

## Examining the Integration of ICT into Teaching and Learning: A Study of Colleges of Education in the Volta Region

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### ABSTRACT

The provision of education to citizens is a requirement for economic and social development, and globalization and the transition to a knowledge-based economy require that existing educational institutions produce individuals who can convert information into knowledge and apply that knowledge in a dynamic, cross-cultural setting. The successful integration of ICT into the learning environment requires instructors to be able to design learning in creative ways, integrate technology with a pedagogy successfully, develop socially engaged learning settings, and encourage cooperative involvement. Students and student teachers frequently have more knowledge and experience with ICT than instructors and teacher educators, and for many people, this demands a different set of abilities than those they now possess. The desire for online learning to satisfy the needs of Ghana's universities' expanding student population remains a worry despite the ongoing discussions and difficulties that higher education faces. Many Ghanaian stakeholders now have a keen interest in the country's level of science and technology. This study's goal was to look at how ICT was used in teaching and learning, with a particular emphasis on the College of Education in the Volta Region. The specific goals of the study were to find out how much ICT was used in teaching and learning in colleges of education in the Volta Region, to find out what factors affected ICT use in teaching and learning in colleges of education in the Volta Region, and to find out what stopped ICT from being used in those institutions. Two theories, notably the Social Constructivist Theory and the Diffusion of Innovation Theory, served as the foundation for the study. The paper employed a desk study review methodology to examine pertinent empirical literature and identify key themes. The results showed that ICT can be utilized as a tool to support transformative, learner-centered faculty development; nevertheless, researchers caution that this approach may be challenging because teachers must contend with both the new technology problems and the learner-centered paradigm. According to the study's findings, ICT can match the current educational system with the knowledge-based, information-rich society by giving it access to high-end tools, approaches, and methodologies. To use ICT in the process of teaching and learning, the study thus advises colleges in the Volta area to build strategies to identify strengths and weaknesses of various technology resources with the aim of adopting ICT in the process of teaching and learning.

**Keywords-** Integration of ICT, Teaching and learning, College of education, influencing factors, ICT integration barriers.

### I. INTRODUCTION

The emergence of information and communication technologies (ICT) has created immense opportunities and obstacles in our pursuit to satisfy the global demands of globalisation and economic development (UGWU & Nnaekwe, 2019). The provision of education to citizens is a requirement for economic

and social development, and globalisation and the transition to a knowledge-based economy require that existing educational institutions produce individuals who can convert information into knowledge and apply that knowledge in a dynamic, cross-cultural setting. According to Minamatov and Nasirdinova (2022), ICT is uniquely suited to resolving these difficulties (Ntanos et al., 2018). ICT presents social and economic

advancement with both challenges and opportunities (Ng et al., 2006). By far, the most important thing about ICT in education is that it can help with every part of teaching and learning.

ICT is frequently used in specific contexts, such as ICT in education, health care, libraries, sports, and commerce. ICTs are useful in many situations to speed up the growth of different facets of society; they have revolutionized how people learn, communicate, and conduct business (Wilson, Ayebi-Arthur & Tenkorang, 2011). ICTs undoubtedly have a big impact on the education industry, but it hasn't had as much of an impact as it has in other industries. Being a social activity, education has historically been linked to high levels of personal contact between effective teachers and their students (Ayensu, Acquah & Annan, 2021). Utilizing ICT tools and equipment as a media and approach for teaching and learning is the goal of ICT in education. This is since ICT is frequently cited as one of the key contemporary variables influencing society and the global economy. They have the power to alter how education is conducted, where and how learning occurs, and the roles that students and teachers play in the educational process (Ayensu *et al.* 2021).

