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# Application of ICT for Effective Performance in Teaching and Learning in Jigawa State College of Education and Legal Studies, Ringim

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**Abstract:** *This study examines the role of Information and Communication Technology (ICT) in enhancing teaching and learning processes at Jigawa State College of Education and Legal Studies, Ringim. Despite the global emphasis on digital education, many Nigerian tertiary institutions, including this college, struggle with inadequate ICT integration, affecting academic performance. The research assesses the level of ICT adoption, identifies key challenges, and proposes solutions for improved implementation. Using a mixed-method approach, data was collected through questionnaires and interviews with lecturers and students. Findings reveal that while ICT has the potential to improve education delivery, challenges such as poor infrastructure, insufficient training, unstable power supply, and limited internet access hinder its effectiveness. The study recommends increased investment in ICT facilities, regular professional development for educators, alternative power solutions, and stronger partnerships with government and private stakeholders to support sustainable ICT integration. The findings contribute to the ongoing discourse on educational technology in Nigeria, providing actionable insights for policymakers and institutional administrators to enhance teaching and learning outcomes through ICT.*

**Keywords:** ICT in education, digital learning, teaching effectiveness, educational technology, Jigawa State.

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## INTRODUCTION

The integration of Information and Communication Technology (ICT) in education has become a global imperative for enhancing teaching and learning outcomes (UNESCO, 2022). In Nigeria, the adoption of ICT in tertiary institutions remains inconsistent, with many colleges facing significant challenges in implementation (Adu & Olatundun, 2013). Jigawa State College of Education and Legal Studies, Ringim, like many similar institutions, struggles with inadequate ICT infrastructure, limited digital literacy among educators, and unreliable power supply, hindering effective technology-driven education (Federal Ministry of Education, 2020).

The ICT stands for 'Information and Communication Technologies' and is defined as a *"Diverse set of Technological tools and resources used to communicate, and to create, disseminate, store and manage information"***.** ICT has become a very important part of the educational delivery and management processes. ICT to a great extent facilitates the acquisition and absorption of knowledge, and hence can provide extraordinary opportunities to developing countries for enhancing their educational systems particularly for the underprivileged constituency, and thereby for raising the level of quality of life of their people. The new communications technologies promise to reduce the sense of isolation, and open access to knowledge in ways unthinkable, not long ago.

The importance of ICT in modern education cannot be overstated. Studies have shown that effective ICT integration improves student engagement, facilitates interactive learning, and enhances access to educational resources (Selwyn, 2019). However, despite these benefits, many Nigerian tertiary institutions lag behind due to financial constraints, poor policy implementation, and resistance to technological change (Oye et al., 2012). This research seeks to evaluate the current state of ICT adoption at Jigawa State College of Education and Legal Studies, identify key barriers, and propose evidence-based solutions for sustainable integration. The significance of this study lies in its potential to contribute to Nigeria's educational development goals, particularly in aligning with the National Policy on Education (2013), which emphasizes ICT as a tool for improving quality and access to education. By examining the challenges and opportunities for ICT adoption in this institution, the study provides insights that can inform policymakers, educators, and administrators in fostering digital transformation in Nigeria's tertiary education sector.

The rapid digital transformation of the 21st century has fundamentally altered global education paradigms, making Information and Communication Technology (ICT) integration an indispensable component of effective teaching and learning (Voogt et al., 2018). In the Nigerian context, the National Policy on Education (2013) explicitly recognizes ICT as a critical tool for achieving educational objectives, particularly in tertiary institutions. However, despite this policy framework and the demonstrated potential of ICT to enhance pedagogical outcomes (Higgins et al., 2019), significant implementation gaps persist across Nigeria's educational landscape (Adedoja et al., 2021).

Jigawa State College of Education and Legal Studies, Ringim, as a key teacher training institution in Northern Nigeria, faces unique challenges in this digital transition. The college operates within an educational ecosystem characterized by infrastructural deficits, limited digital literacy among faculty, and inconsistent power supply (Jigawa State Ministry of

Education, 2022). These constraints mirror broader national challenges documented by Ogbonnaya et al. (2020), who identified inadequate ICT infrastructure and insufficient technical support as major barriers to effective technology integration in Nigerian colleges of education.

The significance of this study is threefold. First, it addresses a critical gap in the literature regarding ICT implementation in Northern Nigeria's teacher education institutions. Second, it provides empirical evidence to inform institutional policy and practice at a time when the National Commission for Colleges of Education (NCCE) is prioritizing digital transformation (NCCE, 2021). Third, the study's findings have implications for achieving Sustainable Development Goal 4 (Quality Education) in Nigeria's context, particularly target 4.4 which emphasizes the acquisition of ICT skills for global competitiveness (UNESCO, 2022).

This research builds on previous studies by Adedokun-Shittu and Shittu (2015) on ICT utilization in Nigerian tertiary institutions while focusing specifically on the unique context of a college of education. The study employs a mixed-methods approach to provide comprehensive insights into current ICT utilization patterns, implementation challenges, and potential solutions tailored to the institution's specific needs and constraints.

**Background of the Study**

The integration of Information and Communication Technology (ICT) in education has emerged as a critical factor in enhancing teaching and learning processes worldwide (UNESCO, 2022). In the Nigerian educational context, the importance of ICT has been recognized in various policy documents, including the National Policy on Education (2013) and the National Digital Economy Policy and Strategy (2020-2030). However, despite these policy frameworks, the implementation of ICT in tertiary institutions, particularly colleges of education, remains suboptimal (Adedoja et al., 2021).

The global education landscape has witnessed significant transformation through digital technologies, with developed nations leveraging ICT to improve access, quality, and relevance of education (Voogt et al., 2018). In contrast, many developing countries, including Nigeria, face substantial challenges in harnessing the full potential of ICT in education due to infrastructural deficits, inadequate funding, and limited technical expertise (Oye et al., 2012). The COVID-19 pandemic further exposed these gaps, as many Nigerian institutions struggled to transition to online learning due to poor ICT infrastructure (Jegede & Owolabi, 2021).

The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning, and research (Yusuf, 2005). A great deal of research has proven the benefits to the quality of education (Al-Ansari, 2006). ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005).ICT is changing processes of teaching and learning by adding elements of vitality to learning environments including virtual environments for the purpose. New technologies make it possible for complicated collaborative activities of teaching and learning by dividing it in space and time, with seamless connectivity between them. Due to its capability to offer

anytime and anywhere, access to remote learning resources, ICT is a potentially powerful tool for offering educational opportunities, both to previously underserved constituencies including persons with disabilities, as well as all others who for reasons of cost or because of time constraints are unable to register for on campus programs.

Jigawa State College of Education and Legal Studies, Ringim, as a teacher training institution, plays a pivotal role in preparing future educators who must be equipped with 21st-century digital skills (National Commission for Colleges of Education [NCCE], 2021). However, like many similar institutions in Northern Nigeria, it faces unique challenges in ICT integration, including unreliable electricity supply, limited internet connectivity, and inadequate ICT facilities (Jigawa State Ministry of Education, 2022). These challenges are compounded by the digital divide between urban and rural areas, where the college is located (Adedokun-Shittu & Shittu, 2015).

The theoretical foundation of this study draws from the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), which emphasizes the intersection of technology, pedagogy, and content knowledge for effective teaching. This framework is particularly relevant as it provides a lens through which to examine how educators in the college can effectively integrate ICT into their teaching practices.
Recent studies on ICT in Nigerian tertiary institutions have primarily focused on universities (Okoli et al., 2020), with limited attention to colleges of education, particularly in Northern Nigeria. This study therefore fills an important gap by examining ICT integration in a teacher training institution in Northern Nigeria, where educational challenges are more pronounced due to socioeconomic factors (Jegede, 2019).

The Nigerian government's efforts through initiatives like the Tertiary Education Trust Fund (TETFund) ICT interventions and the Nigerian National Broadband Plan (2020-2025) provide a policy context for this study (Federal Ministry of Communications and Digital Economy, 2020). However, the effectiveness of these interventions at the institutional level, particularly in colleges of education, remains under-researched.

