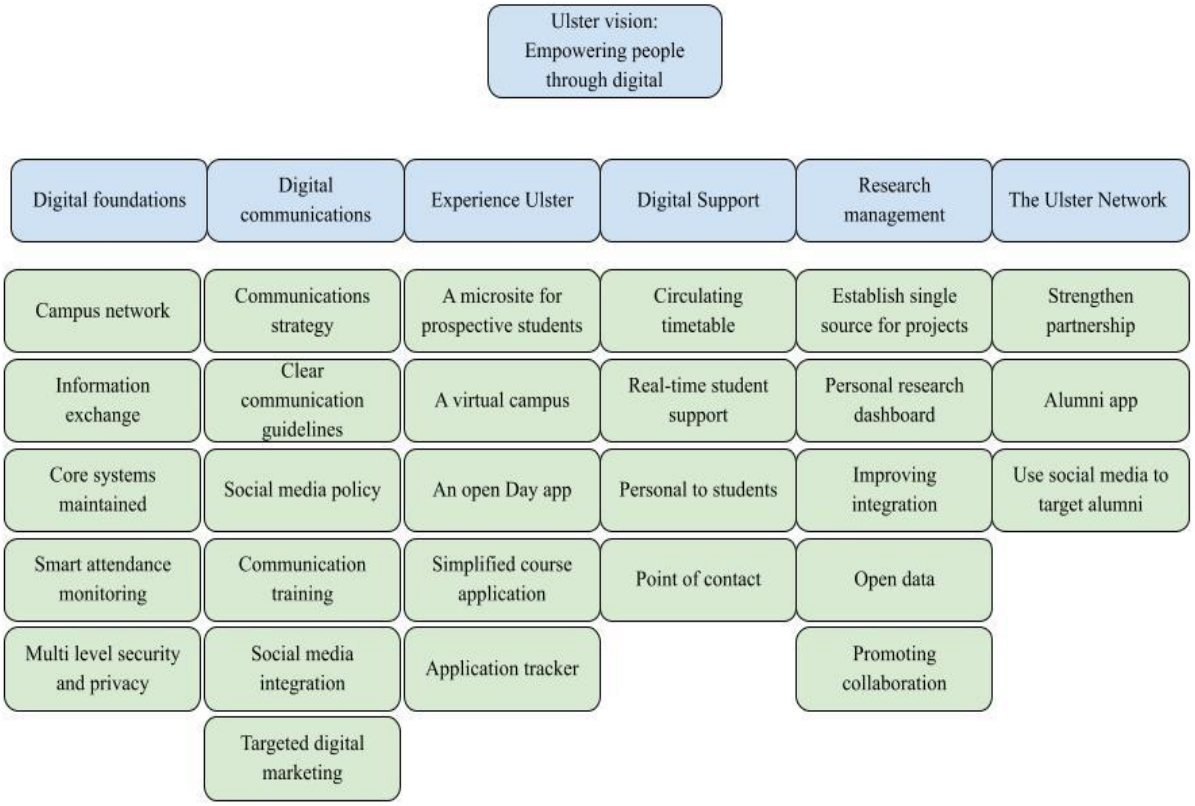

Figure 3. Schema for Ulster University's digital strategy, from (Ulster University, 2022)

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 includes the indicators, of how the success of this strategy will be measured. Every area of strategic priority has identified measures for example academic excellence is measured through an increase in NSS scores, student satisfaction, and TEF score. All the indicated activities are divided into three levels: baseline, transitional and strategic. This gives a good overview of which order different area activities need to be achieved. Baseline activities need to be in place before transitional or strategic activities. The strategy also indicates that there is a need for a Project Management Office, which would lead the whole process, not leaving the responsibilities unclear. The strategy also contains estimated costs for the aimed development.

The inclusion of alumni roles in the policy design is novel. In sum, the policy is human value focused because it spells out the benefits of each thematic focus on 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.