According to Turgut and Aslan (2021), the ability of instructors to establish socially engaged classrooms, integrate technology effectively with a pedagogy, foster cooperative contact, collaborative learning, and group work will be crucial to the success of ICT integration into the learning environment. Students and student teachers frequently have more knowledge and experience with ICT than instructors and teacher educators, and for many people, this demands a different set of abilities than those they now possess (Arkorful, Barfi & Aboagye, 2021). To effectively integrate ICT, all nations regardless of economic standing must acknowledge the trend toward pervasive use of ICTs. This calls for learner-centered attitudes and values. This is why ICTs are frequently referred to as enablers (Turgut & Aslan, 2021). It also applies to the education sector. With the advent of technology, the emphasis in teaching is changing from teacher-centered and lecture-based training to student-centered and interactive learning settings as a result of new technologies. There is growing demand on educational systems all over the world to employ new information and communication technologies (ICTs) to teach students the knowledge and skills they will need in the twenty-first century (Fitri & Putro, 2021).

Digital technologies have spread rapidly in many parts of the world (Cenamor & Frishammar, 2021) and are affecting the way we learn, live and do business. Digital technology have frequently accelerated growth, increased opportunity, and enhanced service delivery. Their combined influence, nevertheless, has been insufficient and unevenly dispersed (Selwyn & Heffernan, 2021). Closing the remaining digital divide, particularly in internet access, is necessary for digital

technologies to benefit everyone and everywhere; otherwise, encouraging usage of digital technologies won't be sufficient. To fully benefit from the digital revolution, countries must also work on the analog complements, says Dai (2018). This includes strengthening regulations that promote business competition, adapting worker skill sets to the needs of the new economy, and ensuring institutions, particularly higher education institutions, are accountable.

Ferede, Elen, Van Petegem, Hunde and Goeman (2022) assert that the effectiveness, cost, equality, and sustainability of ICT use in education in the 21st century are the four fundamental challenges. They note that there has been an increase in interest in recent years about how ICT, particularly computers and the internet, might be most effectively used to enhance education at all levels and in both formal and informal settings (Ferede *et al.*, 2022). Schools today employ a wide range of ICT resources to communicate, produce, distribute, store, and manage information. (A'mar & Eleyan, 2022).

ICT has in some contexts also become crucial to the teaching-learning interaction through strategies like switching from chalkboards to interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the flipped classroom model, where students watch lectures at home on the computer and use class time for more interactive exercises. The use of ICT by teachers who are digitally literate and trained can help students develop higher order thinking skills, give them unique and creative ways to express what they have learned, and better prepare them to deal with ongoing technological change in society and the workplace (Claro et al. (2018).

The 21st century is frequently seen as a technological period (Simuforosa, 2013). Because it is seen as the foundation of economic growth, technology nowadays is seen as playing a significant part in our lives. According to Chakpitak et al. (2018), a technologically underdeveloped economy cannot advance in the current environment since technology has made work considerably simpler and less time-consuming. Every conceivable industry, including communication, business, education, manufacturing, and banking, is affected by technology. The way we live has undoubtedly altered as a result of technology; it has affected many aspects of existence and redefined living (A'mar & Eleyan, 2022). Technology unquestionably has a significant impact on all aspects of life. Technology allows for the automation of numerous manual chores. Modern technology also makes it easier and more efficient to complete many difficult and important tasks (A'mar & Eleyan, 2022). Living has changed, and for the better, as a result of the application of technology. Education has undergone a transformation thanks to technology. It is impossible to undervalue the role of technology in education. (Collins *et al.*, 2018).

In order to provide teaching and learning to students across the country and around the world, colleges and universities around the world have been picky in the ICT they would acquire and implement (TNagy, 2016). When considering whether to invest in ICT, colleges weigh factors such as costs and product delivery capabilities (Reid, 2019). Many colleges choose an ICT that will work well with their equipment and give teachers and students a pleasant experience in the classroom (Matusu, Vojtesek & Dulik, 2020). HLIs value comments on the efficiency and worth of its faculty, students, and administration of ICT adopted and implemented to deliver e-Learning education (Matarirano, Yeboah & Gqokonqana, 2021).