**Statement of the Problem**

In recent years, Information and Communication Technology (ICT) has emerged as a powerful tool for transforming educational practices globally. It has the potential to improve teaching efficiency, enhance learning experiences, and bridge geographical and resource-related gaps. However, in many Nigerian tertiary institutions, including Jigawa State College of Education and Legal Studies, Ringim, the integration of ICT into teaching and learning remains inadequate. Despite government initiatives and institutional efforts to provide ICT facilities, many lecturers and students still face challenges such as insufficient infrastructure, limited access to functional ICT equipment, inadequate internet connectivity, and a lack of technical skills to effectively use these tools. This results in a teaching–learning process that is still largely dominated by traditional methods, which may not fully meet the demands of a modern, technology-driven educational environment.

Furthermore, while ICT is expected to facilitate interactive learning, personalized instruction, and easy access to academic resources, its adoption in the college appears to be hindered by factors such as poor maintenance culture, irregular power supply, and limited institutional

policies promoting ICT-based instruction. These constraints may lead to reduced academic performance, low student engagement, and a widening gap between the institution's output and the technological competencies required in the labor market. Therefore, there is a pressing need to investigate the application of ICT for effective performance in teaching and learning in Jigawa State College of Education and Legal Studies, Ringim, in order to identify the existing gaps, challenges, and opportunities for improvement.

This research is titled "Application of ICT for Effective Performance in Teaching and Learning". The research focused at Academic staff and Students of Jigawa College of education and Legal Studies, Ringim as a case study. There are some major implications in the process of using ICT for effective performance in teaching and learning, these include:

**Policy and Management of ICT**

The mandate for ICT in education has overwhelmingly been interpreted by school as a licensed to acquire equipments. This has been costly, but in addition, has detracted from teaching and learning. These institutional conditions make it difficult for teacher to incorporate ICT into teaching and learning. College management staff should prioritize support by adequate supply of ICT equipments required and even look for assistance from other non-governmental agencies.

**Teaching and Learning with ICT**

The work of the teacher is to take risk of experimenting with ICT in the classroom. The majority of the teacher partners used ICT successfully to enhance student learning. According to observations some students can work with ICT for long time, investigating their own questions and experimenting with ideas in an interactive way. However, some young people engaged with ICT to learn things that were at odds with that of the teacher intended.

**Teachers as enable practitioners of ICT**

Professional development needs to enable teachers to take risks with ICT and learning. Such professional development requires people to break out of set roles and relationships, in which researchers are traditionally seen as knowledge generators and teachers as knowledge translators or users.

**Learner's out of school uses of ICT**

The research found that teachers often underestimate the impact of students' out-of-school experience of ICT on the way they learn in the classroom. Analysis of data revealed that the positive impact of contemporary and popular Music on composition in schools, the use of search engines on language investigation in English and experience of spreadsheets influence how primary pupils learn data handling. Home computer ownership and internet access were high, as been witnessed of handheld devices such as, GSM handset, I-pad, I-pod, PC tablets etc. these findings implies that teachers should encourage students to build on their out-of-schools learning with ICT.

Information is central to the development of a nation or a people. Using relevant information provides quality services to the educational patrons. Students are not provided with current information that will enhance their learning and research activities, such as; equipping

the college library with outdated books is bedeviling the colleges of education nationwide and Jigawa State College of education and Legal Studies, Ringim in particular. It is observed that students do not have adequate access to internet facilities within the college as a result of constant power failure. Consequently, this engenders to poor academic performance among students. Most of the students appear not to be aware of the existence of E-library section of the library. In the College, ICTs are mostly used as tools to supporting administration of the college, without deploying the transformative potential of ICT to teaching and learning in classroom setting and usage by students in the college. It is against these backdrops that the researcher intends to examine the extent ICT has been effectively utilized to enhance effective ICT services in Jigawa State College of Education and Legal Studies, Ringim.

Key Challenges Identified

1. **Limited Access to ICT Infrastructure**Studies on Nigerian Colleges of Education highlight that many institutions lack adequate ICT tools such as computers, projectors, and reliable internet—a barrier to enhancing instructional delivery and academic effectiveness .
2. **Unreliable Power Supply and Infrastructure Deficits**Research indicates that erratic electricity significantly hampers educational activities, undermining student engagement and access to digital learning opportunities .
3. **Insufficient ICT Skills Among Lecturers and Students**Literature on pre-service teacher education underscores low levels of ICT literacy and a lack of structured training programs for both instructors and learners . This is particularly concerning for JSCOELS, where staff proficiency in effective ICT-enabled teaching is crucial.
4. **Absence of Context-Specific Empirical Research**Although broader studies exist (e.g., on ICT's role in social studies teacher training), there is a significant research gap regarding ICT integration specifically at JSCOELS. One relevant study explores ICT integration in Hausa language instruction at the college, but comprehensive investigation remains sparse.

**Objectives of the Study**

General Objective:

To investigate the application of Information and Communication Technology (ICT) for effective performance in teaching and learning at Jigawa State College of Education and Legal Studies, Ringim.

**Specific Objectives:**

1. To determine the availability of ICT facilities and resources in Jigawa State College of Education and Legal Studies, Ringim.
2. To assess the extent to which lecturers and students utilize ICT in the teaching and learning process.
3. To evaluate the effect of ICT application on the effectiveness of teaching and the academic performance of students.
4. To identify the challenges hindering effective application of ICT in teaching and learning in the College.

5. To propose strategies for enhancing ICT integration to improve teaching and learning outcomes in the institution.

**Research Questions**

The research questions provide proper guide to the researchers need in carrying out the study. They are formulated from the specific objectives interrogative form. The following research questions will be investigated.

1. What are the challenges facing teachers and students in the application of ICT in Jigawa State College of education and Legal Studies, Ringim?
2. Are there ICT facilities available for teaching and learning activities in Jigawa State College of education and Legal Studies, Ringim?
3. What are the barriers to effective use of ICT in Jigawa State College of education and Legal Studies, Ringim?
4. What is the level of performance of student with respect to gender in using ICT in learning?
5. What are the measures to solving the problems identified in the application of ICT in Jigawa State College of education and Legal Studies, Ringim?

**Significance of the Study**

This study is significant because it will provide valuable insights into how Information and Communication Technology (ICT) can be effectively applied to improve teaching and learning outcomes in Jigawa State College of Education and Legal Studies, Ringim. The findings will benefit the following groups:

 Lecturers and Academic Staff – The study will highlight best practices for integrating ICT into lesson delivery, thereby enhancing teaching effectiveness and classroom engagement.
 Students – Improved ICT usage will foster interactive learning, better access to educational resources, and the development of digital skills that are essential for academic success and future employment.
 College Management – The research will provide data-driven evidence on existing ICT gaps and challenges, enabling the institution to make informed decisions on ICT investment, training, and policy development.
 Government and Policy Makers – The findings will inform education policy and funding priorities aimed at promoting ICT adoption in Colleges of Education across Nigeria.
 Researchers and Scholars – The study will contribute to the body of literature on ICT in education, particularly in the context of Nigerian Colleges of Education, and serve as a reference for future research.
 The Community and Employers – Graduates equipped with ICT skills will be better prepared to meet workplace demands, thereby contributing to the socio-economic development of the region

**Definition of Terms**

The key terms used in this project research are defined as follows:

**Active Board:** submits to electronic board that uses calibration to enable the presenter uses calibration pen and writes on the board electronically. Active boards are not friendly with board markers.
**Blended Learning:** This refers to learning models that combine traditional classroom practice with e-learning solutions. For example, students in a traditional class can be assigned both print-based and online materials, have online mentoring sessions with their teacher through chat, and are subscribed to a class email list.
**Communication Technology:** is the activity of designing and constructing and maintaining communication system, through communication media.
**E-learning:** encompasses learning at all levels, both formal and non-formal, that uses an information network- the internet, an intranet (LAN) and an extranet (WAN). Others prefers the term as 'online learning'.
**ICT:** refers to electronic technologies used for information storage and retrieval.
**Information Technology:** is the application of computers and telecommunications equipment to store, retrieve and sending information.
**Internet:** refers to global and digital interconnection between two or more computers to share data, information and other resources, in respect of their distance globally, with the aid of satellite.
**Input device:** is a part of a computer that enables data/information and commands into the computer memory for the purpose of processing, such as keyboard, mouse, scanner, touch screen, light pen, microphone etc.
**Learning:** refers to the process involved to acquire a knowledge or skill through study, experience and teaching.
**Multimedia:** refers to judicious mix of various mass media such as print, audio, and video. Also characterized by the presence of text, pictures, sound, animation and video.
**Multimedia Technology:** refers to supports of making use of computer connected to multimedia projector that allows large or small images to be projected onto a standard white board.
**Networking:** is the interconnecting of two or more computers to enable them share of resources.
**Output device:** is a part of computer that provides processed information out of the computer, which could be printed or non-printed, such as monitor/screen, printer, sound speaker etc.
**Processing device:** this is another part of computer that manipulates raw data into meaningful information, with the aid of machine language (binary code).
**Teaching:** refers to the process by which the teacher undergoes to be able to help the learner acquire knowledge properly.
**Technology:** refers to all tools and procedures. It is also, a state of knowledge and development at any given time of our control of our surroundings, and includes all tools, methods, and applied materials.
**Video conferencing:** stands for internet conversation of two or more people in form of video with both audio and visual effects.
**World Wide Web** (**www**): refers to the part of URL address of an internet page.