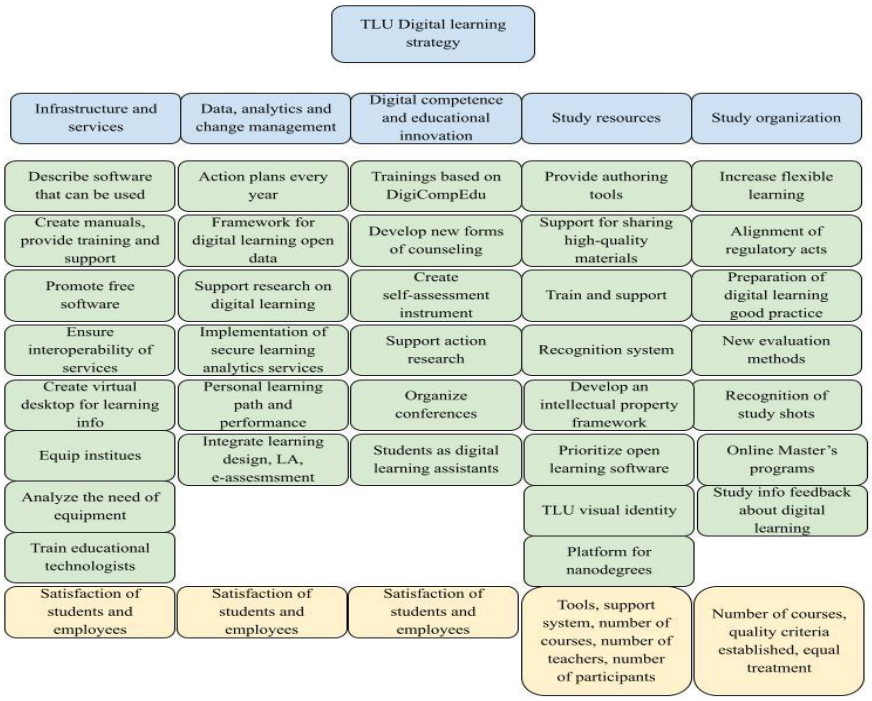

Figure 4. Schema of Tallinn University Digital Strategy from (Tallinn University, 2014)

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-video 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-video 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 vision and mission of the University are to offer equal opportunity for people to access quality higher education based on international education standards. The Policy is run through the Directorate of Information and Communication Service (DICTS).

The Directorate has acquired, adapted, installed, and operated equipment for its four sections: i) Network and Infrastructure, ii) Management and Information Systems, iii) ICT Training and Support and Support and iii) E-learning and Knowledge Management, to create a robust and secured ICT infrastructure that guarantees data integrity; in addition to offering high-end secured communication services cost-effectively.

The Policy aims to create and provide a framework that will enable ICT to contribute to achieving UCC's development goals by providing secure universal ICT services and access to information and communication facilities that will lead to global competitiveness in output and productivity.

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.