Utilizing ICT boosts performance, allows for visual observation, improves perception, and speeds up learning (Gui et al., 2018). Through creative labor, parents at home assist in preparing students. They also research fascinating subjects online. Lawrence and Tar (2018) claim that when ICT is used in the teaching process, teachers act as assistants and instruct students as they do their assignments. There is a chance for improved communication between instructors and students. Students can use the Internet to create presentations or other projects and to create quizzes for school. Email, Facebook, Sky Drive, GeoGebra, Geometric Scratch Pade, Mindomo, and other interactive games are available to them as means of communication. ICT use comes with benefits and drawbacks. ICT has been commended for making learning simpler and more engaging from an advantage perspective. Its drawbacks include the additional preparation needed.

Arkorful *et al.* (2021) believe that by using ICT, students are able to make content that builds upon and refers to sources that are more in-depth than those found in textbooks for the classroom. The internet helps teachers stay up to date on best practices and create lessons that provide pupils the chance to study more deeply. Students can produce a document, film, podcast, or presentation that indicates a stronger comprehension of their subject matter after receiving the right teaching (s). Students not only respond to questions that are asked of them; they also come up with their own inquiries based on the abundance of knowledge they have at their disposal. Students who follow links online get into the habit of checking facts and finding more information, much like students in prior generations who would chase down references.

Lopez, Arriaga, Álvarez, González, Elizondo-Leal, Valdez-García and Carrión (2021) opine that ICT may enhance, supplement, and better the educational process. As the leading United Nations organization for education, UNESCO directs global initiatives to assist nations in comprehending the part that such a technology may play in accelerating progress towards the Sustainable Development Goal 4 (SDG4), a goal encapsulated in the Qingdao Declaration (Wagner, 2018). UNESCO disseminates knowledge about the

many ways that technology can improve management and governance of the educational system, facilitate universal access to education, close learning gaps, assist in teachers' professional development, raise the standard and relevance of education, and foster inclusion (Lopez *et al.*, 2021).

The main obstacles to the successful deployment of new technologies in Nigeria have been identified as unequal access to technology, poor internet connectivity, energy-related issues, and a lack of competence and e-Learning (Fahm *et al.*, 2022). Similarly, Waweru and Kihara's (2013) study on the factors that challenge the adoption and utilization of ICT in public higher learning institutions in Kenya observes that the lack of ICT infrastructure due to lack of funds emerges as the main setback in the adoption of ICT in HLIs. Rytönen and Rasmussen (2013) report that Sokoine University of Agriculture, Tanzania, had no experience with e-Learning while the University of Nairobi, Kenya, and Makerere University, Uganda, had been working with e-Learning since 2005 and 1997, respectively.

Information and Communications Technology (ICT) is a critical part of Ghana's education reforms (Ministry of Education of Ghana, 2021). Ghana intends to guarantee that every teacher and student is ICT-literate so that technology may be used for efficient learning and management of education. For all new teachers who desire to work in elementary schools, the government of Ghana launched a new Bachelor of Education (B.Ed.) in Initial Teacher Education in 2018. (Appiah-Adjei, 2021). ICT is one of the cross-cutting concerns in this B.Ed. program, which means that it must be incorporated into all facets of teaching and learning. For instance, the administration of St. Monica's and Mampong Technical Colleges of Education, two Ghanaian colleges, boldly decided to incorporate ICT into teaching and learning after realizing the significance of ICT in the new B.Ed (Acheampong, Amoah & Britwum, 2021). The COVID-19 pandemic struck the world just as these colleges were raising funds to outfit their campuses with ICT tools to enhance teaching and learning, forcing the closure of all educational institutions in Ghana in March 2020. This meant that both colleges' ICT strategic goals needed to move forward urgently if they were to ensure that as many students as possible could complete their education online.

### **1.1. Statement of the Problem**

It is crucial that we change the way we teach today because technology has impacted almost every aspect of our lives. Additionally, because new learning theories have emerged, teachers are now expected to facilitate learning and make it meaningful for each student, rather than just imparting knowledge and skills (Agyei, 2021). The conventional teaching-learning paradigm has undergone a significant change as a result of ICT, an emergent technology. Incorporating ICT

technologies into teaching and learning has given instructors and student teachers more authority to provide a more effective and efficient education, which has severe consequences for the nature and purpose of educational institutions (Qaddumi, Bartram, & Qashmar, 2021). In terms of pedagogy, lesson preparation, online lesson integration, lesson assessment, research, and tutor professional development, using Google Suite and smart boards has improved teaching and learning. However, the integration of ICT in education is not as pronounced in colleges in Volta Region as other parts of Ghana.