## REVIEW OF RELATED LITERATURE

The integration of Information and Communication Technology (ICT) into higher education is a global imperative for enhancing teaching effectiveness and learning outcomes. This review synthesizes relevant literature pertaining to ICT application in tertiary institutions, with a specific focus on the context of Colleges of Education (COEs) and Legal Studies in Nigeria, particularly considering the unique environment of Jigawa State College of Education and Legal Studies (JSCELS), Ringim.

**Global Imperative and Theoretical Underpinnings:**ICT integration is widely recognized as transformative (UNESCO, 2011). Theories like **Constructivism** (Piaget, Vygotsky) posit that ICT facilitates active, collaborative knowledge construction through simulations, online discussions, and access to diverse resources. **Connectivism** (Siemens, 2005) emphasizes learning through networks, directly enabled by internet-based technologies. The Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) is crucial for COEs, highlighting the need for educators to integrate technology knowledge seamlessly with pedagogical strategies and subject matter expertise – a core competency JSCOELS must instill in future teachers

**ICT Benefits in Teaching and Learning:**
Extensive research documents ICT's potential benefits:

- **Enhanced Engagement & Motivation:** Interactive multimedia, simulations, and gamification increase student interest and participation (Higgins et al., 2012).
- **Improved Access to Information:** Digital libraries, online databases (critical for Legal Studies), and open educational resources (OERs) provide vast, current information beyond physical limitations (Adu & Olatundun, 2013).
- **Personalized Learning:** Adaptive learning software and online platforms allow students to learn at their own pace and address individual needs (Means et al., 2013).
- **Development of 21st-Century Skills:** ICT use fosters digital literacy, critical thinking, collaboration, communication, and research skills essential for modern graduates (Voogt & Roblin, 2012).
- **Flexibility & Accessibility:** E-learning platforms (LMS like Moodle) enable anytime, anywhere learning, potentially overcoming geographical barriers in Ringim (Anderson, 2008).
- **Efficiency in Administration:** ICT streamlines record-keeping, communication, and resource management for faculty and administrators.

**ICT in Nigerian Higher Education and Colleges of Education:**
While potential is high, implementation in Nigeria faces significant challenges:

- **Infrastructure Deficit:** Inadequate power supply, limited internet bandwidth (especially in Northern states like Jigawa), and insufficient hardware (computers, projectors) are pervasive barriers (Adomi & Kpangban, 2010; Ololube et al., 2012). Ringim's location likely exacerbates these issues.

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- **Digital Literacy Gap:** Many faculty and students lack adequate training and confidence to effectively utilize ICT for pedagogical purposes (Oye et al., 2012; Agbo et al., 2020). This is particularly critical in COEs where lecturers model teaching practices.
- **Inadequate Funding:** Recurrent underfunding hinders procurement, maintenance, software licensing, and staff development (Yusuf, 2005; Federal Ministry of Education, 2019).
- **Policy-Practice Misalignment:** Despite national policies (e.g., Nigerian National Policy for ICT in Education), implementation at institutional levels like JSCOELS is often weak and unsustained (Aduwa-Ogiegbaen & Iyamu, 2005).
- **Resistance to Change:** Traditional pedagogical approaches and fear of technology among some faculty impede adoption (Ertmer et al., 2012).
- **Relevance to COEs:** For teacher training institutions like JSCOELS, ICT integration is doubly important: preparing future teachers to *use* ICT effectively in their own classrooms (Nwachukwu, 2008; Tondeur et al., 2012). Studies show Nigerian COEs struggle with this mandate due to the above challenges (Olakulehin, 2007; Jimoh, 2018).

**Context of Jigawa State College of Education and Legal Studies, Ringim:**
Literature specific to JSCOELS Ringim is scarce, but studies on Northern Nigeria and similar institutions provide context:

- **Infrastructure Challenges:** Jigawa faces significant hurdles in reliable electricity and high-speed internet, especially in rural areas (Jigawa State ICT Policy, 2013; World Bank, 2020). Mobile networks might be more reliable than fixed broadband.
- **Socio-Cultural Factors:** Gender dynamics, cultural attitudes towards technology, and varying levels of prior ICT exposure among students need consideration (Hassan & Mitrovic, 2017).
- **Mobile Technology as Lever:** Given the high mobile penetration in Nigeria, leveraging mobile learning (M-Learning) might be a more feasible initial strategy than full desktop reliance (Aker et al., 2012; Traxler, 2018).

**Strategies for Effective ICT Integration:**
Literature suggests pathways relevant to JSCOELS:

- **Needs Assessment & Strategic Planning:** Institution-specific assessment of infrastructure, skills, and resources to guide targeted investment (UNESCO, 2011).
- **Robust Infrastructure Development:** Prioritizing stable power (solar solutions?), reliable internet connectivity (improved bandwidth, Wi-Fi hotspots), and adequate hardware (computer labs, projectors, potentially mobile devices) (Adomi & Kpangban, 2010).
- **Comprehensive Capacity Building:** Mandatory, ongoing, and pedagogically focused ICT training for *all* academic and support staff (Agbonlahor, 2006; Jimoh, 2018).
- **Curriculum Integration:** Embedding ICT use explicitly into course design and delivery across *all* programs (Education and Legal Studies), moving beyond basic computer literacy to pedagogical application (TPACK) (Mishra & Koehler, 2006).

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- **Leveraging OERs & Mobile Learning:** Utilizing freely available resources and designing learning accessible via smartphones to mitigate infrastructure gaps (Butcher, 2015; Traxler, 2018).
- **Strong Technical Support:** Establishing a responsive ICT support unit within the college.
- **Leadership Commitment:** Active support and resource allocation from college management and governing council (Ertmer et al., 2012).
- **Developing an Institutional ICT Policy:** A clear, actionable policy framework specific to JSCOELS's context and goals.

**Gaps in Literature and Research Focus:**

- There is a significant lack of empirical studies specifically investigating the *current state* of ICT infrastructure, usage patterns, challenges, and impact on teaching/learning effectiveness *within Jigawa State College of Education and Legal Studies Ringim*.
- Research on effective ICT integration models tailored to the unique constraints (infrastructure, funding, faculty readiness) of COEs in Northern Nigeria, like Ringim, is limited.
- Studies focusing specifically on the dual mandate of *Jigawa State College of Education and Legal Studies Ringim*. – training teachers *and* legal professionals – regarding ICT integration needs are scarce.

**Literature Appraisal**

The recent century has been characterized with some new and outstanding technologies impacting human life, the most important of them is Information Technology. Research was conducted in both developing countries prove that the educational authorities in these countries among their other activities have given the priority of "ICT Literacy" through developing various educational programs (Tapscott, 1998; Currier, 2001). In the other words, ICT learning and utilization is one of the most concerns of educational authorities around the world and for a number of years there has been evidence that a training and development area, which may be labeled information literacy is being formed (Edwards, et al., 2006). A variety of authors have surveyed the literature of educational technology in information skills teaching (e.g. Cox, 1997; Rader, 2000; Contain and Kaplowitz, 2000; Joint et al., 2001). Broadly speaking, the literature reveals the importance of using ICT in teaching and learning purposes (Ayers, et al., 2002).