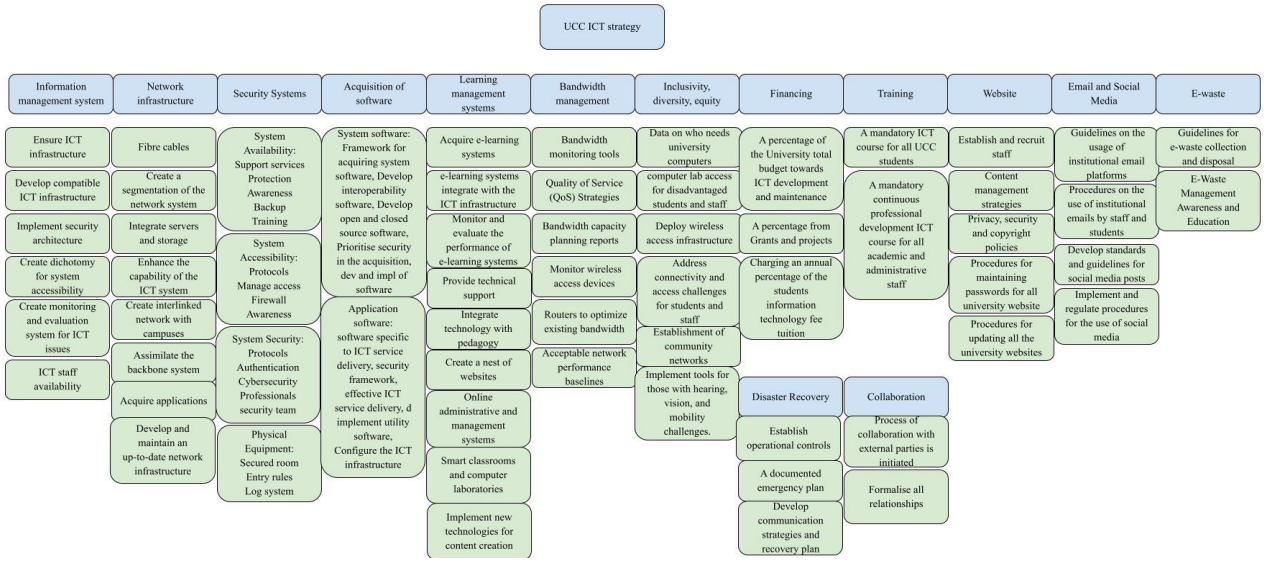

Figure 5. Schema of the University of Cape Coast ICT Policy from (DICTS, 2023)

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

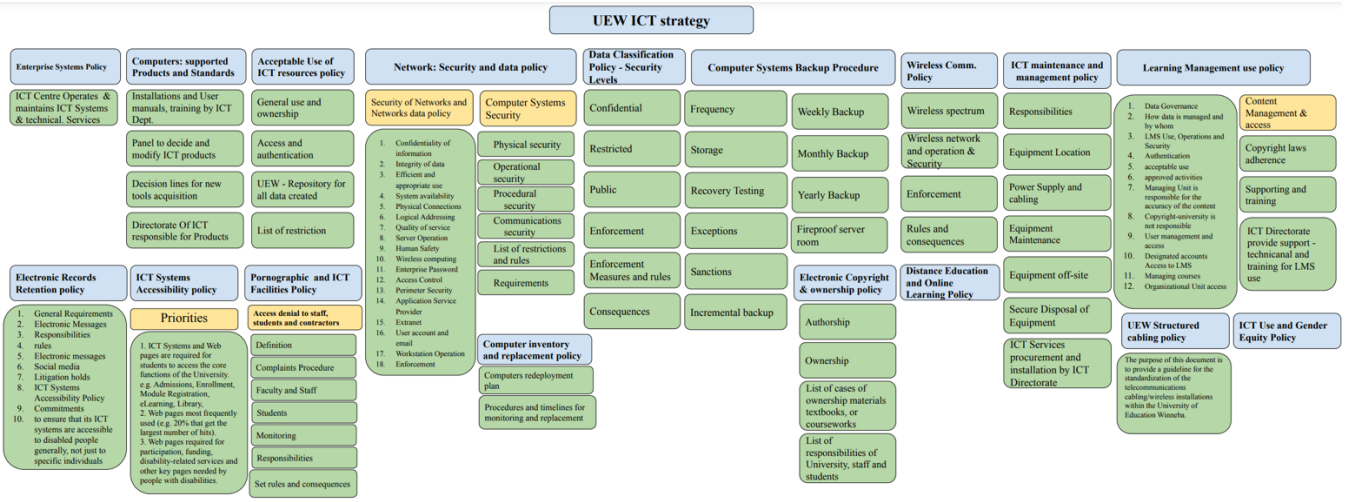

Figure 6. Schema of University of Education ICT Policy

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 licensed software and approved hardware purchased by UEW will be attended to by the Directorate of ICT Services and where software or equipment is interfering with UEW will be taken off the UEW system and depending on the severity of the problem, Directorate of ICT Services will confiscate such equipment or remotely delete such an application especially when permission was not asked before the installation of the said application on UEW.

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

To analyse the ICT Policies of the University of Cape Coast and the University of Education based on common indicators, the contents of the literature ((Martin & Xie, 2022), Tallinn University Digital Learning Strategy (Tallinn University, 2021), Ulster University Digital Strategy (Ulster University, 2022) and Ghana's ICT in Education Policy (MoE, 2015) were analysed. Twenty (20) Thematic areas were composed and labelled as "Human Actors – focused institutional digital strategy indicators". In formulating those thematic areas the key consideration was making digital teaching and learning satisfying and beneficial to both the teachers and learners on one hand, and all other supporting personnel in the institutions on the other hand. Table 2 showcases the parameters extracted.

