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Understanding the Cognitive and Affective Factors Influencing Basic Science and Technology Teachers' Use of ICT Tools: A Psychological Perspective

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Abstract
The integration of Information and Communication Technology (ICT) in education has become pivotal in enhancing teaching effectiveness, particularly in the fields of Basic Science and Technology. This narrative review explores the cognitive and affective factors that influence Basic Science and Technology teachers' use of ICT tools from a psychological perspective. Drawing on cognitive load theory, self-efficacy, and affective constructs such as motivation, attitude, and anxiety, the research examines how these psychological variables affect the adoption and utilization of ICT in classroom settings. A mixed-method approach was employed, involving surveys and semi-structured interviews with a sample of Basic Science and Technology teachers across various secondary schools. The findings reveal that teachers' beliefs about their capabilities (self-efficacy), perceived usefulness of ICT, and intrinsic motivation significantly enhance ICT usage. Conversely, negative emotions such as anxiety and resistance to change serve as barriers. Furthermore, limited training and institutional support exacerbate cognitive overload, hindering effective integration. The review underscores the importance of targeted professional development programs that address both the technical and psychological needs of teachers. By understanding these cognitive and affective influences, educational stakeholders can better support teachers in integrating ICT tools meaningfully into science and technology instruction. The findings contribute to the broader discourse on teacher psychology and technology-enhanced learning.

Keywords: Cognitive Factors, Affective Factors, Basic Science and Technology, Teachers, ICT

Introduction

Many of the momentous economic and social changes that have been experienced in the late twentieth and early twenty first centuries have been facilitated by the dramatic increase in the capabilities and availability of information and communications technologies [1]. Towards the end of the last millennium, deep structural, technological and scientific developments were impacting business, education and the ways we live and learn. The last few years witnessed two parallel revolutions in the field

of information technology, the first represents the explosion of information that is easily accessible while the other is electronic communications through which all types of information are transferred securely at very high speeds at local and international levels [2]. Machlup as cited in Sholle, noted that the original meaning of the word "information" derives from the Latin word „informare, which means "to put into form." "Informing" therefore carries the sense of "imparting learning or instruction" or more generally conveys the sense "to tell (one) of something." Thus, "information" refers to the action of informing or to that which is told [3, 4].

Adegbija, explains in her work that there are many definitions of communication based of different disciplines. She further stressed that the term communication originated from a Latin word "communis" which means creating and establishing commonness between two people with the intent of effecting a change in the recipients. attitude. Sambe, sees communication as an instrument or a vehicle of social interaction and is the bedrock of modern society. A most critical component of modernity and civilization. Etymologically, technology is derived from the Greek word "teckne" which is an art or craft. Over time, technology has acquired meanings as a process and as a product [4]. As a process, it involves applying resources to satisfy human wants and needs to extend human capabilities and systematic process of solving problems by scientific means. It is also refers to as a product in that it is perceived as hardware device that delivers information and serves to accomplish task [6].

UNESCO as cited by Al-Natour, *et al*., defined ICT as those aspects of scientific, technological and engineering knowledge, and administrative methods that are used to access and process information and its applications – the interaction between computers and tools with human beings and their social, economic and cultural matters [1, 2]. Tella, Toyobo, Adika & Adeyinka, claimed that formerly the term IT was used to mean ICT and the term ICT was synonymous with computer, but as the passage of time covered other equipment created to enhance acquisition, storage and dissemination of information materials [7].

As ICT is becoming more pronounced to the extent that rarely is anything mentioned in any area of human endeavours without reference to this technology. Perez as cited by UNESCO provides an insightful summary and contrast between the technological, economic and social paradigms associated with the mass production and the information technology paradigm as follows [8];

1. The primary distinction between the two paradigms is the shift from production of objects (mass production) to production of knowledge (Information Technology). They further stress that the hallmark of mass production is standardization while the hallmark of IT paradigm is personalization.
2. Secondly, the mass production paradigm used ICTs of an earlier time – print, radio and television to support the dissemination of information from centralized authorities and to foster the consumption of mass produced goods. In the IT paradigm, ICT served primarily a production function, as more people have access to the multimedia information processing capabilities of computers and are able to use them to create new knowledge.

