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Building Teachers' Capacity for Effective Technology Integration into Teaching and Learning in Tertiary Institutions in Nigeria

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Abstract: ***The paper focused on building teachers' capacity for effective technology integration into teaching and learning in tertiary institutions. The concept of capacity building has been discussed and justification for it elucidated. Also, identified and deliberated was technological, pedagogical and content knowledge (TPACK) framework as viable model for enhancing teachers' capacity to integrate technology into teaching and learning effectively. The paper also identified and discussed guidelines for effective technology integration into teaching and learning in tertiary institutions and finally it was suggested among others that there should be adequate funding as fundamental requirement to meet the training needs of staff and provide technological tools and other basic infrastructures.***

Keywords: Capacity Building, Technology Integration and Effective Teaching.

1. INTRODUCTION

The instrumentality of education for achieving national development cannot be overemphasized. Education sector has increasingly continued to receive attention from government and civil society organisations with a view to improving the quality of education at all levels. Considering the role of teachers as key actors and implementers of school curriculum, it will be an overstatement to the fact that no education system can raise above the quality of its teachers. Teachers have profound influence on all the activities set to attain educational goals. To this end, all efforts to ensure effective teaching and learning in our schools are largely dependent upon the number of well-trained teachers supported by adequate facilities and efficient administration committed to provision of leadership instrumental in goal achievement. In the last two decades, education system in Nigeria has witnessed a number of reforms, successive ambitious policies with concomitant expectations

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in terms of students' and teachers' performance at all levels. Information and communication technology (ICT) has pervaded education in general and teaching-learning process in particular. It has shaped the ways teachers and students interact. Educators are, today faced with new role and challenges of both using ICTs and preparing students for effective use of ICT. In order for teachers to be able to educate their students, they themselves need to be equipped with skills in using and teaching with ICT (Damian, Shukri, Leanne, Keys & Roger, 2013). Effective technology integration is by far the most important area many institutions are investing their resources today.

In recognition of the changing role of technology in global economy and the need for sustainable national development in the country, the tertiary education level has received, in varying forms, many reforms and measures aimed at improving students' learning. Many of such measures were not accompanied with provision of appropriate skills, expertise and facilities to teachers as executers of new reforms and policies. Computer Studies was introduced into tertiary institution curricula as part of government's measures to tackle emerging social, economic and political challenges facing the country on one hand and to prepare the students for the world of work on the other. The fact that most of these reforms are intimately linked to instructional practices, their success is largely determined by the capacity of teachers to carry them out. To this end, Adebayo and Sagaya (2016) stated that the continuous changes in the school curriculum made it imperative for the teachers to be well prepared for these changes and challenges. Capacity building has been recognized as integral part of every organisation. It helps in enhancing the abilities of organisations for effective service delivery. Schools as formal organisations can provide opportunities for teachers to enhance their skills, abilities and knowledge in order to impact positively on students' learning.

The ultimate goal of teaching is to bring about learning on the part of the students. Most often, teachers do their possible best to ensure learning has taken place. These teachers can only give what they have. The pervasive forces of technology are gradually transforming the education sector particularly teachers and students' activities who must be ready to adapt to a rapidly changing world. Teachers are required to use technology to maximize students' learning and enable them to utilize it for learning and later in the world of work.

Conceptual Groundwork

Capacity building (CB) means different thing to different people at different circumstances. CB is learning process which increases the ability, skills, knowledge of an individual or organisation to work effectively in order to achieve desired outcomes. Capacity Building can be described as the process of helping local actors to acquire and use information relevant to successful policy implementation. The Department for International Development (DFID) (2010) defines capacity building as enhancing the abilities of individuals, organisations and systems to undertake and disseminate high quality research efficiently and effectively. In educational institutions, CB involves all processes by which the performance of teaching and non-teaching staff is enhanced through interactions between school personnel on one hand and more experienced and knowledgeable individuals on the other. The interactions may take different forms such as workshop, conference, in-service training etc. the ultimate goal of

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which is to help individuals acquire certain capabilities germane to attainment of desired goals.