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

This section of the document showcases the results of the institutional ICT Policy analysis of UCC and UEW. The inferences are made using the parameters created out of the matrix of Ghana's ICT in Education Policy, Ulster University's digital strategy, Tallinn University Digital learning strategy and relevant literature on digital transformation in education. See Table 2 for the said parameters. The ensuing discourse shows the status of UCC and UEW with an overview and recommendations as well.

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		√

Concerning Table 2, and Figure 5, it is observed that the ICT Policy of UCC strongly focused on technical systems, Infrastructure and applications/products of ICTs in the University. Additionally, the policy highlights support for students with disabilities, pursuance of internet etiquette and academic honesty.

There are also references to training and support, however, the human actors' benefits and satisfaction which are characterised by digital teaching and learning are not strongly articulated. In such a situation the authors of this report foresee under-utilisation of resources for teaching and learning and research on the part of students and some faculty.

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		√

Concerning Table 3 and Figure 6, it is observed that the UEW Policy has a very strong technical focus. Unlike UCC where other domains of the university system operations are being incorporated into the policy, UEW ICT appears more as technical operational guidelines. Briefly, one can observe that the policy is for the consumption of the Technical ICT team and missing the linkages to professional digital teaching and learning capacity development. Even though training and support are mentioned, this needs to be elaborated with very specific actions to meet the satisfaction and benefits of the human actors of the University system. The policy is commended for addressing E-waste issues, user online well-being and addressing gender disparity issues in ICT uptake.

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. Digital technologies play a crucial role in the learning process. Both UEW and UCC have substantial baseline actions and policies in place to ensure stable computing and authoring systems in place. The next step from these would be to ensure some commonly used digital learning and teaching technologies.

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 have not addressed the previously listed technologies strongly in their strategies. Both institutions leave this open: UEW lists a sequence of actions and regulations which must be met before implementing any new technologies. All the software that is planned to implement needs to comply with the existing systems. Both institutional strategies also indicate that there is a need to monitor the list of hard- and software and policies regularly to update both. The use of emerging technologies such as AI use in learning and coursework should be addressed.

Instructional Modality

From the strategy and policy documents, evidence is found about various instructional modalities such as Face-to-Face (F2F), Hybrid/Blended and Fully Online; however, is not clear the universities plan to focus their teaching owing to the emerging technologies (e.g. Artificial Intelligence, Wearable technologies in education etc) that are transforming teaching and learning pursuits in Higher Education Institutions. Holistically, six possible modalities are projected for discussion: on-campus technology-enhanced, hybrid/blended, asynchronous online, synchronous online, bichronous online, and hyflex. Which modality to focus on should depend on the possibilities of the students and the university, but should be underpinned by staff and student satisfaction. The least digitalized modality is the on-campus technology-enhanced modality which would be most suitable considering that some students do not have their devices. Hybrid/blended modality gives the possibility to add some parts of the course online. Asynchronous online modality leaves the opportunity for learners to choose when they do their learning tasks. This would be suitable when the students do not have equal access to the internet or are employed as well as learning (students). Giving them the freedom to plan their learning based on their possibilities. Other modalities would demand possibilities to be involved online at a specific time. It is also important to note that these modalities need different digital and pedagogical competence from the teacher. Suitable training and support should be planned based on the focus.

Personnel and support service

Transforming teaching and learning into more digital would need investments to support services and personnel. Both universities have incorporated the baseline activities for training and maintaining the personnel for the ICT services. But there are no specific actions planned regarding the digital learning tools, training and support (the only exception is the LMS).

If there is a goal to develop online learning courses, then instructional designers could be helpful. They would help to plan and design effective courses for different modalities.
Academic support services - Students need to have access to resources and tools. Students also need to have support and training to be competent in digital learning. These are targeted in UEW and UCC policies under the LMS theme. Even though the policies of the universities provide for personnel support services, it is unclear how this activity is organised within various faculties/departments/schools.