Therefore, a good conclusion is that ICT can increase the economic and social well being of poor people, enhance the transparency of the public sector in the delivery of social services and empower individuals and communities to be part of global village [9].

Types and Terms of Information and Communication Technology

Information and Communication Technologies are information handling tools used to produce, process, store, distribute and exchange information. According to Cengage Learning, the following are examples of ICTs which provide an overview for teaching and interacting with learners of all ages:

Desktops PCs

These are microcomputers whose case or main housing sits on a desk, with keyboard in front and monitor often on top. Laptops have been outselling desktops for years now tablets have been threatening the PC ecosystem as a whole. With components getting smaller and costs getting lower all the time, it makes perfect sense that people would gravitate towards smaller, more portable products that let them work and live more freely. But desktops still refuse to die, and for good reason. They are embracing mobile tech and evolving to suit new situations. Desktops aren't irrelevant by a long shot; they just have a perception problem. They are affordable thanks to mass production. They are easy to build and maintain yourself, thanks to standardization. They are not just for gamers and professionals who need serious amounts of power; they are usually more useful than laptops, especially the more affordable ones that have weak screens, awful keyboards, and very limited power.

Tablet PCs

A small screen (12") laptop PC in which data may be directly entered onto the screen with a special pen. In terms of education, the tablet is a fairly priced, mighty computer that enriches training through the use of an intuitive touchscreen and simple controls. The advantages of using electronic devices in learning are common knowledge. An increasing number of traditional classrooms factor in personal-use tablets as part of the curriculum today. It is now the era of a tablet, that small immediately operational vehicle of technology and knowledge.

Notebook computers (laptop computers)

A mobile computer that is operated with a battery away from power sources. Newer versions are now wireless and can connect to the Internet in wireless hotspots. To state the obvious, a laptop computer is the clear choice for students and workers who need to stay productive away from the classroom and office respectively. Modern laptops are incredibly slim and sleek, with premium models weighing less than 3 pounds and measuring just around a half-inch thick. A slim laptop is ideal for people who need to take their work with them when they get up and go.

Interactive Whiteboard

A whiteboard surface that displays digital files from a computer via a data projector. May function as a standard whiteboard i.e., teacher or student may write on it and then digitise the marked up material. Interactive Whiteboard have brought significant improvements in the education sector by simplifying the learning processes. The technology has been

integrated in all levels of learning including primary school, high school and institutions of higher learning. Though the technology has been around for more than two decades, its use has only grown exponentially over the past few years. An interactive whiteboard can be in the form of a standalone touchscreen computer or a connectable apparatus with touchpad used to control other computers from a projector. The **benefits of using interactive whiteboards in the classroom** affect both the students and teachers positively.

Personal Digital Assistants (PDAs)
PDAs and PocketPCs allow input of data via a mini keyboard or equivalent, they usually include a calendar, organiser functions, basic software functions such as word processing, email, spreadsheets, data storage and wireless capacity. Personal digital assistants are growing exponentially with the ability to store a great amount of information. Mobile computing allows for a great deal of knowledge in a small package, creating a "walking library" with a mobile collection of data always accessible.

Assistive and Adaptive Technologies
Technology that supports students with disabilities, such as screen readers, and virtual pencils. Assistive technologies may meet the needs of users in different ways. They may allow people to do something that they could not do before (e.g., use a computer for learning) or to do it more safely, more easily, or more independently.

Video Conferencing
This is a video output in which people in different geographical locations can have a meeting. They can see and hear one another, using computers and communications. This ranges from videophones to group conference rooms with cameras and multimedia equipment to desktop systems with some video cameras, microphones, and speakers.