The majority of ICT teachers are aware of the many ways in which students are processing and interpreting information. However, failing to acknowledge individual student variances during the teaching and learning process might result in subpar academic performance from pupils (Mensah, Poku, & Quashigah, 2022). Studies have revealed numerous crucial elements that contribute to pupils' appalling performance in math, science, and ICT (Arkorful *et al.*, 2021). According to the chief examiners report of the Institute of Education at the University of Cape Coast (UCC), Mathematics received the lowest scores in the first semester exams for the academic year 2013–2014. Low performance in these subjects has been attributed to a number of causes, including under-resourced scientific and computer laboratories, under-trained and unqualified science teachers, a lack of practical ICT textbooks, and ineffective teaching techniques. (Barfi, Bervell & Arkorful, 2021).

Despite the continuous debates and challenges that higher education is facing, the demand to meet the needs of the growing number of learners in the colleges of Ghana through online learning remains a matter of concern. The state of Science and Technology in Ghana is has become a matter of great interest to many stakeholders in the country (Arkorful *et al.*, 2021). The concern is brought on by the growing knowledge that science and digital technology serve as the backbone for Ghana and all other developing nations' agendas for socio-economic growth. To this purpose, numerous requests have been made for the redesign of technology education in general and ICT education in particular to fulfill acceptable norms (Sarpong *et al.*, 2021). As a result, the Ministry of Education and the Ghana Education Service have recently engaged in a lot of practical work to fulfill this national objective. But the fact that this desire exists indicates that there are issues with Ghana's technology education that warrant attention and change, especially in Volta Region. The current study thus sought to examine the integration of ICT into teaching and learning with focus on College of Education in the Volta Region.

### **1.2. Research Objective**

- i. To establish the level of ICT integration into teaching and learning in college of education in the Volta Region.
- ii. To examine the factors influencing ICT integration

into teaching and learning in college of education in the Volta Region.

- iii. To identify barriers to ICT integration into teaching and learning in college of education in the Volta Region.

### **1.3. Research Questions**

- i. What is the level of ICT integration into teaching and learning in college of education in the Volta Region?
- ii. Which factors influence ICT integration into teaching and learning in college of education in the Volta Region?
- iii. What are the barriers to ICT integration into teaching and learning in college of education in the Volta Region?

## **II. THEORETICAL LITERATURE**

The study was informed by two theories namely; Social constructivist theory and Diffusion of innovation theory.

### **2.1.1. Social Constructivist Theory**

Vygotsky created the social constructivism theory (1978). According to the theory, knowledge is created through interpersonal interaction and is socially placed. Vygotsky thinks that the community plays a crucial part in the process of creating meaning. His hypothesis emphasizes the essential significance of social interaction in the growth of cognition as a result (Vygotsky, 1978). In accordance with Vygotsky (1978), cognitive development first takes place on a social level before it may happen within an individual. Because of this, social constructivists contend that the sharing of individual viewpoints, also known as collaborative elaboration, leads to students jointly building an understanding that is not possible for them to build individually (Meter & Stevens, 2000). Understanding social experience is necessary to comprehend human thought and knowledge, and social contact is what gives the cognitive process its drive.

Social constructivist teaching, peer collaboration, cognitive apprenticeships, problem-based instruction, online quests, anchored instruction, and other strategies that include learning with others are prioritized in social constructivist teaching methodologies (Shunk, 2000). Social constructivist instructional strategies emphasize the value of cooperation between students and with professionals in the community (McMahon, 1997). Because of this, teachers are presented in the social constructivist method as facilitators rather than as didactic lecturers. (Bauersfeld, 1995).

