CURRICULUM INNOVATION IN TECHNOLOGY EDUCATION: THE WAY FORWARD

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Abstract

The paper examine the curriculum innovation and the way forward in Nigeria. The development of the nation lies on its vibrant technology curriculum particularly for the developing nation like Nigeria. The curriculum of technical education in Nigeria need update because of technology innovation in the world. Although the current curriculum for technology education has a lot of issue in the implementation process. Technology education is a multifaceted, multi-disciplinary field of study which is aim at equipping the learner with technical requisite skill. The paper therefore focused on the importance of curriculum innovation in technology education as well as possible suggestion for moving the technology innovation curriculum for technology education.

Keywords: *Curriculum, Innovation, Technology, Education.*

Introduction

Nigeria has a long way to go in terms of curriculum innovation in technology education in order to be relevant in the labour market in 21st century. In Nigeria, the technical institution is still heavily burdened with a lot of setbacks ranging from policy formulation, curriculum implementation to curriculum innovation. The issue is not formulating policies but empowering the implementers to successfully execute the policies. There is need for values reorientation so as to inculcate in the learners the right attitudes, values and the acceptable norms in Nigeria (Afuah, A. 1998). All the stakeholders in the educational sector especially technical education must come together to set the right priorities in education so as to join in the ongoing technological race. It is only when this is done that Nigeria will achieve her lofty goals of buoyant economy and self- reliance.

The importance of curriculum innovation to overall future corporate success cannot be over emphasised in this modern world. We believe that innovation is the engine that will keep business organizations vital and growing. They create and rapidly convert technology skills into products and services, constantly searching for new ways to make technology more useful to customers. Curriculum innovation is the principal driver of societal and global growth. To UNESCO (2011), curriculum consists of a statement of aims and objectives, of content in terms of theoretical knowledge, practical skills to be acquired, attitude towards work and necessary support materials to be used in its presentation. A curriculum usually defines; objectives, outcomes and contents of education and training processes and activities necessary for their achievement and implementation (organizational forms strategies models and methods of

teaching and learning) and ways of assessment and criteria for the assessment of achievement (Republic of Serbia, 2008). According to Offorma (2014), curriculum can be define as the document plan or blueprint for instructional guide, which is used for teaching and learning to bring about positive and desirable leaner behavior change. According to Lin (2006), the word innovation is originated from Latin word, innovare which means "to make something new". Back in 1985, Drucker (1985) had define innovation as the entrepreneur specific tool to exploit change for diverse business or service. He added, this innovation can be presented as a discipline which can be learned and practiced. In other words, innovation is also said as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Daugherty et al., 2011; Grawe, 2009; Rogers, 1995).

Afuah (1998) suggested that curriculum innovation is the "use of new technical and administrative knowledge to offer a skills to new product or services to customers". Thus many authors concluded that curriculum innovation is "any practices that are new to organizations including equipment, products, services, processes, policies and projects".

Similarly, according to Frascati Manual (OCDE, 2002), technological innovations comprise new or significantly modified technological products and processes, where technological novelty emerges, unlike improvements from their performance characteristics. Pavin (1987) notes "most technologies are complex and are cumulative. They are specific for companies at whose level technologic activity predominantly occurs", while inventors may result from different economic and social environments, innovation are mainly a result of the firm's activity. To be capable to utilize an invention and turn it into innovation, the firm should efficiently combine information, human, financial and materials resources and existence of a functional distribution system is needed. From such perspective, the inventors role differs from that of inventors/person or organisation unit responsible for required factors combination; Some common features of technology innovation process are:

> They imply exploring opportunities for achieving new improved goods (products and services) based upon technical knowledge as well as the market demand change or a combination of the two. Investment efforts of technological innovation predominantly correspond to "development and production engineering, in which knowledge is accumulated by experience in production, learning by using and learning by doing (Pavitt, 1987).

> It is impossible an accurate provision of cost and performances involved in the innovation process mainly based on research and development and users' reaction to the new artifacts. Innovation is based on the use of previously acquired knowledge, on the results of new technologies, on the technological development or on the new combinations of existing technology.

Issues of Implementing Technology Education Curriculum Innovation at Different Technical Education Levels

Technology education curriculum implementation concept is the execution of curriculum document. It is the interpretation of curriculum by the teacher and learners. It is the practice and instruction phases of the curriculum process. According to Saylor, Alexander and Lee, (1982). "It is the actual engagement of learners with learning opportunities. Curriculum implementation is the transmission of the planned curriculum into operational curriculum (Offorma, 2005). The major implementers of the curriculum technology education are the teachers. They set up learning opportunities aimed at enabling learners acquire the desired

knowledge, skills, attitude, and values. Technology education curriculum implementation is fraught with a lot of issues which include: Curriculum overload, Large class population, Dearth of instructional resources, Teachers factors, Examination malpractice and Evaluation Ivowi, U.M (2005).