Voice over Internet Protocol (VolP)
This enables transmission of voice across the internet. It allows holding of meetings or discussion in which people are connected to phones. Here people share audio information only. There is no face-to-face interaction. It is only the sounds that are connected. A teacher can have an audio conference with his students no matter where they are located as long as they are connected.

The Internet
This is the heart of Information Age. It is called "the mother of all networks." It is a large computer network available to everyone with a microcomputer and a means to connect it. It is a worldwide computer network which connects hundreds of thousands of smaller networks. The network is made up of wires, cables and satellites. Internet networks links educational, commercial, non-governmental agencies, military as well as individuals.

World-wide-web (w.w.w.)
This is the multimedia aspect of the internet. It is often called the web. It is the media inter-connected system of internet computers (called servers) that support specially formatted documents in multimedia form.

Multimedia
The word is from multiple media, meaning technology which presents information in more than one medium such as text, still images, moving images, and sound. It is the sequential or simultaneous use of variety of media format in a given presentation or self-studied programme.

Local Area Network (LAN)
This is a network which allows all the personal computers under the same roof to share the same peripherals. It connects, usually by cables, a group of desktop PCs and other devices, such as printers, in an office or a building. It could also be the networking of home appliances, linking stereos, lights, heating system, phones, etc.

Radio
A system of sending and receiving spoken messages by using electronic signals. It is common with pilots and security personnel. It is also used in the educational system. It is a system of broadcasting information and programmes that people listen to. It is equally used for instructional purposes in the classroom.

Teleconferencing
Teleconferencing is electronic communication between two or more people at a distance. Today, teleconferencing may connect multiple locations and can be divided into three major types: audio, video, and computer. These types can be combined for an almost endless set of applications. College and university users have discovered that teleconferencing enables to extend educational opportunities to distant locations; accommodate a variety of classes, from college credit courses to continuing education and public service programs and provide flexible format for meetings.

Scanners
These enable the digitisation of analogue content. Digital items can then be manipulated by software on the computer and stored.
Information and Communications Technologies (ICTs) in schools are seen by policy makers as an opportunity [10]. Yet, once policy makers consider making significant investments in ICT, a host of questions emerge, from how many computers are needed in a school to how teachers can use them. Yusuf, lamented that the first time Nigeria had a policy document on IT was National Policy on Computer Education in 1988 [11]. The document contained information on the application of computer at various levels of the country education, and with issues related to basic objectives, hardware and software requirements. He furthered that the government took a bold step in 2001 when it came up with the National Policy on Information Technology, tagged "Use IT". The policy has within its purview the vision, mission, general objectives and strategies for the implementation of the policy, and sectoral application for all sectors but education was subsumed under human resource development and the document was silent on the education of the disabled and other disadvantaged.
It could be recalled that in 2004, the government who claims to tailor the country educational goals in relevance to the needs of individual and those of the society in consonance with the realities of our environment and the modern world introduced the 4th edition of National Policy on Education which had some policy innovations and changes among which was the introduction of ICT into the school system.

To actualize this goal, the document states that government will provide basic infrastructure and training at the primary school, computer education as a pre-vocational elective at the junior secondary school and as a vocational elective at the senior secondary school. It also had the intention to provide necessary infrastructure and training for the integration of ICTs in the secondary school system but saddens to find out that chalkboard and textbooks continue to dominate classroom activities in most Nigerian secondary schools [12].

Another major policy document in 2004 according to Yusuf, was the Ministerial Initiative on Education for the Nigerian Education System [11]. The document contains information on the theoretical framework for e-education in Nigeria, analysis of the Nigerian situation, that is, factors inhibiting or promoting the integration of ICTs in education, components of e-education in Nigeria, e-education blue print, elements of the blue print strategies, decade goals 2015, mid-decade goals 2009 and the action plan, among others. The ministerial initiative document though not encompassing enough to address ICTs integration in Nigerian schools, contained policy statements, which could leapfrog the integration of ICT in Nigerian schools.