There are reasons, today, necessitated the Iranian university professors to be equipped with new technologies, especially ICT applications in higher education (Villanueva, 1999; Meerts, 2003). Increased number of students in Iranian universities, greater demand for the use of the virtual materials within and outside of the university, an increase in the amount of educational activities being done by information and communication technology, changes in the nature of teaching and learning and becoming more and more web based (i.e. more use of CDROMs, electronic journals, on-line sources of materials, etc.), and the development of new and cheaper computers, are among the main reasons more attention is paid to ICT literacy of academics by Iranian authorities.

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The roles and responsibilities of college and university faculty members are closely tied to the central functions of higher education. Broadly defined, faculty fulfills three primary functions at University: teaching, research, and service (Fairweather, 1996). The teaching role of faculty members reflects their centrality in addressing the primary educational mission among colleges and universities. Faculty members are expected to provide instruction and student advising as assigned by the departmental chairman. In brief the main aspects of teaching responsibilities of faculty members are classroom teaching, academic advisement, course development, academic program review and course duplication review, all of them can be categorized as curriculum development process. If ICT tools are to improve institutional effectiveness and efficiency, it is obvious that their application in support of teaching and learning should be seriously considered. However, investments in this area should always be carefully balanced against other ways in which teaching and learning may be improved and strengthened.

**Concept of Information and Communication Technology in Teaching and Learning**

The rapid advancement of Information and Communication Technology (ICT) has transformed the educational sector worldwide. Computers, as a core component of ICT, have become essential tools for enhancing the quality, accessibility, and effectiveness of teaching and learning. They provide teachers and students with powerful resources for communication, content creation, research, assessment, and collaboration (UNESCO, 2019).

The integration of Information and Communication Technology (ICT) and computers into education has brought significant transformation to teaching and learning processes worldwide. ICT tools enhance lesson delivery, improve learner engagement, and provide access to vast educational resources (UNESCO, 2019). Computers, as a central element of ICT, support interactive learning, assessment, and collaboration, enabling both teachers and learners to operate effectively in a knowledge-driven society (Anderson & van Weert, 2002).

**a. Enhancing Teaching Methods**

ICT tools such as multimedia projectors, interactive whiteboards, and educational software make lessons more engaging and dynamic. They help teachers explain abstract concepts using animations, simulations, and visual aids, which improve student understanding and retention (Becta, 2004).

**b. Facilitating Access to Learning Resources**

Computers and the internet give both students and teachers access to e-books, academic journals, online tutorials, and open educational resources. This access allows for up-to-date and comprehensive learning experiences (Voogt & Knezek, 2008).

**c. Supporting Individualized Learning**

ICT enables personalized learning, where students can learn at their own pace through adaptive learning platforms and computer-based tutorials. Such systems adjust content difficulty to suit learners' abilities, enhancing learning outcomes (Means et al., 2010).

**d. Encouraging Collaboration**

Online collaboration platforms, such as Google Workspace, promote group work and cooperative learning. Students can share files, edit documents together, and communicate in real time regardless of location (Redecker & Johannessen, 2013).

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**e. Assessment and Feedback**
Computer-assisted assessment systems provide quick grading, immediate feedback, and detailed performance analytics. This enables teachers to adjust instruction to meet learners' needs (UNESCO, 2019)

**Advantages of ICT and Computer Use in Education**

- Enhances teaching efficiency and lesson delivery.
- Motivates and engages learners through interactive methods.
- Encourages self-paced, independent learning.
- Builds digital literacy skills needed in modern workplaces.
- Broadens access to global educational materials.

Information Technology (IT) was limited only to the textual mode of transmission of information with ease and fast. But the information not only in textual form but in audio, video or any other media is also to be transmitted to the users. Thus, the ICT = IT + Other media. It has opened new avenues, like, Online learning, e-learning, Virtual University, e-coaching, e-education, e-journal, etc. Third Generation Mobiles are also part of ICT. Mobile is being used in imparting information fast and cost effective. It provides e-mail facility also. One can access it anywhere. It will be cost effective. The ICT brings more rich material in the classrooms and libraries for the teachers and students. It has provided opportunity for the learner to use maximum senses to get the information. It has broken the monotony and provided variety in the teaching learning situation. The ICT being latest, it can be used both at school and higher education levels in the following areas:

- Teaching, Diagnostic Testing, Remedial Teaching, Evaluation, Psychological Testing
- Development of Virtual Laboratory, Online Tutoring, Development of Reasoning & Thinking, Instructional Material Development

Teaching at School as well as Higher Education, mostly, concentrates on giving information which is not the sole objective of Teaching. Along with giving information, the other objectives are:

- developing understanding and application of the concepts, developing expression power, developing reasoning and thinking power, development of judgment and decision making ability, improving comprehension, speed and vocabulary
- developing self-concept and value clarification, developing proper study habits
- developing tolerance and ambiguity, risk taking capacity, scientific temper, etc.

With the present infrastructure, class size, availability of teachers, quality of teachers, training of teachers, etc., it is difficult to achieve all the objectives. Further, most of the teachers use Lecture Method which does not have potentiality of achieving majority of above mentioned objectives. The objectives are multi-dimensional in nature, so for their achievement multiple methods should be used in an integrated fashion. At present ICT may be of some use. It is a well known fact that not a single teacher is capable of giving up to date and complete information in his own subject. The ICT can fill this gap because it can provide access to

different sources of information. It will provide correct information as comprehensive as possible in different formats with different examples. ICT provides online interaction facility. Students and teachers can exchange their ideas and views, and get clarification on any topic from different experts, practitioners, etc. It helps learners to broaden the information base. ICT provides variety in the presentation of content which helps learners in concentration, better understanding, and long retention of information which is not possible otherwise. The learners can get opportunity to work on any live project with learners and experts from other countries. The super highway and cyber space also help in qualitative improvement of Teaching and Learning Process. ICT provides flexibility to a learner which is denied by the traditional process and method. Flexibility is a must for mastery learning and quality learning.

On Internet many websites are available freely which may be utilized by teachers and students for understanding different concepts, improving vocabulary, developing Reasoning & Thinking, etc. ICT can help in preparing students for SAT, GRE, TOEFL, etc.

**Concepts of AI Technologies in Education:**

Artificial Intelligence (AI) technologies comprise a diverse range of advanced tools and applications that are reshaping the educational landscape. Key innovations such as machine learning algorithms, natural language processing (NLP), and data analytics platforms are increasingly being integrated into classrooms to enhance teaching and learning experiences (Li & Li, 2021).

These technologies enable the development of personalized and adaptive learning environments, where instruction is tailored to meet the unique needs, pace, and learning styles of individual students (Wang & Chen, 2021). By analyzing real-time student data, AI systems can provide targeted feedback, recommend customized learning paths, and support differentiated instruction

The integration of AI into education has transformed traditional pedagogical methods, equipping educators with powerful tools to enhance engagement, track learner progress, and improve academic outcomes. This research is aim to examines a variety of AI-powered tools specifically designed for educational use, exploring their practical applications, pedagogical benefits, and the broader implications for teaching and learning in a digital age.

**SpinBot**:

Spinbot is an online tool that utilizes natural language processing (NLP) algorithms to rewrite or"spin" existing text to create new variations. While SpinBot can be used to generate unique versions of text, it is often associated with article spinning, a technique used to create multiple versions of an article for SEO purposes (Lee & Seo, 2021). Educators may use SpinBot to: Create paraphrased versions of educational materials; and/or to generate alternative versions of assignments or assessments. An educator may use SpinBot to create different versions of a reading passage for students to compare and analyse, promoting critical thinking and comprehension skills.

**Canva**:
Canva is a versatile graphic design platform that provides educators with tools and templates for creating visually engaging educational materials. With Canva, educators can design lesson plans, presentations, infographics, posters, and other visual aids to supplement classroom instruction. By incorporating images, icons, charts, and text, educators can create visually appealing materials that capture students' attention and enhance their understanding of complex concepts (Ivanova & Li, 2020). Ojelade et al. (2020) suggests that visual and audio visual instructional materials can improve comprehension, retention, and engagement among students, making Canva a valuable tool for educators seeking to enhance their teaching practices (Bartsch & Cobern, 2013).