To enhance the uptake of professional practices, recognition systems should be offered for employees who develop their digital teaching materials and skills. Regular monitoring of employees' digital competence should be planned to estimate the need for training and support. For example, DigiCompEdu, OPEKA, etc. could be used. In this analysis, we have also worked through Tallinn University Digital Learning Strategy which is especially focused on increasing the digital competence of employees and learners. This could be used as an example to develop the digital learning strategy for UEW and UCC.

Organizational Policies and Planning

The ICT policies and strategies in both universities are very technology-driven and equipment based. The documents included a lot of policies about different technology use aspects. Often these activities and actions were more like a common set of rules and consequences rather than aims and goals for the future which are also important. Neither of the universities had addressed digital teaching in their policies. Therefore, we suggest also creating a policy and strategy for digital teaching and learning which would emphasize research-based decision-making. The policies should also be complemented with standards, like workload, enrolment, course evaluation etc. The universities would benefit from strategic planning on how to achieve set goals for digital teaching and learning and, how to measure the effectiveness of the strategy and the budget for it.
Both universities addressed the issue of equity and access to ensure that students have access to hardware. This could also be widened when it comes to access to the software and internet connection although it was not identified how these goals would be achieved specifically.

Instructor Development

The institutions should strategically plan the development of the digital competence of employees and students. There should be possibilities to develop their skills to integrate new content. These attempts could be met with reluctance. It is important to motivate the staff to develop their skills. The employees also need to be aware of intellectual property rights. The institution's policy could target these issues more as well. In the UEW strategy, this topic was targeted, whereas in UCC this topic was addressed in the context of training in academic honesty and compliance with anti-plagiarism standards.

Learner development

For digital learning transformation to happen, it is important to make sure that students can learn in various modalities and that they have access to computers and the internet. The digital learning's different modalities also demand different skills from the learners, for example, some modalities need students to be self-regulated learners who manage their time and learning. Also, students need to have different content formats to learn from (text, video, audio) but they also need to interact with each other. Therefore, it is suggested to incorporate the theme in the future strategy to develop the necessary skills for learners to cope with digital learning.

Partnerships

Collaboration with other universities, organizations and industries should also be addressed in the strategies. Collaborations could make digital learning stronger and up to date. The collaboration could also be on the level of research on digital education. The partnership was addressed in the UCC strategy but not with a focus on digital learning. UEW did not address this topic.

During this analysis, Ulster University ICT policy was analysed. This document sets the main emphasis on the development of partnerships and cooperation with industry and alumni. Aiming to build a stronger community between academia and society, which would bring them more students. It could be beneficial to adapt some possible themes from the strategy to improve the partnerships part of the policies.

Conclusion

The policy and strategy documents of the University of Education, Winneba and the University of Cape Coast cover the most important baseline activities that are needed to facilitate digital learning and digital transformation in digital learning and teaching. The high-quality strategy needs to have a clear aim, activities, deadlines, budget and clear share of responsibilities. UCC and UEW strategies have set clear aims and activities, but it is unclear in some places when these goals need to be reached. Also, there is no clear indication of how to measure if the strategy has been implemented successfully.

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.

References

Asamoah, R., Asiedu, N. K., & Buadi, D. W. (2022). Use of ICT in Teaching and Learning in Second Cycle Institutions: Understanding the Technological Aspect of the Tpack Model. *UDS International Journal of Development*, *9*(1), 737–748. https://doi.org/10.47740/537.udsijd6i

DICTS. (2023). *ICT Policy University of Cape Coast*.

Education Strategic Plan 2018-2030. (2015). *Ministry of Education/GOG,* http://www.moe.gov.gh/emis/index.htm

Eraut, M. (1982). Evaluation of a systematic approach. In *International Journal of Educational Development* (Vol. 2, Issue 3, p. 291). https://doi.org/10.1016/0738-0593(82)90010-4

European Commission. (2016). *The European digital competence framework for citizens*. https://doi.org/10.2767/00458

European Commission. (2020). *Digital Education Action Plan 2021-2027, Factsheet* (Issue September 2020).