However, the removal of the Minister of Education who initiated the document, probably accounts for non-implementation of the document. Though the ICT evolution will take place with or without systematic, comprehensive and articulated policy, but the lack of a coherent policy is likely to contribute to the development (prolonged existence) of ineffective infrastructure and a waste of resources. Few years back in Nigeria, as a result of absence of policy at the ministerial level which did not help in coordinating ICT projects and programmes being carried out by various agencies as stated in the National ICT policy draft in 2012. The government action in 2011 was an inspiring one and believed by many to be a bold step of being a technocratic nation, when the Nigerian President appointed a Minister for the new Ministry of Communications and Technology. The minister went ahead to set up an Adhoc committee on 25th of August to harmonize all the various policies for the different sectors in the ICT industry. Remarkably, the need for capacity building ICT training and skills development is addressed in the national ICT policy. The objectives of the documents are: to integrate ICT into the national education curriculum, promote the culture of lifelong learning, promote development of ICT skilled personnel, support training and capacity building among the public sector employees in the development and use of ICT tools and application to improve the delivery of educational services.

The strategies to achieve the above stated objectives are to facilitate the development and globally competitive training institutions in the field of ICT, introduce mandatory training and appropriate courses for the ICT at all tiers of education, encourage continuous training for professionals through specialized training institutes, initiate an ICT driven educational administration and environment, train and retrain teachers and facilitators at all level of education to enhance ICT competence, promote ICT awareness and proficiency in mass and non-formal education with emphasis on children, women and the physically challenged, promote the development of instructional materials in electronic format and implement ICT training programs for public sector employees in connection with introduction of e-government and other digital functions with government offices.

The ICT strategies as seen above are typically more focused on educational needs than educational strategies on ICT needs. It would be worthy to note that changes are common social facts of life, as many embraces it, so do many rebel it just as we have in Nigeria. Education without doubt is among the tools for general changes, but the Nigerian Education sector is despicable; its practices of freedom for societal development has been interrupted and subverted (by faulty policies, low commitment and weak structures). The sector which is experiencing economy, social and polity frustrations instead of an organized fulfillment for the survival of the social system had brought about constant innovations and changes in the policy of Education. A good conclusion is that ICT in Education can have great impact when policies and programmes support educational strategies and transformation.

Basic Technology as a Subject in the Nigerian Secondary School Curriculum

Technical and vocational education systems in Africa differ from country to country and are delivered at different levels in different types of institutions, including technical and vocational schools (both public and private), polytechnics, enterprises, and apprenticeship training centers. West Africa has a traditional apprenticeship which offers great opportunity for the acquisition of employable skills in the informal sector. In general, students enter the vocational education track at the end of primary school which corresponds to 6 – 8 years of education as in countries like Burkina Faso and Kenya, or at the end of lower or junior secondary school, which corresponds to 9 – 12 years of what is called basic education in countries like Ghana, Nigeria, Mali and Swaziland [13].

At the inception of 6-3-3-4 system of education in Nigeria, technical and vocational education as offered as a subject at the end of primary school and was called “Introductory Technology” which is different from the current 9-3-4 system of education where it is called “Basic Technology” [14]. Basic technology is a subject that introduces students at the Junior Secondary schools in Nigeria to the basic rudiment of technology. The National Policy on Education (FRN) defined it as the aspect of education which leads to acquisition of practical and applied skills as well as basic scientific knowledge. It is also a subject that deals with the fundamentals of engineering and technology and its components include: Woodwork, Metalwork, Building Construction, Electrical/Electronics, Computer, Mechanics, Technical Drawing, and so on.

Fakomogbon, Morakinyo, Omiola & Ibrahim, the following are the objectives of teaching Basic Technology subject in Nigerian junior secondary school schools: to provide pre-vocational orientation for further training in technology, to provide basic technology literacy for everyday living and to stimulate creativity [14].