**ChatGPT**:
ChatGPT, a variant of the Generative Pre-trained Transformer (GPT) model, is an AI-powered tool that generates human-like text in conversational contexts. Educators can leverage ChatGPT to create dialogue-based simulations, interactive learning activities, and conversational feedback systems for students. By prompting ChatGPT with questions or scenarios, educators can generate realistic responses that simulate conversations with virtual tutors, providing students with personalized support and guidance. Additionally, ChatGPT can be used to generate text-based content for lesson plans, lecture notes, and instructional materials, streamlining the content creation process for educators (Hao et al., 2020).

**ScribeSense:**
ScribeSense is an AI-powered platform that automates the grading process for handwritten assignments and assessments. Using handwriting recognition technology, ScribeSense analyzes and evaluates student responses, providing instant feedback to both educators and students. By automating the grading process, ScribeSense saves educators time and effort, allowing them to focus on providing targeted support and intervention to students (Grover et al., 2016). Research indicates that automated grading systems can enhance efficiency, consistency, and fairness in assessment practices, leading to improved student outcomes (Dikli, 2006).

**SMART Learning Suite:**
The SMART Learning Suite is an integrated set of software tools designed to enhance interactive learning experiences in classrooms. Educators can use the SMART Learning Suite to create interactive lessons, deliver engaging presentations, and assess student understanding in real-time. With features such as adaptive learning pathways, real-time student feedback, and personalized recommendations for instructional content, the SMART Learning Suite enables educators to differentiate instruction and provide targeted support to students (Hodges et al., 2020). This suggests that interactive learning environments can promote active engagement, collaboration, and critical thinking skills among students, leading to improved learning outcomes.

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**Edpuzzle:**
Edpuzzle is an AI-powered platform for creating interactive video lessons. Educators can use Edpuzzle to embed quizzes, questions, and annotations into videos, allowing students to interact with the content and demonstrate their understanding. By monitoring student progress and engagement with video content, educators can personalize instruction and provide targeted support to students. Research indicates that interactive video lessons can increase student engagement, retention, and comprehension, making Edpuzzle a valuable tool for educators seeking to enhance their instructional practices (Clark & Mayer, 2016).

**DreamBox Learning:**
DreamBox Learning is an adaptive math program that provides personalized learning experiences for students. Using AI algorithms, DreamBox Learning assesses each student's individual strengths, weaknesses, and learning preferences, and dynamically adjusts the content and difficulty level of math lessons accordingly. By differentiating instruction based on individual student needs,

DreamBox Learning promotes active learning, mastery, and confidence in math concepts. This suggests that adaptive learning systems can improve student outcomes in mathematics, particularly for students with diverse learning needs (Pane et al., 2014).

**Quillionz**:
Quillionz is an AI-powered question generation tool that creates quiz questions from textual content. Educators can use Quillionz to generate formative and summative assessments, study materials, and review guides for students. By analyzing the text and identifying key concepts, topics, and keywords, Quillionz generates contextually relevant questions that assess students' understanding and retention of course material (Mitra et al., 2020). This indicates that formative assessments can enhance student learning outcomes by providing feedback, promoting selfregulated learning, and identifying areas for improvement.

**Grammarly:**
Grammarly is an AI-powered writing assistant that helps users improve the quality of their writing. Educators can use Grammarly to correct grammar, spelling, punctuation, and style errors in written assignments, presentations, emails, and other communications. By providing feedback on sentence structure, clarity, and coherence, Grammarly helps educators ensure that their written communication is professional, accurate, and effective (Johnson, 2011). Effective written communication skills are essential for academic success and career readiness, making Grammarly a valuable tool for educators seeking to enhance their students' writing skills.

**Gamma AI:**
Gamma is an AI-powered platform designed to assist educators in creating interactive lesson plans and learning experiences. The app utilizes AI algorithms to analyze educational content and generate personalized learning pathways for students (Olatunde-Aiyedun & Hamma, 2023). Educators can input learning objectives, content materials, and assessment criteria into the platform, and Gamma generates customized lesson plans, activities, and assessments based on individual student needs and preferences. By leveraging Gamma's AI capabilities, educators

can create dynamic and engaging learning experiences that adapt to the diverse needs of their students. An educator can input learning objectives and content materials for a history lesson into Gamma. The app then generates interactive activities, multimedia resources, and assessments tailored to each student's learning style and proficiency level, promoting personalized learning and student engagement.

AI-powered tools offer educators innovative ways to enhance teaching and learning experiences, streamline administrative tasks, and provide personalized support to students. By leveraging the capabilities of AI technology, educators can create dynamic and engaging learning environments that foster student success and achievement. However, it's important for educators to critically evaluate the effectiveness and appropriateness of AI tools in their specific educational contexts, considering factors such as accessibility, equity, and ethical considerations. Further research is needed to explore the impact of AI tools on teaching and learning outcomes, as well as to identify best practices for their integration into educational settings.

**b) AI Training Platforms for Educators:**
i. Virtual Platforms: Virtual platforms are online environments or software applications that facilitate communication, collaboration, and interaction among users in a digital space (Olatunde-Aiyedun, et al., 2021). Cao, Li, and Li (2020) noted that these platforms allow individuals to connect remotely, share information, and engage in various activities without the need for physical presence. Examples of virtual platforms include video conferencing tools, online learning management systems, and social media networks. Virtual platforms offer educators the flexibility to participate in AI training programs from anywhere with an internet connection. These platforms may include virtual classrooms, webinars, and online courses hosted on learning management systems (LMS) such as Moodle, Canvas, or Blackboard. Virtual platforms provide educators with access to AI training content, resources, and expert instructors, enabling them to engage in self-paced or synchronous learning experiences (Zhang et al., 2022). In conclusion, leveraging a variety of virtual platforms such as Zoom,

**Google Meet**, WhatsApp, Microsoft Teams, Cisco Webex, Skype, Slack, and Discord is essential for delivering effective AI training programs to educators. These platforms offer flexibility, accessibility, and interactivity, enabling educators to engage participants in virtual training sessions, workshops, and conferences from anywhere with an internet connection. By harnessing the capabilities of virtual platforms, AI training programs can empower educators to develop the competencies and skills necessary to leverage AI technologies successfully in education entrepreneurship.

**Physical Workshops and Seminars:** Physical workshops and seminars are traditional face-to-face educational events where participants gather in a physical location, such as a classroom, conference center, or training facility, to engage in learning activities, presentations, discussions, and hands-on exercises. These events provide opportunities for direct interaction, networking, and collaboration among participants and facilitators (Graham,2013).Physical workshops and seminars provide educators with opportunities for hands-on learning and

collaboration in a face-to-face setting. These events may be hosted at educational institutions, conference centers, or professional development venues and feature expert speakers, interactive sessions, and networking opportunities. Physical workshops and seminars allow educators to deepen their understanding of AI concepts, exchange ideas with peers, and gain practical experience with AI tools and technologies (Chen et al., 2020).

**Hybrid/Blended Training Platforms**: Olatunde-Aiyedun and Adams (2022) defined blended/hybrid learning/training platforms as the educational approaches that combine traditional face-to-face instruction with online learning components. These platforms offer a mix of in-person sessions and virtual activities, allowing learners to engage with course materials both in a physical classroom setting and through online resources. The aim of hybrid/blended training platforms is to leverage the strengths of both traditional and online learning modalities to create a flexible and personalized learning experience for participants.
Hybrid/blended training platforms such as Udemy, Coursera, edX, LinkedIn Learning, and Kadenze offer educators a flexible and versatile approach to AI training programs. By combining online resources with live virtual sessions, group activities, and interactive assignments, these platforms provide educators with opportunities to engage in self-paced learning while also benefiting from real-time interaction, feedback, and support. Leveraging hybrid/blended training platforms can enhance the effectiveness and accessibility of AI training programs for educators, empowering them to develop the competencies and skills necessary to leverage AI technologies successfully in education entrepreneurship. This incorporation of hybrid/blended training platforms enriches the discussion on delivering AI training programs to educators by offering a flexible approach that combines online resources with live virtual sessions and interactive activities.