According to social constructivism, learning is a social process that involves people interacting with one another (Pritchard & Woollard, 2010). To create a favorable environment for employing learning management systems in their educational process, this approach encourages students to participate in forums discussing specific instructional themes (Duki & Maari, 2012). The social constructivist approach states that it is

crucial for facilitators to give their students opportunities for online collaboration and conversation about a variety of academic subjects (Smith, 1999). According to Bognar, Gajger, and Ivi (2015), social constructivism has also been referred to as a stance, a theory, a theoretical orientation, and an approach. On its position, psychologists are still uncertain. However, this won't have an impact on the study's conclusions because the researcher will continue to adhere to the premise that it encourages students to collaborate as a team.

John Dewey (1859-1952) was the first to apply the idea of constructivist learning as he believed that teaching and learning are individual growth that comes through social experiences (Dewey, 1897). This idea was further expounded by Roblyer (2006) who said "learning occurs when one constructs both mechanisms for learning and his or her own unique version of the knowledge, coloured by background, experiences and aptitudes". This theory is relevant to this study in that, it helps the researcher to understand how collaboration in integrating ICT in learning and teaching in college education in Volta Region can enhance students' understanding of the use of ICT in learning.

### **2.1.2. Diffusion of Innovation Theory**

Rogers created the Diffusion of Innovation Theory (1962). It explains how new technologies are adopted and integrated as well as how, why, and how quickly new concepts and technologies proliferate. The diffusion of innovation theory is one of the earliest social science theories (Rogers, 1995). It was first used in communication to describe how a concept or product gradually gains traction before circulating or spreading among a specific population or social system. As a result of this distribution, individuals gradually adopt a new concept, style of conduct, or item as a component of a social system. When someone adopts, it denotes that they act differently from how they previously behaved (e.g., by buying or using a new product, learning to engage in a new behavior, etc.). The person's perception of the concept, action, or product as novel or inventive is essential for acceptance and integration; it also makes dissemination possible. The idea of diffusion of innovation seeks to clarify and detail the mechanisms by which new innovations, in this case, ICT is adopted and become successful in teaching and learning (Clark, 2012).

It may take a while for an innovation to be embraced, even if it is a good innovation (Mannan, 2013). In addition, he claims that opposition to change may slow down innovation's diffusion, even if it won't always result in innovation's cessation. Five crucial characteristics are listed by Rogers (1995) as having a significant impact on adoption rates. Relative advantage, compatibility, triability, and observability are a few of them. According to Rogers, the organization's perception of the relative advantage, compatibility, triability, observability, and complexity of new technologies will determine how quickly they are adopted and integrated.

As a result, a person's mood and perception influence their intention, which then defines their actual behavior (Fathema, Shannon & Ross, 2015). The degree to which teachers believe they have control over different technology platforms, such as ICT, is important. Their attitude and perceptions about behaviour influence their perceptions of whether it is difficult to engage in that behaviour and whether there are obstacles to overcome.

Based on these five characteristics, different innovations spread and get adopted at different rates: relative advantage, which measures how much a potential adopter believes an invention is better than what it replaces; compatibility the extent to which it is regarded as being consistent with pre-existing belief values and complexity the extent to which it is regarded as being difficult to comprehend; and trial ability, which describes how well the innovation performs under pressure (Rogers, 2003).

This theory was seen to be pertinent to the study because it explains how quickly universities in the Volta region are willing to adopt and use ICT into their instructional practices. In this situation, a college that is prepared to implement and promote the use of ICT in teaching and learning will have an advantage over rival institutions. This hypothesis was thought to be pertinent to the proposed study since it gives more insight on how technology is disseminated around the globe and the study focuses on integrating technology into learning. The diffusion of innovation theory has been chosen in this study to help to explain why and colleges in Volta region can adopt, integrate and use ICT to improve teaching and learning among college students.

### **2.2 Empirical Review**

Any device that can electronically store, retrieve, alter, transmit, or receive information in a digital form, such as personal computers, laptops, mobile phones, email, and robots, is considered to be an information and communication technology (ICT) product (Shoraevna et al., 2021). ICT, according to Okauru (2021), is the digital processing and use of information using electronic computers. It includes information storage, retrieval, conversion, and transmission. ICT integration, according to Pisapia (2015), is the process of introducing, reinforcing, enhancing, and extending capabilities. Earle (2002) compared ICT integration to the idea of wholeness, which occurs when all system components are interconnected to form a whole. For example, content and pedagogy which are very important elements of teaching and learning must be brought together when technology is used in a lesson. So, the more provision of ICT tool to the students by the teacher does not constitute ICT integration since pedagogical issues are not tackled.