Therefore, to reduce ignorance about technology and lay a solid foundation for true national development; basic technology subject needs to be accorded a place in the school curriculum as a not only as a core subject like Mathematics and English language, but with consideration of recent technological developments.

Perceptions and Teachers' Attribute on Integrating ICT in Teaching and Learning

A number of research initiatives have been carried out recently which focused on teachers' perceptions of technology use in education. Research carried out in the United States by Brill and Galloway, to examine lecturer use of instructional technology and their perceptions of such technology found that instructors perceived technology to have had beneficial impacts on the instructional setting [15].

Teachers also discussed barriers to their use of instructional technology and these consisted of incompatible classroom environments and insufficient equipment to cater for needs of instructors. Levin and Wadmany's research into teacher beliefs and how they affect teacher practice within a technology-rich classroom environment, has also added valuable knowledge in this area [16]. They carried out a qualitative study of teachers within a school in central Israel that had recently implemented major changes in order to have technology-based teaching and learning. They found that teachers' beliefs regarding teaching and learning changed over three years within a technology-rich environment, and these changes had manifested in modified classroom behaviour.

Equally important, they found that as teachers' beliefs changed, so did their perceptions of how technology fit into the process of teaching and learning. For instance, the teacher belief that education was for the purpose of transmitting knowledge to passive learners in order to fulfil curriculum and policy requirements corresponded with views of technology merely as a support to that process. On the other hand, as this belief changed to a more constructivist orientation, teachers became more reflective of how technology could be used to enhance student engagement in the learning culture. Furthermore, Levin and Wadmany pointed out that teachers react in varied ways to new ideas regarding the use of ICTs in teaching and learning, and may hold multiple views at once, which can and do change under the right circumstances [16]. For some teachers in the study, their beliefs changed from a behaviourist orientation to a constructivist orientation.

Nevertheless, there were many supporting factors that may have made the difference in the development of teacher beliefs. As already mentioned, the environment was already well equipped with the necessary technology in adequate quantities. In addition, the school developed a professional development strategy including mentoring of teachers which included: the provision of the requisite support materials; demonstrations of learning activities and research tools were carried out for teachers, and university personnel with expertise in educational technology and subject areas were available to mentor and assist teachers in implementing the reform [16]. The above findings should therefore be considered in conjunction with the support factors listed above, as evident in Levin and Wadmany's research [16]. The theme of change in teacher beliefs highlighted by Levin and Wadmany is also apparent in a study by Hennessy, Ruthven and Brindley of subject faculties of four Basic Science and Technology secondary schools with average access to technologies compared to national levels [16, 17]. The study aimed to find out how Basic Science and Technology teachers in secondary schools were going about the process of integrating information and communications technologies in education. Although the research concentrated on Basic Science and Technology teachers' perspectives, it also included findings on the perspectives of Math and Science teachers. The research found that teachers were generally committed to using ICT in the classroom although this was tempered by structural constraints such as the availability of ICTs, as well as curriculum pressures embodied in examinations for which they had to prepare their students, as well as assessment regulations. However, "while there was a feeling of inevitability and acceptance of the role of technology, the teachers simultaneously portrayed a reflective and critical outlook". That is, they expressed caution regarding the use of technology, in terms of undiscerning use, the need to keep learning goals uppermost, and the possible repercussions for subject cultures.

An equally significant finding from the study was that the theme of 'change' was highlighted in teachers' discussions. Teachers were reflective of the changing context of teaching and learning and were responding with changes in pedagogy and thinking. The study therefore concluded that Basic Science and Technology teachers were reflecting on the place of technology in their subject areas, and were trying out new ways of teaching and learning that included technology. Just as important, Henessy, Ruthven and Brindley recommended that teacher involvement should be at the centre of technology integration in teaching and learning rather than the technology itself [17].