Justification for Teachers' Capacity Building

Capacity building is integral part of every tertiary educational institution. Among other goals of tertiary institutions in Nigeria as stated in the Federal Republic of Nigeria (FRN) (2013) include to:

1. Contribute to national development through high level manpower training
2. Provide accessible and affordable quality learning opportunities in formal and informal education in response to the needs and interests of all Nigerians
3. Reduce skills shortages through the production of skilled manpower relevant to the needs of labour market.

To this end, tertiary institutions shall pursue these goals through quality teaching and learning, research and development, high standards in the quality of facilities, services and resources, staff welfare and development among others. Of all the variables affecting learning process, teacher has the most powerful influence on the learning outcomes. Teachers' capacity is fundamentally important if effective learning is the motive of the tertiary institutions in the country. Learning is influenced by the unique characteristics teacher brings to classroom. Teachers' content knowledge, attitudes and readiness to work are some of the characteristics that affect the quality of instruction and in turn students' performance in educational institutions. To this end, Akinmusuru, in Romina (2013) attributed the low quality of Nigerian universities graduates to little attention given to teaching effectiveness, stressing that institutional policies are not geared towards making students learning a priority. CB enhances lecturers' abilities, skills, competencies and knowledge to improve their performance and achieve the set objectives. Many researchers have put forward reasons affirming the necessity for building capacities of tertiary institutions' teaching staff for improved efficiency in the discharge of their responsibilities. Universities require enhancement of their capabilities to generate and disseminate knowledge from time to time if they are to remain relevant in the present world realities where globalization holds a pride of place (Basil, Felix & Eno, 2013).

Teaching staff in Nigerian tertiary institutions are being blamed for observed anomalies presently prevalent in their institutions. The colossal level of student failure in the country is a clear indication of the fact that there are significant problems within the system (Udoikah & Omeje, 2017). The recurrent industrial actions by the lecturers of tertiary educational institutions (universities, colleges of education, polytechnics etc.) is another indication of unaddressed challenges at this level of education. Most of these industrial actions are triggered by agitations centred on needs for increased funding, improved condition of service for staff, addressing infrastructural decay among other things. In 2012 the FGN carried out Needs Assessment of Nigerian Universities. The report of this exercise could best be described as shocking revelations of the poor state of staffing, infrastructural facilities and funding eminent in Nigerian universities. The needs assessment report of Nigerian public universities exposed a disturbing level of decay in public universities in Nigeria (Nnorom, & Nwakaire, 2015). One critical issue ASUU has been struggling for in this country is the need

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for increased funding of public universities and evidently this has not yet received needed attention from relevant state and federal authorities.

Inadequate funding is the bane of public higher institutions in particular and education in general. The report of 2012 need assessment of public universities in the country found serious financial constraint in the nation's ivory tower and thus the need for revitalisation through increased funding. The present practice whereby recurrent allocation from government contributes 68% of the total annual public universities' spending is not yielding positive result. To ameliorate the situation, the federal government singed MoU with ASUU (2012 FGN-ASUU's MoU) to inject over three trillion naira into university system for revitalisation. The money was to be spread into three trenches for disbursement to benefiting tertiary institutions. However, this has not been actualised for government failed to implement the content of the MoU. When funds are not available or sufficient, academics work under difficult conditions and the teaching-learning process is hampered. Many lecturers may not be able to go on training, attend conferences, workshops and have access to basic facilities for effective learning. Institutions cannot procure facilities and equipment needed for quality education delivery.

Capacity By Building For Effective Technology Integration In Tertiary Institutions: The Tpack Framework

As far back as 1986 Shulman introduced the concept of pedagogical content knowledge (PCK) to describe the relationship between content knowledge (what) and pedagogical knowledge (how). According to Shulman (1986) teachers should develop PCK, which is "the particular form of content knowledge that embodies the aspects of content most germane to its teachability". For effective teaching, content knowledge and knowledge of how to present the content are indispensable. This initial conception of knowledge bases needed for effective teaching propounded by Shulman was expanded to incorporate technological knowledge to enable teachers teach with technology. To this end, Koehler and Mishra (2005) built on Shulman's notion of PCK to articulate the concept of technological pedagogical content knowledge (TPACK) giving rise to three knowledge bases.