Information and communication technology integration is defined as the use of ICT resources (such as the internet, e-learning technologies, and CD Roms)

to support teaching and learning (Offem & Anashie, 2021). Gilberts (2020) argues that ICTs can now serve as a justification and a tool for advancing both old and new educational aims that have eluded us for a long time. Technology will be more beneficial than harmful if sufficient resources, careful effort, and patience are invested. ICT may be a driving force for faculty development that is transformational and learning-focused. The increased technical obstacles and the learner-centered paradigm the teacher must contend with may make it challenging, but technology is frequently a way into a particular department to initiate a discourse about good teaching and learning practice.

The use of technology-supported collaborative inquiry practices assumes that the educational environment is designed as a cohesive whole that gives students useful technological tools, instructs them on how to collaborate effectively, and encourages epistemologically advanced and creative working with the material, according to Song and Cao (2021)'s study on improving teacher orchestration in students' seamless collaborative science inquiry using the m-Orchestrate App. Australian governments have undoubtedly accepted the task of modernizing schools to meet the demands of the digital age, according to Brandy and Kennedy (2013). The Queensland Government launched a three-year ICT for learning strategy in 2002 to describe its vision for integrating ICT into teaching and learning inside Queensland public schools. These initiatives are a part of the Queensland Government's (2022) policy, Education and training Reforms for the future.

In Tigania West Sub County, Meru County-Kenya public secondary schools, Gikundi (2016) examined the variables impacting the integration of information and communication technology in learning and teaching. All of the public secondary schools in Tigania West Sub County, Meru County, were the study's intended audience. It used a descriptive survey research methodology. 14,444 people were the study's target population, including 400 teachers, 44 head teachers, and 14,000 students. The study's conclusions showed that three elements access to ICT infrastructure, teacher proficiency, and technical support had a substantial impact on how ICT was integrated into teaching and learning in the sampled schools. The study came to the conclusion that teachers face difficulties in successfully integrating technology into lesson plans. Teachers' use of ICT in teaching and learning is influenced by their training, expertise, and skills in the field. Lack of ICT infrastructure, outdated or badly maintained hardware, a lack of appropriate instructional software, restricted access to ICT, and spotty or nonexistent internet connectivity were all identified to be obstacles to ICT integration.

Tay, Lim and Lim (2013) while assessing The sociocultural perspective on factors affecting the ICT integration and implementation of one-to-one computing learning environment in a primary school found that the

ICT department coordinated with various industry representatives and worked with the teachers to set up the necessary infrastructure (e.g., wireless network). Together with these representatives, the school's ICT team of teachers and technicians recommended a computer model with the required software, warranty and repairs, and insurance plan for the kids. A four-person technical team was also available to the school to help with setup, troubleshooting, and technical requirements. The degree to which ICT was used in classrooms was directly impacted by how well-maintained the computers and technological infrastructure were. The study came to the conclusion that a number of elements, including technical infrastructures and support, teachers' practices and beliefs, curriculum, school leadership, and professional development, had an impact on the one-to-one and ICT integration.

Boahen and Atuahene (2021) examined the effects of ICT integration in Kumasi High Schools, Ghana-Teachers' and Students' perspective. According to the study, information and communication technology (ICT) has a wide range of educational applications and is influencing education by altering the teaching and learning process. By incorporating ICT into their teaching and learning processes, schools are working to take use of its potential. The study's conclusions showed that while the majority of teachers had a strong desire to include ICT into teaching and learning, there were a number of issues and difficulties with doing so in schools. The study also identified internal hurdles linked to teacher cognition and external barriers related to teacher access to ICT, environmental supports, and ICT literacy. It is up to the teachers to decide whether and how to employ ICT once the external impediments have been identified. According to Boahen and Atuahene (2021), there are still not enough ICT resources available in schools for kids to use. Because there are so few working machines in the computer labs, accessibility is time-limited, which makes it difficult to integrate accessibility into the teaching and learning curricula. The study suggested additional research to evaluate the effects of comprehensive ICT integration in teaching and learning in schools.