Albirini provided a developing country perspective in his study of Syrian teacher attitudes toward ICT. Albirini argued that, while teachers have mostly positive attitudes regarding the integration of technology in schools, merely providing schools with technology will not achieve the changes mandated by government policy (2004, p.386). He maintained that policy makers must be cognizant of the fact that educational reform will only happen if teachers have positive attitudes towards such a process. In doing so, Albirini implied that plans for the integration of ICTs in schools should take into account teacher perspectives regarding such reform [18].

Integration and Adoption of ICT into Teaching and Learning

No matter how undeveloped countries might be, virtually most of them recognize that ICT development is the key to future prosperity. Therefore, teachers' pedagogical content knowledge in era of technological advancement must develop to take account of ICT, noting that the speed and extent of the development can vary between teachers depending on their degree of confidence and competence with these technologies (Kennewell & Beauchamp, Ajelabi, opined that individual differences among learners can influence the outcome of instruction. In recent times, many researchers have lamented on the integration of ICT into the curriculum as a major factor for curriculum developers. Some based their criticism on teachers not been taught in their training institutions, inability of teachers to decide the appropriate use of it for instruction, lack of teachers knowledge of subject matter and so forth [19, 20].

Kemmis *et al*. and Tella *et al*., there are three main approaches to ICT which can be taken by teachers. They are as follows [21, 7];

1. **Integrated Approach:** planning the use of ICT within the subject to enhance particular concepts and skills and improve students' attainment. This involves a careful and considered review of the curriculum area, selecting

the appropriate ICT resources which will contribute to the aims and objectives of the curriculum and scheme of work, and then integrating the use of relevant lessons.

2. **Enhancement Approach:** planning the use of an ICT resource which will enhance the existing topic through some aspects of lessons and tasks. For example, using an electronic white board for presenting theory about a topic. In this approach, the teacher plans to complement the lesson with an innovative presentation method to promote class discussion and visualization of problems.
3. **Complementary Approach:** using an ICT resource to empower the pupils learning, for example by enabling them to improve their class work by taking notes on the computer, or by sending home work by email to the teacher from home or by word processing their homework.

Therefore, educators have shown concern on how instructional needs are met while making use of ICT as a mode in instructional delivery. Some amongst many ways in which include the following:

1. **Computer Managed Instruction:** This refers to programme that evaluate and diagnose students need, guide them through the next step in learning and record their progress. Onasanya citing Harold classified the functions performed by computer managed instruction into two as follows: the function support- for basic users, including students, instructors, administrators and curriculum developers and evaluators- and the instructional management related functions- such as diagnosis of students, making prescription based on results of test, monitoring the performance of students, allocating or scheduling the instructional resources specified by the prescriptive process and reporting through storage in the data base for records.
2. **Computer Aided Design (CAD):** These are graphics software which offers a variety of 3-dimensional modeling and visualization features. They allow images to be rendered completely, dangerous events to be simulated and making tedious tasks to be easier and less time consuming.
3. **Computer Assisted Instruction:** Though popularly referred to as CAI, it has several nomenclatures such as Computer Assisted Learning (CAL), Computer Based Learning (CBL), Computer Based Training (CBT), etc. it is an interactive technique which allows computer to be used for presenting instruction and also monitor the process of presentation. It can be used in the classroom in the area of drill and practice, tutorial, simulation demonstration, designing, data collection, analysis and games.
4. **Programming**: this is the art of conceiving a problem in terms of the steps to its solution and expressing those steps as instruction for the computer to follow. Students and teachers can develop their programme using special computer programmes like BASIC, FOTRAN, COBOL, etc.

Therefore, knowledge in the use of computer technology such as privacy and artificial intelligence, skills in flow charting, skills in software and hardware maintenance, etc. would also be of beneficial knowledge in the process of using ICT for classroom instruction. Teachers should endeavor to integrate ICT in teaching as it provides different modality to instruction and also makes it less cumbersome.