Integrating technology into teaching appears to be challenging and complex to teachers. Teachers are required to make drastic change of their pedagogical practices in order to appreciate the value of new and unstable technologies that are transforming instructional practices. Koehler & Mishra (2009) thus, stated that it is not surprising that teachers do not consider themselves sufficiently prepared to use technology in the classroom and often do not appreciate its value or relevance to teaching and learning. Many teachers are sceptical to use technologies for lack of prerequisite knowledge and skills to integrate them into their practices. A more flexible knowledge required to successfully integrate technology into teaching and learning is embodied in the TPACK framework. The TPACK represents the complex connection and interaction among three bodies of knowledge: technology, pedagogy and content. The three components are the knowledge bases that form the heart of effective technology integration.

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It is fundamentally important to mention at this juncture that there is interplay between several different knowledge bases and their subsets subsumed under TPACK framework. The knowledge components of TPACK are shown in fig. 1 below:

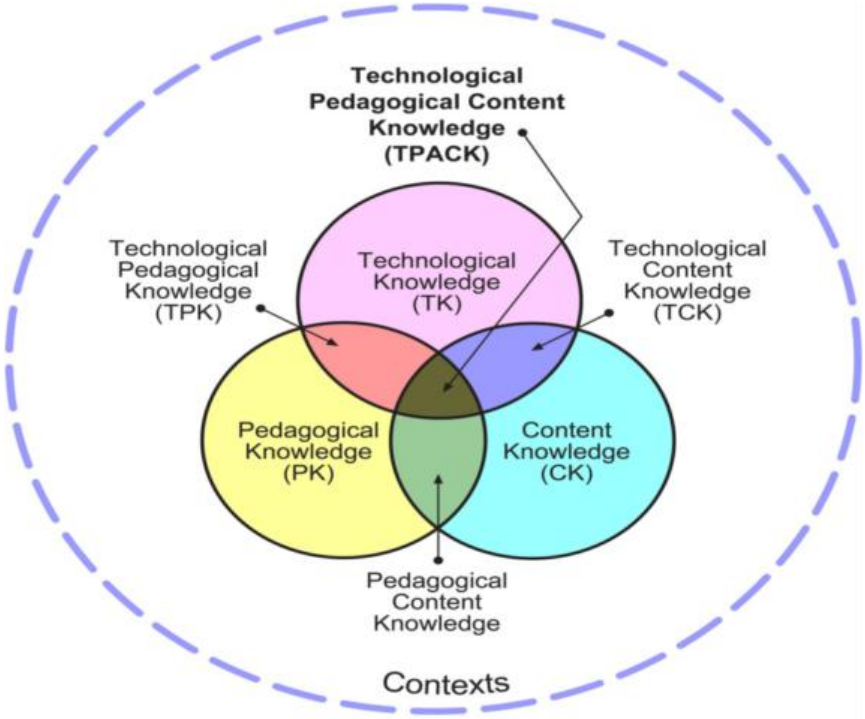


Fig. 1: Knowledge Components of TPACK Framework

Content Knowledge (Ck)

This knowledge is of great importance to the teaching of any subject at all levels of education. It represents knowledge of the subject matter to be learned or taught in a given area of study. Teacher is expected to have a good mastery of subject matter in terms of concepts, ideas, theories, principles, practices etc. depending on the subject area under consideration. Knowledge and the nature of inquiry differ greatly between fields, and teachers should understand the deeper knowledge fundamentals of the disciplines in which they teach (Koehler & Mishra, 2009). Effective teaching and learning is largely determined, amongst other things, by the content knowledge a teacher possesses. As such, lack of comprehensive, up-to-date content knowledge can inhibit effective learning and results in misinformation and misconception. For effective technology integration, institutions should provide opportunities for staff to update their content knowledge and keep abreast of new development in their various fields.