Environmental Issues and Innovation Technology Education Curriculum

Environment is very crucial to the teaching-learning-processes. For effective curriculum implementation the environment must be adequately organized and arranged. This is categorized into physical, social, and psychological components. The human and material resources as well as interaction and attitudinal behaviours in the classroom make up the classroom environment Ivowi, U.M (2005).

The physical environment is made up of the material resources, infrastructures, equipments, structures at home, school and community. The social environment is made up of the social life, societies and clubs. It is also the interaction setting, patterns, modes and media within school eg. The classroom setting, teacher-pupil, pupil-pupil patterns. The psychological environment deals with the condusiveness of the classroom environment. The teacher-learner, learner-learner, learner-method and leaner-material interactions also constitute the psychological classroom environment. The classroom environment may defer from one class to another. It has been found that enriched classroom environment influence learning and thus curriculum implementation Ezeudu (1999), Ofomata and Phil-Eze (2001), Mgbodile (2005) recommend a good classroom/school climate for effective curriculum implementation.

Information and Communication Technology (ICT) and Innovation Technology Education Curriculum

The introduction of information and communication technology into the school system "is one of the innovations and changes in the National policy on Education" (FGN 2004). The world has become a global village and Nigerians have to be trained in the new devices and technologies to be able to follow the trends. The computer, internet, e-mail, video conferencing, the web and electronic white board are valuable to both learners and teachers, information and communication Technology provides skills for individualistic and group work. It also promotes interest and motivation in the learners and facilitates the teachers tasks. ICT introduces variety to the resources and learning styles thus making learning fun.

Issues of Innovation, Reforms and Changes and Technology Education Curriculum

The essence of technology education is to transfer the skill to the society through the learners. Curriculum is a vehicle through which this is achieved. The society is dynamic and changes occur now and then, it is through the curriculum that the positive and acceptable changes in the society are implemented. As new change occur, innovations and reforms are introduced. In Nigeria some educational innovations have occurred and call for reforms in the content resources and evaluation procedures.

Alebiosu (2005) wrote that the reason for innovation in the curriculum is to update the curriculum to enable it meet the demands of the changing society as well as society needs and aspirations. Therefore curriculum reform or review is embarked on whenever there is the need. But as a rule of the thumb, national curricula are advised to be implemented for about ten years before they are reviewed. This is to allow for an opportunity to interact with a wide range

of ability students and with the various components of the curriculum change and innovation agents.

The importance of technology and innovation must be emphasized by people at the very top and reinforced by people throughout the corporation. The innovation issues include.

1) Technological Development: Most new developments that threaten existing business practices and technologies do not come from existing competitors or even from within traditional industries (Towner, 2004). A new technology that can substitute for an existing technology at a lower cost and provide higher quality can change the very basis for competition in an industry. Consider, for example, the impact of internet technology on the personal computer software industry.

2) Impact of Stakeholders on Innovation: A company should look to its stakeholders, especially its customers, suppliers, and distributors, for sources of products and service improvements. These groups of people have the most to gain from innovative new products or services. Under certain circumstances, they may propose new directions for product development. Some of the methods of gathering information from key stakeholders are using lead users market research and new product experimentation.

3) Resources Allocation Issues: The company must make available the resources necessary for effective research and development. Research indicates that a company's R &D intensity (its spending on R & D) as a percentage of sales revenue is a principal means of gaining market share in global competition (Franko, 2005). The amount of money spent on R & D often varies by industry.

4) Time to Market Issues: In addition to money another important consideration in the effective management of research and development is time to market. A decade ago, the time from inception to profitability of a specific R&D programme was generally accepted to be 7 to 11 years. According to Karlheinz Kaske, CEO of Siemens AG, however the time of available to complete the cycle is getting shorter. In the past, Kaske says, 10 to 15 years went by before old products were replaced by new ones now, it take only 4 to 5 years" (Hill and Yamada, 2012). Time to market is an important issue because 60% of patented innovations are generally imitated within 4 years at 65% of the cost of innovation.

5) Strategy formulation: research and development strategy deals not only with decision to be leader or a follower in terms of technology and market entry but also with the source of the technology. Should a company develop its own technology or purchase it from others;? The strategy also takes into account a company's particular mix of basic versus applied and product versus process R&D. The particular mix should suit the level of industry development and the firms particular corporate and business strategies. The global issue features illustrates how a company's competence in different aspects of R&D can affect its competitive strategy and its ability to successfully enter new market.