**AI Training Conferences:** AI training conferences bring together educators, researchers, industry experts, and policymakers to explore the latest trends, innovations, and best practices in AI education. These conferences may feature keynote presentations, panel discussions, workshops, and poster sessions on topics such as AI pedagogy, curriculum design, and educational technology. AI training conferences provide educators with opportunities to learn from leading experts in the field, share their experiences and insights, and collaborate on AI driven projects and initiatives (Li et al., 2020). Effective AI training platforms for educators must leverage a combination of virtual, physical, and remote online platforms to deliver training, seminars, workshops, and conferences. By offering flexible and accessible professional development opportunities, AI training programs can empower educators to develop the competencies and skills necessary to leverage AI technologies successfully in education entrepreneurship. Moreover, these platforms facilitate collaboration, networking, and knowledge sharing among educators, fostering a community of practice dedicated to advancing AI education and innovation.

The Model of Supplemental CAI was found to be effective in improving educable mentally handicapped students' achievement in Mathematics and Spelling (Ankney, 1987). Language Impaired Children benefited from written format, like, dialogue with a computer (Ward, 1987). Setting goals, following instructions, accessing information to accomplish the task, and evaluating performance benefited students with learning disabilities when they were engaged

with CAI activities (McPherson, 1991). Older Adults successfully used the computer and were able to improve their knowledge about Health with a CAI lesson (McNeely, 1988). CAI was effective in Language acquisition (Edfelt, 1989) and teaching abbreviation (Edward, 1989). CAI had a positive impact on reading comprehension for average reader but not for learning disabled readers (Trahan, 1989). CAI, Tutorial Retrieval Text, and Programmed Lecture were equally effective in promoting learning (Whitakar, 1990). Use of software improved achievement in learning calculus and did not cause damaging effects when access was denied (Cunningham, 1991). CAI was found to be effective in terms of achievement of Science Process Skills (Vensel, 1988), in increasing Meta-cognitive Writing Skills (Bonk et al., 1989), in teaching reference skills to seventh grade students (Driscoll, 1990), in increasing the rate of the acquisition of School Readiness Skills of pre-school children (Legenhausen, 1991) and in improving writing skill (Powell-Hart, 1992). In spite of benefit of CAI in different aspects of learning, CAI has not entered into the Classrooms as most of the developed CAIs were not based on sound Theories of Learning. People involved in developing CAI were not having the sound base of Instructional Design. Secondly, the courses are changing, the schools also do not have sufficient computer facility, teachers are not trained in the use of CAI, etc. The use of Computers was not only for teaching but also for Psychological Testing, Evaluation; database Management, Library Management, etc.

**Information and Communication Technology (ICT) for Education in Nigeria**

Osei Tutu Agyeman (2007), reported that, Nigeria started implementing its ICT policy in April 2001 after the Federal Executive Council approved it by establishing the National Information Technology Development Agency (NITDA), the implementing body. The policy empowers NITDA to enter into strategic alliances and joint ventures and to collaborate with the private sector to realize the specifics of the country's vision of, "making Nigeria and IT capable country in Africa and a key player in the information society by the year 2005 through using IT as an engine for sustainable development and global competitiveness." This vision is yet to be fulfilled.

Outlined below are some of the objectives of Nigeria's ICT policy:

A. To ensure that ICT resources are readily available to promote efficient national development
B. To guarantee that the country benefits maximally, and contributes meaningfully, by providing the global solutions to the challenges of the Information Age
C. To empower Nigerians to participate in software and ICT development
D. To encourage local production and manufacture of ICT components in a competitive manner
E. To establish and develop ICT infrastructure and maximize its use nationwide
F. To empower the youth with ICT skills and prepare them for global competitiveness
G. To integrate ICT into the mainstream of education and training
H. To create ICT awareness and ensure universal access in promoting ICT diffusion in all sectors of national life
I. To create an enabling environment and facilitate private sector (national and multinational) investment in the ICT sector
J. To encourage government and private sector joint venture collaboration

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K. To develop human capital with emphasis on creating and supporting a knowledge-based society
L. To build a mass pool of ICT literate manpower using the NYSC, NDE, and other platforms as a train-the-trainer scheme for capacity-building.

## RESEARCH METHODOLOGY

### Research Design

The study adopted a descriptive survey research design. This design was considered appropriate because it allows the researcher to collect information from a target population on their opinions, experiences, and attitudes regarding the use of ICT for effective performance in teaching and learning. The descriptive survey method is suitable for assessing current practices, challenges, and possible improvements in ICT integration.

### Population of the Study

The population of the study is made of respondents that comprised staff (academic staff) and students drawn randomly from five (5) schools in the College of Education and Legal Studies, Ringim. The schools are;

- ✓ School of Secondary Education (Arts and Social Sciences)
- ✓ School of General Education
- ✓ School of Secondary Education (Languages)
- ✓ School of Secondary Education (Sciences)
- ✓ School of Qur'anic and Legal Studies

Since the population was large and impossible for the researcher to cover the intake populations, therefore, samples of 700 respondents consisting of 500 students were selected from the schools and 200 staff is used for the study. It is through the students and academic staff that the researcher got the required information on the study through the use of questionnaires.

### 11.1.4 Sample and Sampling Techniques

The sample selection was done using random sampling technique. Simple random sampling according to Olakunle S. A. and David O. K.(2011)is a method of obtaining representative which involves identifying every element in the sampling frame and choosing them on the basis of any planned process, but on major thing in the process is that element or member has an equal opportunity of being selected. Also, stated by Awotunde, Ugoduluwa and Ozoji (1997) is a carefully planned procedure for drawing a simple random sampling of an element from a population in such a way that the following conditions are met:

- ✓ Every element in the population had an equal chance of being selected in the sample
- ✓ Every possible combination of an element on the population had an equal chance of constituting the sample.

### Instrument(s)

The instrument used for the study is a questionnaire which was designed by the researcher. The questionnaire was used to obtain information from respondents on the application of ICT to enhance effective performance in teaching and learning. The questionnaire was divided into two parts, namely section A and B. Section-A educed information on personal data of the respondents while section-B contained items directly related to the research questions. The

respondents will be given alternative responses to choose from. It is a closed ended questionnaire in which the responses were categorized as follows: Strongly Agree (SA), Agree (A), Strongly Disagree (SD) and Disagree(D) respectively.

**Validity and Reliability of the Instrument(s)**

With the main instrument developed, it was then necessary to carry out a pilot study purposely to test the validity and reliability of the instrument. A total number of 750 copies of the questionnaire were administered to 500 students and 250 questionnaires for academic staff of Jigawa State College of Education and Legal Studies, Ringim and the same 750 copies were filled and returned by these respondents. The responses were analyzed using Chi-squared($X^2$) procedure to the null hypothesis calculated data obtained.

Where, N= the number of items in the test

$\sum$ = the sum of values

The table of $X^2$ consistency and reliability were found to be within the range of probability value of $x \leq 0.99$ or $x \geq 0.001$ respectively, which shows a significance difference from the null hypothesis to be accepted or rejected.

$X^2$ Procedure using two or more independent variable:

1. Set out a table of value from the data collected;
2. Decide on null hypothesis;
3. Calculate the expected frequencies, based on the null hypothesis;
4. Decide the number of degree of freedom;
5. Running the analysis as usual.

Note that, the sum of all $X^2$ values obtained for the number of items observed in the column will be put together as a single value for each category.

**Administration of the Instrument(s)**

The data for the study were collected through the administration of questionnaire. The researcher visited the respondents to sample their opinions by administering the questionnaire to them. The respondents were instructed on how to fill the questionnaire, and were asked to respond to the statements indicating their degree of responses. Opinion of the respondents completed their own questionnaire and returned it immediately. For those respondents who could not complete theirs immediately, the researcher came back the next day to collect the rest of the questionnaires.

**Method and Techniques of Data**

Data collected from the administered questionnaire were categorized and presented while the Chi-square($X^2$) statistical analysis was adopted for the calculation of the research questions based on the related questionnaire items for each of the research question

**Data Analysis, Interpretation and Discussion of Findings**

The researcher presents data obtained from the study. The analysis was conducted using data conducted using data collected from the administered questionnaire and were categorized and presented while; the mean score statistical analysis was adopted for the calculation of the

research questions based on the related questionnaire items for each of the research question. 750 copies of questionnaire were dispatched but not all the questionnaires were dully filled by the respondent. About 107 copies of questionnaires were vender invalid because, some teachers and students could not fill them appropriately while others could not return theirs. At the time collection only 643 copies were duly countered which however made the total number of the questionnaire analyzed to be 643. Mean statistics and percentage were used for analysis of data collected. The formula adopted is stated below:

$\overline{X} = \frac{Efx}{Ef}$ where,
$\overline{X}$= mean
$\sum$ =summation or addition
f =Frequency
$\sum$fX=Addition or summation of all the total frequency
$\sum$rw = summation of values in the table rows
$\sum$cl = summation of the values in the table columns
(O) = Observed value (frequencies)
(E) = Expected value= ($\sum$r*($\sum$c/$\sum$r+$\sum$c))
$X^2 = (O-E)^2/E$ (i.e. Chi-squire value)

The researcher used only 86% of the questionnaire distributed to take decision on whether to accept or reject the null hypothesis from the responses of the respondents.