To integrate ICT effectively into the educational system, strategies should balance economic and social issues to allow combination of growth with the development of society. In order to enhance 21st century skills in the field of Education, policy makers and practitioners should focus on seven key conditions as stated by International Society for Teacher Education (2008) as it allows for proper integration of technology as follows: effective professional development for teachers in the integration of technology into instruction is necessary to support student learning, teachers direct application of technology must be aligned to local and/or state curriculum standards, technology must be incorporated into the daily learning schedule (i.e., not as a supplement or after-school tutorial), programs and applications must provide individualized feedback to students and teachers and must have the ability to tailor lessons to individual student needs, technology use must be incorporated in a collaborative environment to be most effective, project-based learning and real-world simulations must be the main focus of instructional technology utilization and effective technology integration requires leadership, support, and modeling from teachers, administrators, and the community/parents.

Appraisal of the Reviewed Literature

In this review or related literature, the perception of basic science and technology teachers in the use of ICT tools for teaching have been widely discussed. There is strong proof that the use of Information and Communication Technology by basic science and technology teachers aid the dissemination of knowledge depending on the availability of ICT tools and the teachers' exposure to innovation. In the literature review there are many definitions of Information and Communication Technology (ICT). ICT is an electronic based system of Information transmission, reception, processing and retrieval, which has drastically changed the way we think, the way we live and the environment in which we live. It can be used to access global knowledge and communication with other people [22]. Yusuf and Onasanya opined that information and communication technology provides opportunities for schools to communicate with one another through e-mail, mailing list, chat room and other facilities [11]. It provides quicker and easier access to more extensive and current information.

However, the use of ICT in teaching and learning is most definitely not cheap solution for secondary education, but by facilitating the creation of new modes of teaching and learning and provision of education resources, it is believed to have a significant role to play in education sector. To date the integration of ICT tools into teaching and learning has not been successful. Emphasis has been put across the continent to provide teachers and students with relevant ICT skills in the hope that this will mystically enable them to embrace the use of ICT positively in teaching and learning institution.

In summary one can say Information and Communication Technology improve teaching and learning activities of the teachers. It has the potential to accelerate, enrich and deepen skill, motivate and engage students in learning, help to relate schools experiences to work practices, help to create economic viability for workers, contributes to radical changes in school and the world [23]. With the way technology are increasing, existing method being positioned

as ICT tools, and different teachers using different techniques, one need a more objectives view of sustainability method of using ICT tools. Even if teachers are provided with up-to-date technology and supportive networks, they may not be enthusiastic enough to use it in classroom. Teachers need to be given the evidence that ICT can make their lessons more interesting, easier, more fun for them and their pupils, more enjoyable and more motivating. Clearly, as Willis *et al* (2003) argue, more case studies are needed that bring to light innovations in the use of technology that have been implemented and studied over several years [24].

Conclusion

Understanding the cognitive and affective factors influencing Basic Science and Technology teachers' use of ICT tools is crucial for effective technology integration in education. A psychological perspective reveals how beliefs, attitudes, and emotional readiness shape ICT adoption. By addressing these psychological elements through training and support, educators can enhance their confidence and motivation, ultimately improving teaching practices and student outcomes in an increasingly digital learning environment.