Florence Martin, & Kui Xie. (2022). Digital Transformation in Higher Education: 7 Areas for Enhancing Digital Learning. *Educause Review*, 1–12. https://er.educause.edu/articles/2022/9/digital-transformation-in-higher-education-7-areas-for-enhancing-digital-learning

GOG (2003). Ghana ICT4AD Policy: A Policy statement for the realisation of the vision to transform Ghana into an information-rich knowledge-based society and economy through the development, deployment and exploration of ICTs within the economy and society.

Goswami, A., & Dutta, S. (2016). Gender Differences in Technology Usage—A Literature Review. *Open Journal of Business and Management*, *04*(01), 51–59. https://doi.org/10.4236/ojbm.2016.41006

Grajek, S., & Reinitz, J. (2019). A Framework for Digital Transformation in Higher Education. EDUCAUSE Review, 54(3), 22-35. https://er.educause.edu/articles/2019/5/a-framework-for-digital-transformation-in-higher-education

International Trade Administration. (2022). *Ghana Digital Economy: The Ghanaian Government outlines its priorities in the digital ICT sector for 2022-2023*. https://www.trade.gov/market-intelligence/ghana-digital-economy

Kpessa-Whyte, M., & Dzisah, J. S. (2022). *The Digitalisation of Basic Services in Ghana: State of Policies in Action and Lesson for Progress*. *September*.

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3). https://doi.org/10.1177/21582440211047576

Martin, F., & Xie, K. (2022). Digital transformation and educational innovation in higher education. Journal of Educational Technology Development and Exchange (JETDE), 15(1), 1-14.

MoE. (2015). *ICT in Education Policy*. Ministry of Education/Government of Ghana. http://www.moe.gov.gh/assets/media/docs/ICT_in_Education_Policy_August_2015_new.pdf

MOE. (2008). *ICT in Education Policy* (Issue November). http://www.moe.gov.gh/assets/media/docs/ICTinEducationpolicy_NOV2008.pdf

Mugisha, A. K., Lubega, J. T., Kasujja, J. P., & Atuhaire, S. (2021). A Systematic Review of Adaptable ICT Teaching Strategies on Teaching Process in Primary Teachers' Colleges in Africa. *Journal of the National Council for Higher Education*, *9*(2), 54–64.

Obiri-Yeboah, K., Kwarteng, K. O., & Kyere-Djan, R. (2013). Factors Affecting ICT Adoption in Tertiary Institutions in Ghana: A Case of Kwame Nkrumah University of Science and Technology. *Information and Knowledge Management*, *3*(6), 13–21. http://www.iiste.org/Journals/index.php/IKM/article/view/6235

Tagoe, M. (2012). Students' perceptions on incorporating e-learning into teaching and learning at the University of Ghana. *International Journal of Education and Development Using Information and Communication Technology*, *8*(1), 91–103.

Tallinn University. (2014). *Tallinn University*. https://www.tlu.ee/en/development-plan-2023-2027

The World Bank. (2019). Ghana Digital Economy Diagnostic. In *Digital Economy Diagnostic*. https://doi.org/10.1596/37786

The World Bank. (2022). *World Bank Provides $200 Million to Accelerate Ghana's Digital Transformation Agenda for Better Jobs*. Press Release. https://www.worldbank.org/en/news/press-release/2022/04/28/afw-world-bank-provides-200-million-to-accelerate-ghana-digital-transformation-agenda-for-better-jobs

Ulster University. (2022). *Ulster University Digital Strategy 2018/19 - 2022/23*. https://doi.org/10.1007/978-3-030-94759-0_12

UNESCO. (2013). *UNESCO Handbook on Education Policy Analysis and Programming*.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, *28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

Vial, G. (2019a). Digital transformation: A conceptual framework. Journal of Innovation Management, 7(1), 89-107. https://doi.org/10.24840/2183-0606_007.001_0006

Yidana, I., Ephrem, K.-A., & Hubert, A. (2019). *UEW ICT Policy* (Issue April).