**Demographic data of the respondents**

Table 1:Teachers and Students respondents' population in percentage

| Type of Respondents | Number of Respondents (N) | Percentage (%) |
|---|---|---|
| Teachers | 214 | 85.6 |
| Students | 429 | 85.8 |

From the above table 1, it shows that the teachers constitute 214 (85.6%) of the respondents, while the students constitute 429 (85.8%) of the respondents.

Table 2: Data collected from Teachers respondents

| S/N | ITEMS | SA | A | D | SD |
|---|---|---|---|---|---|
| 1 | ICT medias brings abstract concept to real life situations for proper understanding of students. | 88 | 100 | 17 | 9 |
| 2 | ICT media in the teaching and learning such as television, computer and projector ensure better retention of subject and make learning more permanent. | 80 | 113 | 17 | 4 |
| 3 | ICT media helps to stimulate student interest in reading and save time to understand the lesson | 79 | 110 | 20 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | Uses of ICT like internet help staff and students have access to relevant research materials. | 97 | 93 | 22 | 2 |
| 5 | Academic staff considers the use of ICT media as waste of time. | 72 | 110 | 31 | 1 |
| 6 | Insufficient energy supply act as barrier to effective use of ICT in teaching and learning activities in the college | 65 | 50 | 92 | 7 |
| 7 | The lack of expertise to handle these ICT media by academic staff and students is a barrier to effective use of ICT in teaching and learning activities in the college. | 45 | 71 | 90 | 8 |
| 8 | Poor quality and inadequate maintenance of ICT hardware is a barrier to effective use of ICT in teaching and learning activities in the college. | 57 | 90 | 49 | 18 |
| 9 | There are enough ICT media like computer, electronic gadgets and overhead projectors in the college. | 86 | 99 | 25 | 4 |
| 10 | There are adequate provisions of televisions, video recordings in the lecture rooms. | 91 | 90 | 23 | 10 |
| 11 | Opaque and video camera are available in the college lecture rooms. | 91 | 90 | 31 | 2 |
| 12 | There is adequate provision of ICT (computer) learning software in all the school subjects in the college. | 85 | 69 | 54 | 6 |
| 13 | If fund is made available by government and other non-governmental agencies, the college will provide ICT facilities to the institutions. | 68 | 118 | 19 | 9 |
| 14 | If academic staffs are trained on the use of ICT media through organized seminar and conference, they will make appropriate use of ICT media in providing services. | 94 | 91 | 17 | 12 |
| 15 | If college management makes appeals to companies such as HP computer, Zinox and Compaq, they will assist the college in provision of computers to the college in form of computer instructional gadgets. | 73 | 123 | 16 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| 16 | Provision of stable power supply will ensure appropriate use of ICT media in teaching and learning activities in the college. | 122 | 82 | 7 | 3 |
| | Total | 1293 | 1499 | 530 | 102 |

The above table shows how teachers responded to the questionnaire; the figures in the table were used to check the validity and reliability of the data obtained on each item from item 1 to item 16, the sum of the total values given are 3424 (i.e. 1293+1499+530+102=3424) which is the same as the total number of the respondents 214 multiplied by the number of items 16 that gives the same values 3424 (i.e. 214*16=3424

Table 3:Data collected from Students base on gender level respondents

| S/N | ITEMS | SA | | A | | D | | SD | |
|---|---|---|---|---|---|---|---|---|---|
| | | M | F | M | F | M | F | M | F |
| 1 | ICT medias brings abstract concept to real life situations for proper understanding of students. | 65 | 131 | 71 | 132 | 5 | 16 | 4 | **5** |
| 2 | ICT media in the teaching and learning such as television, computer and projector ensure better retention of subject and make learning more permanent. | 85 | 122 | 51 | 123 | 7 | 31 | 2 | 8 |
| 3 | ICT media helps to stimulate student interest in reading and save time to understand the lesson | 78 | 129 | 56 | 115 | 10 | 37 | 1 | 3 |
| 4 | Uses of ICT like internet help staff and students have access to relevant research materials. | 100 | 156 | 35 | 105 | 7 | 13 | 3 | 10 |
| 5 | Academic staff considers the use of ICT media as waste of time. | 27 | 65 | 49 | 84 | 39 | 63 | 30 | 72 |
| 6 | Insufficient energy supply act as barrier to effective use of ICT in teaching and learning activities in the college. | 19 | 42 | 19 | 44 | 38 | 83 | 69 | 115 |
| 7 | The lack of expertise to handle these ICT media | 23 | 25 | 15 | 44 | 40 | 109 | 67 | 106 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | by academic staff and students is a barrier to effective use of ICT in teaching and learning activities in the college. | | | | | | | | |
| 8 | Poor quality and inadequate maintenance of ICT hardware is a barrier to effective use of ICT in teaching and learning activities in the college. | 28 | 72 | 38 | 45 | 30 | 72 | 49 | 95 |
| 9 | There are enough ICT media like computer, electronic gadgets and overhead projectors in the college. | 33 | 64 | 29 | 51 | 48 | 87 | 35 | 82 |
| 10 | There are adequate provisions of televisions, video recordings in the lecture rooms. | 52 | 98 | 58 | 102 | 22 | 53 | 13 | 31 |
| 11 | Opaque and video camera are available in the college lecture rooms. | 57 | 104 | 46 | 82 | 36 | 51 | 6 | 47 |
| 12 | There is adequate provision of ICT (computer) learning software in all the school subjects in the college. | 64 | 95 | 53 | 101 | 20 | 44 | 8 | 44 |
| 13 | If fund is made available by government and other non-governmental agencies, the college will provide ICT facilities to the institutions. | 71 | 141 | 56 | 101 | 13 | 19 | 5 | 23 |
| 14 | If academic staffs are trained on the use of ICT media through organized seminar and conference, they will make appropriate use of ICT media in providing services. | 90 | 154 | 46 | 96 | 5 | 21 | 4 | 13 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 15 | If college management makes appeals to companies such as HP computer, Zinox and Compaq, they will assist the college in provision of computers to the college in form of computer instructional gadgets. | 68 | 109 | 61 | 131 | 9 | 27 | 7 | 17 |
| 16 | Provision of stable power supply will ensure appropriate use of ICT media in teaching and learning activities in the college. | 95 | 194 | 35 | 63 | 7 | 21 | 8 | 6 |

The above table 2, shows how students responded to the questionnaire; the figures in the table were used to check the validity and reliability of the data obtained on each item from item 1 to item 16, the sum of the total values given are 6864 (i.e. 955+1701+718+1419+336+747+311+677 =6864) which is the same as the total number of the male and female respondents as 145 and 284 respectively, multiplied by the number of items 16 by number of male and number of female respondents and get the sum of the values obtained that gives the same values 3424 (i.e. (16*145)+(16*284)=6864).

**The Null Hypothesis (Ho):** the calculated $X^2$ values obtained were simplified in to two categories (Agreed and Disagreed) to represent the four categories (Strongly Agreed, Agreed, Disagreed and Strongly Disagreed) used in the questionnaire to the result simpler for better understanding. This was done by taking the average of each of the two $X^2$ values (i.e. SA+A/2=A; D+SD/2=D) to make it a single $X^2$ value as presented in the each of the research hypothesis tables below.

**Research hypothesis 1:** There is no significant difference in the male and female gender level in using ICT for learning purposes.