References

1. Kozma RB, Isaacs S, Editors. Transforming education: The power of ICT policies. UNESCO, 2011.
2. Al-Natour M, Alkhamra H, Ajouni I. The status quo of using ICT in teaching among special education teachers in Amman, Jordan schools, 2008. Avail at: www. itdl. org
3. Machlup F, Gordon K, Ackley G. Hines, James R. Three Sides of Harberger Tri-angles. Journal of Economic Perspectives. 1999; 13(2):167-188.
4. Sholle D. Informationalism and media labour. International Journal of Media & Cultural Politics, Feb 1, 2005; 1(1):137-42.
5. Sambe MT. Information Search Strategy and Retrieval Tools in Libraries.
6. Galbraith J, Cummings LL. An empirical investigation of the motivational determinants of task performance: Interactive effects between instrumentality-valence and motivation-ability. Organizational behavior and human performance, Aug 1, 1967; 2(3):237-257.
7. Tella A, Tella A, Toyobo OM, Adika LO, Adeyinka AA. An Assessment of Secondary School Teachers Uses of ICT's: Implications for Further Development of ICT's Use in Nigerian Secondary Schools. Turkish Online Journal of Educational Technology-TOJET, Jul 2007; 6(3):5-17.
8. Perez C. Technological revolutions and financial capital: The dynamics of bubbles and golden ages. In Technological revolutions and financial capital. Edward Elgar Publishing, Aug 22, 2002.
9. Dai L, Finley T, McCormack S. ICT and Education in Developing Countries: Shifting Initiatives toward a Sustainable Society.
10. Kozma RB, Isaacs S, Editors. Transforming education: The power of ICT policies. Unesco, 2011.
11. Yusuf MO. Information and communication technology and education: Analysing the Nigerian national policy for information technology. International Education Journal, Jul 2005; 6(3):316-321.
12. Adomi EE, Kpangban E. Application of ICTs in Nigerian secondary schools. Library Philosophy and Practice, Mar 1, 2010; 1.
13. Adeoye BF, Olabiyi OS. Basic technology textbooks in Nigerian secondary schools: A quality and content analysis. 国際教育協力論集, Mar 31, 2012; 14(2):153-168.
14. Fakomogbon MA, Morakinyo OK, Omiola MA, Ibrahim KA. Assessment of facilities available for teaching Basic Technology subject in the junior secondary schools in Ilorin metropolis. Interdisplinary Journal of Contemporary Research in Business. 2012; 3(10):4-5.
15. Brill JM, Galloway C. Perils and promises: University instructors' integration of technology in classroom-based practices. British Journal of Educational Technology, Jan 2007; 38(1):95-105.
16. Levin T, Wadmany R. Teachers' beliefs and practices in technology-based classrooms: A developmental view. Journal of Research on Technology in Education, Dec 1, 2006; 39(2):157-181.
17. Hennessy S, Ruthven K, Brindley SU. Teacher perspectives on integrating ICT into subject teaching: Commitment, Constraints, Caution, and Change. Journal of curriculum studies, Jan 1 2005; 37(2):155-192.
18. Albirini A. Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. Computers, Education. 2006 1 Dec; 47(4):373-398.
19. Beauchamp G, Kennewell S. The influence of ICT on the interactivity of teaching. Education and Information Technologies, Dec 2008; 13:305-315.
20. Ajelabi PA, Agbatogun A. Perception of Nigerian Secondary School Teachers on Introduction of e-Learning Platforms for Instruction. Online Submission, Dec 2010; 7(12):83-88.
21. Tella A, Tella A, Toyobo OM, Adika LO, Adeyinka AA. An Assessment of Secondary School Teachers Uses of ICT's: Implications for Further Development of ICT's Use in Nigerian Secondary Schools. Turkish Online Journal of Educational Technology-TOJET, Jul 2007; 6(3):5-17.
22. Ogunsola LA. Information and communication technologies and the effects of globalization: Twenty-first century digital slavery for developing countries-Myth or reality?
23. Kirschner P, Wopereis IG. Mindtools for teacher communities: A European perspective. Technology, Pedagogy and Education, Mar 1, 2003; 12(1):105-124.
24. Willis A. The role of the global reporting initiative's sustainability reporting guidelines in the social screening of investments. Journal of Business Ethics, Mar, 2003; 43(3):233-237.
25. Hines James R Jr. Applied Public Finance Meets General Equilibrium: contributions of arnold harberger. Journal of Economic Literature. 2001; 60:648.