Asana, Irabor, Seppo, Jean, Ngoma, Elzawawy, and Ngwa (2021) noted in their study on the use of ICT in education that while ICT is advancing in developed western nations, its use in education is still lagging in Africa and other developing nations. However, despite being in the early stages, a survey on ICT usage in South African schools found that the country had made substantial strides toward the integration of ICT in classrooms. In light of these findings, Ghana has made progress through the MoE in recognizing the role played by ICT in education, noting that a nation needs an ICT-literate workforce in the current globalized economy to increase its participation in the knowledge economy. Ghana is no different from the other African nations in

this regard. According to the Ministry of Education in Ghana, the study showed that integrating ICT into education was the obvious way to give countries the ICT skills they need for rapid and sustainable economic growth.

### III. RESEARCH METHODOLOGY

The study examined the integration of ICT into teaching and learning with focus on College of Education in the Volta Region. The paper employed a desk study review methodology to examine pertinent empirical literature and identify key themes. To elaborate on the integration, a very detailed assessment of the empirical literature was conducted of ICT into teaching and learning with focus on College of Education in the Volta Region.

### IV. RESULTS AND DISCUSSIONS

A number of studies were reviewed, and the findings were presented in this section. From the reviewed literature, it is evident that most studies have indicated that Information and communication technology (ICT) refers to any product, such as a personal computer, laptop, mobile phone, email client, or robot, that can store, retrieve, alter, transmit, or receive information electronically in a digital form. Most studies have related ICT integration with the idea of completeness, which is when all components of a system are connected to one another to form a whole. The review discovered that ICT can be utilized as a tool to assist transformative, learner-centered faculty development, but researchers warn that it could be difficult because the teacher must contend with the new technology obstacles in addition to the new learner-centered paradigm. However, using technology is frequently a way to enter a department and start a discussion about effective methods for teaching and learning (Offem & Anashie, 2021).

According to the majority of the papers in the reviewed literature, the ability of teachers to design learning in novel ways, integrate technology effectively with a pedagogy, create socially engaged classrooms, and promote cooperative interaction, collaborative learning, and group work are key factors in the successful integration of ICT into the learning environment. Students and student teachers frequently have more knowledge and experience with ICT than instructors and teacher educators, and for many people, this demands a different set of abilities than those they now possess (Arkorful, Barfi & Aboagye, 2021). The analysis has shown that, in order to properly integrate ICT, all nations regardless of economic standing must acknowledge the trend toward widespread usage of ICTs.

Furthermore, it is clear from the reviewed literature that some of the most frequent elements impacting the integration of ICT in teaching and learning

in schools include teacher competence, the availability of ICT infrastructure, and technical support. It has also been demonstrated that teachers face challenges when integrating technology into classroom activities, and that teachers' ICT training, knowledge, and skills have an impact on how they use technology to teach and learn. Lack of ICT infrastructure, outdated or badly maintained hardware, a lack of appropriate educational software, restricted access to ICT, and unpredictable internet connectivity were all identified to be barriers to ICT integration.

Even if there is a growing demand for accessibility and the use of ICT skills to prepare students for global transitions, effective integration into teaching and learning is still a mirage in Ghana. Despite the fact that ICT tools and apps that improve teaching and learning are becoming more accessible, this is still the case. For instance, in Ghana, almost 100% of people have access to mobile connectivity, and internet connectivity has improved as well, with around 70% of people having access. The main reasons for this are the 3G and 4G GSM technologies (NCA, 2018). The study discovered that institutional barriers such as inadequate facilities for full ICT integration and the exclusion of ICT programs from administrators' training on curriculum delivery are the most frequently encountered obstacles to the use of technology resources in school administration and management. The Ghana Education Service is looking for feedback from school administrators on the problems with ICT integration that have been identified in order to provide proper planning and prompt solutions for the successful implementation of ICTs in schools.