Table 4:Chi-square ($X^2$) value for Male and Female Students for gender level in using ICT for learning purposes.

| | **Agreed (A)** | **Disagreed (D)** |
|---|---|---|
| **Male** | 10.08 | 1.87 |
| **Female** | 5.60 | 10.54 |

Table 4 above shows that the responses of respondent on application of ICT for effective performance in teaching and learning. From the table, it is clear that enough the usage of ICT media like computer electronics gadgets, overfed projectors etc in the Jigawa State College of

education and Legal Studies, Ringim has a great impact for learning purposes. The null hypothesis is accepted as the $X^2$ value obtained are 10.08 and 5.60 for male and female students as agreed, using the $X^2$ table degree of freedom 3; for male gender the probability ($p$) is greater than or equals to 0.01 ($p \geq 0.01$), and for female gender the probability ($p$) is less than or equals to 0.05 ($p \geq 0.05$). That shows that there is significant difference in male and female gender in using ICT for learning purposes.

**Research hypothesis 2:** There is no significant difference in the teachers' and students' barriers to effective use of ICT for teaching and learning purposes.

Table 5: Chi-square ($X^2$) value for Teachers and Students for the barriers to effective use of ICT for teaching and learning purposes.

| | **Agreed (A)** | **Disagreed (D)** |
|---|---|---|
| **Teachers** | 9.29 | 17.39 |
| **Students** | 24.92 | 42.32 |

Limitations to the teachers' and students' barriers to effective use of ICT for teaching and learning purposes. The null hypothesis is accepted as the $X^2$ value obtained are 9.29 and 24.92 for teachers and students, using the $X^2$ table degree of freedom 3; for teachers the probability ($p$) is greater than 0.05 ($p > 0.05$), and for students the probability ($p$) is greater than 0.001 ($p > 0.001$) gives more confidence as it exceeds the $X^2$ values in 0.001 probability column. That shows that there is significant difference in teachers' and students'barriers to effective use of ICT for teaching and learning purposes.
Note that, the detail of the analyzed values is presented in the index section in table 10.

**Research Question 3:** There is no significant difference in the challenges faced by teachers and students in the application of ICT.

Table 6: Chi-square ($X^2$) value for Teachers and Students for the challenges faced in the application of ICT.

| | **Agreed (A)** | **Disagreed (D)** |
|---|---|---|
| **Teachers** | 49.20 | 185.40 |
| **Students** | 254.52 | 340.26 |

Table 6 shows the response of the respondents on measures to solving the problems associated with the use of ICT in the Jigawa State College of education and Legal Studies, Ringim. The table revealed that all the respondents agreed that problems associated with the use of ICT in the Jigawa State College of education and Legal Studies, Ringim, can be solved if fund is made available by government for the college authority to purchase ICT media and subsequently teachers in the use of these ICT media. It also revealed that if the college management makes appeal to ICT companies such as HP computer and COMPAQ etc, they will assist the college in the provision of computer instructional gadgets as well as provision of stable power supply will also ensure appropriate use of ICT media in the college. This conclusion is reached based on the $X^2$ of teachers with 49.20 as agreed and students with 254.52 as agreed as well. Both

the two values givemore confident as the calculated $X^2$ value is more than 0.001 in the probability column ($p$> 0.001).

## SUMMARY OF FINDINGS

This show that application of ICT in teaching and learning services by Jigawa State College of Education and Legal Studies, Ringim, impact positively in the services provided by academic staff to users of the students. This, the majority of the constraints inherent in the application of ICT in teaching and learning services.

From the data collected and the research questions analyzed, we observed that the respondents have various opinions about ICT in terms of its usage in providing services to its users. The first research question revealed that ICT makes teaching and learning simple by bringing abstract concept to real life situations for students. ICT through its media or tools ensure better retention of subjects taught, and ICT saves time of the library users. The application of ICT based on the research questions among others highlighted that the college has enough computer electronics gadgets, video recording, and video camera, computer learning software. Although, the research also exposed some inadequacies associated with the ICT deployment such as lack of sufficient power supply, expertise, inadequate fund to mention but a few.
In the cause of the analysis of the data collected from the field and represented as shown on the various tables and through the use of chi-square statistical analysis, the following finding were made;
(i) ICT media brings abstract concept to real life situations for proper understanding of students;
(ii) ICT media in the teaching and learning such as television, computer and projector ensure better retention of subject taught and make earning more permanent;
(iii) ICT media helps to stimulate student's interest in reading and save time duly spent in the library;
(iv) The use of internet helps staff and students have access to relevant research materials;
(v) There are enough ICT media like computer electronics gadgets and overhead projectors in the college;
(vi) There is adequate provision of video recording in the lecture rooms;
(vii) Opaque and video camera are available in the college lecture rooms;
(viii) There are adequate provisions of ICT (Computer) learning software in all the school subjects in the college;
(ix) Lecturers consider the use of ICT media as waste of time;
(x) Insufficient energy supply act as barrier to effective use of ICT in teaching and learning activities in the college;
(xi) The lack of expertise to handle these ICT media by academic staffs and students is a barrier to effective use of ICT in teaching and learning activities in the college;
(xii) When fund is made available by government, the college will make provision for the use of ICT media to five schools in the institution;
(xiii) When college management makes appeal to ICT companies such as HP, Zinox, Samsung, Toshiba and COMPAQ etc, they will assist the college in the provision of computer instructional gadgets;

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**Challenges**

1. Inadequate ICT Infrastructure
    - Limited availability of functional computers, projectors, smart boards, and internet facilities.
    - Poor maintenance of existing ICT equipment.
2. Unstable Power Supply
    - Frequent electricity outages affecting ICT-based teaching and learning.
    - Lack of backup power sources like generators or solar systems.
3. Low ICT Skills among Teachers and Students
    - Many lecturers and students have limited training in the effective use of ICT tools.
    - Resistance to adopting new teaching methods due to lack of confidence or familiarity.
4. Limited Internet Connectivity
    - Slow or unreliable internet makes accessing online resources difficult.
    - High cost of data subscriptions.
5. Insufficient Funding
    - Budget constraints limit investment in ICT equipment, software, and training programs.
6. Lack of Technical Support
    - Few or no trained ICT technicians to manage, repair, or update equipment.
7. Curriculum Gaps
    - ICT use not fully integrated into teaching syllabi.
    - Teaching still dominated by traditional chalk-and-talk methods.

**Recommendations**

1. Improve ICT Infrastructure
    - Provide more computers, projectors, and internet-enabled devices in classrooms and laboratories.
    - Ensure regular maintenance of ICT facilities.
2. Ensure Reliable Power Supply
    - Install alternative power sources such as solar panels or standby generators.
3. Capacity Building
    - Organize regular ICT training workshops for both lecturers and students.
    - Encourage peer-to-peer mentoring for ICT skills.
4. Enhance Internet Access
    - Partner with internet service providers to offer high-speed, affordable connectivity on campus.
    - Create campus-wide Wi-Fi hotspots.
5. Increase Funding for ICT Development
    - Allocate a specific budget for ICT projects.
    - Seek partnerships with government agencies, NGOs, and private companies.
6. Provide Technical Support
    - Employ trained ICT technicians for maintenance and troubleshooting.
    - Create a helpdesk for quick ICT problem resolution.

7. Integrate ICT into the Curriculum
    - Revise syllabi to embed ICT-based teaching methods.
    - Encourage blended learning (combining face-to-face and online methods).

## CONCLUSION

The study examined the use of ICT for effective teaching and learning at Jigawa State College of Education and Legal Studies, Ringim, involving academic staff and students from five schools. Using a research design with questionnaires analyzed via chi-square, the findings showed that ICT enhances understanding, stimulates interest, and saves study time. The null hypothesis was confirmed, indicating no significant difference in the stated conditions. Recommendations included stable electricity, proper funding, and provision of adequate textbooks, with suggestions for further research in other crucial ICT areas. However, application of ICT in teaching and learning at Jigawa State College of Education and Legal Studies, Ringim, has the potential to significantly enhance the quality, efficiency, and accessibility of education. However, the realization of these benefits is hindered by challenges such as inadequate infrastructure, unstable power supply, limited internet access, low ICT skills among staff and students, and insufficient funding. Addressing these issues through strategic investment in ICT facilities, capacity building, reliable internet services, and curriculum integration will create an enabling environment for effective ICT-driven education. With sustained commitment from the college management, government, and relevant stakeholders, ICT can become a powerful tool for improving academic performance, promoting innovative teaching methods, and preparing students for the demands of the digital age

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