Pedagogical Knowledge (Pk)

This is knowledge related to how to teach various content, understanding of how students learn and how to use various teaching methods, techniques and strategies. Teacher's pedagogical knowledge includes knowledge of assessment techniques and how to remedy students' learning difficulties. Reiterating the importance of pedagogical of knowledge to teacher, Koehler and Mishra (2009) stated that a teacher with deep pedagogical knowledge

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understands how students construct knowledge and acquire skills and how they develop habits of mind and positive dispositions toward learning.

Pedagogical Content Knowledge (Pck)
This is knowledge that enables the teacher use various strategies to present specific content to student. Quality instruction requires comprehensive knowledge of instructional strategies. Shulman in Brantley-Dias, Shoffner and Kinuthia (2005) defined PCK as the teachers' ability to identify learning difficulties and students' misconception combined with the fluidity to transform subject matter using "the most powerful analogies, illustrations, examples, explanations, and demonstrations. The interaction of content or subject matter and pedagogy knowledge bases produces PCK which in turn allows the teacher to transform th subject matter for effective teaching. As PCK domain, teachers is expected to know what make the teaching and learning of specific content difficult.

Technology Knowledge (Tk)
Knowledge of technology goes beyond knowing about technology but a deep understanding and appreciation of technology is paramount for effective learning. TK includes what teacher should know and be able to do with technology, that is understanding and productive application of technology in classroom instruction. There are variety information technologies teachers and students can use to accomplish a given task.

Technological Content Knowledge (Tck)
Technology has influenced the subject matter of many disciplines. Technology and content knowledge are intricately related. Understanding the impact of technology on the practices and knowledge of a given discipline is critical to developing appropriate technological tools for educational purposes (Koehler & Mishra, 2009). Technological advancement has brought with it a number of digital tools that affect curricular content decision in that teachers need a deep understanding of how curricular content can be changed by the application of specific technologies. TCK represents the point at which content and technology intersect.

Technological Pedagogical Knowledge (Tpk)
This refers to teacher's understanding of how the use of specific technologies can transform the teaching learning process. Teachers need to be innovative, creative, opened-minded and willing to use technology beyond its common use. For instance, social networking can be transform to suit teaching learning situation. According to Koehler and Mishra (2009) teachers need to reject functional fixedness and develop skills to look beyond most common uses for technologies, reconfiguring them for customized pedagogical purposes.

Technology, Pedagogy, and Content Knowledge (Tpack)
TPACK refers to knowledge base needed to effectively integrate technology into teaching and learning. This knowledge base brought together all the three knowledge bases of content, pedagogy and technology germane to effective technology integration. TPACK has been described as integration of the development of knowledge of subject matter with the development of technology and of knowledge of teaching and learning (Niess, 2005). TPACK is an understanding emanating from an interplay among content, pedagogy and

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technology knowledge. Capacity building programmes are expected to make provision for teachers to acquire skills in using technology effectively in addition to subject matter knowledge and knowledge of teaching and learning. TPACK goes beyond knowledge of three primary components (content, pedagogy and technology), it implies a form of knowledge that lies at intersections between the three primary forms. This is the knowledge required by teachers for technology integration in their teaching.

Many times, initiatives to stimulate teachers' interests in technology use and foster students' engagement in schools are producing very low return particularly in Nigerian tertiary institutions. This might not be unconnected to the fact that teachers are not provided with adequate support to use technology effectively in classroom. TPACK provides a more effective means of developing knowledge for technology integration among both beginning and experienced teachers (Koehler, Mishra, & Yahya, 2004; Mishra & Koehler, 2006).