The study in addition established that ICT integration involves the process of integrating information communication technologies (ICTs) into the teaching and learning environment for the purposes of information gathering, recording, reserving, processing, researching, transferring, and receiving. New literacies on the internet and other ICTs are necessary to effectively use and adapt to the rapid changes in technology-led improvements around the world. Despite the fact that computers have always been a part of education, the internet has allowed ICT to undergo a phenomenal metamorphosis in terms of its processing, storage, and communication capacities, making it a pervasive tool for education. ICT integration in the classroom is credited with the rise in students' analytical and critical thinking abilities.

### V. CONCLUSIONS

The study draws the conclusion that ICT promotes the utilization of cutting-edge educational resources and the modernization of teaching techniques, fostering greater student participation and the concurrent acquisition of technological knowledge. ICTs also greatly aid in the development of discernment. Some of

the most significant abilities that students acquire as a result of using ICT include the ability to find and compare different sources of information as well as to organize information. Thanks to numerous digital tools, student collaboration is visibly strengthened. It is much simpler for them to develop team projects, cooperate, and learn from one another. ICT in education has a great deal of potential to benefit and assist those involved in the process and outcome of education in a variety of ways. According to the study's findings, ICT can match the current educational system with the knowledge-based, information-rich society by giving it access to high-end tools, techniques, and approaches.

Additionally, the usage of ICT causes a paradigm shift in the conventional beliefs and approaches to the teaching and learning process in Ghanaian colleges. According to the study's findings, some of the common advantages of ICT in education include: shifting from teacher-centered instruction to learner-centered instruction, which helps students become independent and self-directed in the acquisition and application of knowledge and skills; putting the emphasis on learning rather than teaching, which makes the learning environment for teachers and students more dynamic and engaging; and empowering students to take more responsibility for their education as they seek out independent learning opportunities, transforms instructors' roles from merely knowledge transmitters to learning facilitators, knowledge navigators, and active co-learners with students. They become aware of their educational potential as a result.

Finally, the study concludes that the major challenges facing successful ICT implementation by colleges in Ghana includes ICT system quality, ICT use policy, and management support are all lacking, as is sufficient ICT infrastructure, ICT usage skills, and ICT usage training. According to the findings, the problems with ICT integration in college education in the Volta region can be divided into the following categories: system-related; IT infrastructure; skills/training; technical support; leadership and management support; policy issues; personal issues; e-content and e-curriculum; and finally, time constraints.

## RECOMMENDATIONS

Based on the outcomes of the reviewed papers, the study recommends to the management of the colleges to work toward setting up funds targeted toward offering fundamental training in the use of ICT for the students and lecturers. Based on the results and recommendations, it is sufficient to advise the management of colleges in the Volta Region to concentrate their participation in workshops intended to support the development of fundamental technical and pedagogical skills for using ICT in elementary-level courses. This study also suggests that college professors and instructors in the Volta region should devote the

majority of their efforts and attention on cultivating the fundamental abilities needed to employ ICT basic functionalities.

This study father recommends that in a view to incorporating ICT into the teaching and learning process, colleges in the Volta region should establish techniques to determine the strengths and weaknesses of various technology resources. The Volta region's colleges should also seek out partners, well-wishers, stakeholders, and sponsors to help fund the purchase of more ICT infrastructure because doing so will guarantee that the colleges' computers are adequate and will improve how well they are used during the teaching and learning process.

Colleges ought to lighten instructors' workloads so they have more time to study ICT and incorporate it into the teaching and learning process. The workload for instructors would be greatly reduced by the usage of ICT in the teaching and learning process. The administrations of colleges in the area also need to offer frequent trainings and seminars on how to integrate ICT into the teaching and learning process, and tutors need to go through required ongoing refresher training. The report also suggests that institutions in the Volta Region create guidelines for the systematic integration of ICT into the teaching and learning process. Adopting appraisal procedures that reward teachers who try to incorporate ICT into the teaching and learning process is one of the policies that can be implemented. Another is defining ICT competency standards for teacher trainers.

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