Guideline for Effective Technology Integration

The benefits derivable from technology integration are enormous. If properly integrated, technology has the potential to improve the success of teaching learning process. It is therefore imperative to adopt mechanism that serve as roadmap to successful technology integration in tertiary institutions. Jhurree (2005) provided a list of guidelines meant to be used for the establishment of priorities and goals regarding national policies on technology integration in education. These include but not limited to the following:

A. Identification of priority area: Considering the social, economic, educational and technological realities of the country, priority list can be formulated in terms of ICT before considering how much money an institution or government has. This also takes into account the context where ICT will be integrated.
B. Technology integration implementation plan: implementation plan should be clearly prepared with a clearly defined millstone and schedules. The plan should take into consideration the real school needs, goals and objectives, availability of resources, training and staff development needs and funds.
C. Major stakeholders' involvement: the success of technology integration in to teaching and learning is dependent upon active involvement of key stakeholders as teachers, school administrators and parents in decision making regarding technology integration in schools. This can go a long way in changing their apprehensive attitude which appear detrimental to successful technology integration.
D. Exploring funding sources: funds is prerequisite for the implementation of technology integration plan. Procurement of hardware and software, subscription of internet connectivity and facilities compel authorities to explore all possible sources of funding. Tertiary institutions may explore private gifts, donor organisation to realise the objective.
E. Provision of adequate school technological infrastructure: it is imperative for the success of technology integration, government should equip these institutions with necessary technological tools such as computers to ease access by both students and teachers. An important milestone for countries both developing and developed is to equip their schools with computers and associated accessories and tools such as appropriate educational software, printers, scanners and multimedia system in laboratories (Jhurree, 2005).

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Internet connectivity facilitates communication and collaboration between teachers and students. However, in developing countries this network connection is relatively expensive but through collaboration and synergy of all stakeholders, the dream of providing internet access can be a reality.

F. Meeting the staff training needs: different categories of staff such as academics, administrators and librarians need to be trained. The training should be ordered according priority as academics require more training than other staff.

G. Gradual integration of technology into instruction: technology integration is gradual process. As such it is not advisable to change current classroom instructional practices of teachers abruptly without giving them ample time to get used to the presence and utilisation of technology as instructional aids (Jhurree, 2005).for the transition from non-technology based to technology based instruction to be successful, the process must be gradual and properly planned to allow for increasing appreciation of technology for instruction by the teachers.

H. Provision of technical support to institutions: most educational institutions are in need of technical support in order to effectively integrate technology into teaching-learning process. According to Jhurree (2005) areas where such support is required include: a) maintenance and repair of technological devices; b) training support to teachers on how to use technology in their classroom instruction and c) adequate support to both teachers and administrative staff on how to use technology for communication and administrative purpose.

Tertiary institutions in developing countries are encouraged to source for technical support both within and from other institutions. The ultimate goal is to ensure that teachers and other staff are equipped with necessary skills and knowledge germane to effective use of technology. Setting up of information and educational network linking schools and other educational organisation: there is nee d for tertiary institutions to set up information and educational network to allow for cooperation, communication and collaboration efforts. Examples of such networks are African School Net, School Net South Africa etc.

2. CONCLUSION

Knowledge explosion, emerging technologies curricular reforms have continued to transform instructional practices in our schools thereby placing more and more expectations on teachers. Capacity building has appeared to be a surest means by which teachers of tertiary institutions can be prepared to meet the ever-increasing demands of rapidly changing world. To this end, the TPACK framework provides more effective and comprehensive approach to professionally develop and enhance teachers' capacity for technology integration in tertiary institutions. Teachers can only give what they have, as such therefore, capacity building is inevitable. The TPACK as embodiment of different knowledge bases a teacher requires to integrate technology into his teaching serve as vehicles by which many institutions can transform their educational landscape which in turn would help to prepare students for global competativeness.

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Suggestions

1. There should be adequate funding which is fundamental requirement in order to meet the training needs of staff, procure technological tools and infrastructures by the institutions;
2. Effective collaboration and communication should be established amongst tertiary institutions within and outside the country to enable them access and share support both technically and professionally; and
3. Tertiary Institutions should organise training workshops and seminars regularly aimed at helping teachers to use technology effectively and transform their instructional practices for better learning.

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