6) Products versus process R&D: The proportion of product and process R&D tends to vary as a product moves along its life cycle. In the early stages, products innovations are most important because the product's physical attributes and capabilities most affect financial performance. Later, process innovations such as improved manufacturing facilities,

increasing product quality and faster distribution become important to maintaining the product's economic returns. Generally, product R&D has been a key to achieving differentiation strategies, whereas process R&D has been at the core of successful cost leadership strategies.

Need for Technology Education Curriculum Innovation

Technology innovation is developing new ideas, products, services and processes which exploit technology driven by new technology or by needs, it creates valuable product and build a mobile application that will address a community and global problem for global changes. The importance of technology innovation curriculum includes Automation, Integration, empowerment, analysis and accountability.

Technology automation presents the opportunity for new innovative skills for implementors to automate routine learning practices, integration technology creates a more effective flow of information among and between various learners, instructors and tools that facilitate integration, the technological empowerment directly empower learners to manage benefits and services according to their schedules and the privacy of their homes, while technological analysis helps learners understand their ability, allow them track and evaluate their performances, uncover long term trends and develop improvement and technological accountability allows for better communication of important information to instructors, learners and decision making.

According to National Education Technology Plan (NETP) 2017 update sets a national vision and plan for learning enabled by technology through building on the work of leading education researchers, schools, higher education leaders and teachers developers with principles provided in the document to support the effective use of technology to improve and enhance learning both in formal and informal settings with transformational learning in action.

Conclusion

It was concluded that technology innovative curriculum will update the skills of the learners toward making him be employed or be self-reliance. It was also concluded that technology innovative curriculum will update the improvement in human welfare increase of public health and agriculture, while value to both short and long-term economic, societal and environmental sustainability.

Technology innovative curriculum will empower learners to acquire technological knowledge and skills to be self-employed, provide trained manpower in technology and industrial, give training and impact leading to technological production.

Recommendations

1. The federal government should periodically make it compulsory to NBTE to update curriculum to include the new innovative skills in the existing curriculum.
2. Experts and professional should be involve in curriculum update in order to achieve proper implementation of new innovative skills in the existing curriculum.
3. Federal and state government should made adequately available resources full implementation of technology innovative curriculum, create awareness and training of implementer of the new innovative skills.
4. Federal and state government should encourage multinational firms to specifically develop and implementation technology through shifting their R & D to the country-setting in motion the internationalization.

Offormata G.E.K and Phil Eze; P.O (2001) (eds) Geographical perspectives on environmental problems and management in Nigeria. Enugu Tamoe enterprises.

Ollua, P.F. (2001). Developing the Curriculum 5th Ed. N.Y Longman.

Oumstein, A.C & Hunkind, F.P (1998). Curriculum foundations principles and issues Boston. Allyn & Bacon.

Partnership for 21st century learning (2013) framework for 21st century learning. Retrieved from from http://www.youtube.com/watch?v6m.

Pavict, K. (1987). The objectives of technology policy science and public policy 14, pp. 182-188.

Ribbie, M. and Bailey .G.D (2005) Digital Citizenship in schools (3rd ed.) Eugene, or: international society for technology in education.

Rogers, E.M (1995) diffusion of innovation. New York: NY

Saylord, I.G., Alexander, W.M & Lewis A.J (1982). Curriculum planning for beller teaching and learning New York: Rinehart and Winstom.

Smith, G.E. and Throne, S (2007) Differentiating instruction with technology in K-5 classrooms Washinngton, DC: international society for technology in education.

Towner, S.N. (2004). "What every business should learn from Microsoft" Journal of Business Strategy September/October pp. 36-41.

Wernet S.P. R.H, Delicath 2001, Post course evaluation of WebCT (Web Course Tools) classes by social work students. Research on social work practice, 10(4): 487- 504

UNESCO, (2005). Education for Sustainable Development.

REFERENCES

Afforma. G.C. (2005). Curriculum and communication for functionality. In Orainfo, S.O Edozie G.C & Ezeh D.N. Curriculum Issues, In contemporary education Benin City Da-Silvia Influence 197-203.

Afuah, A. (1998). Innovation management strategies, implementation and profits. New York Oxford University press.

Dougherty, P.J., Chen, H, & Ferrin, B. G. (2011). Organizational structure and logistics service innovation International Journal of Logistics management 22(1) 26-51.

Drucker, P. (1985). Innovation and entrepreneurship (MA). Cambridge.

Esu, A.E.O (2005), capacity building curriculum, a necessary for sustainable development forum 5(2), 1- 13.

Ezeudu, F.O. (1999). Science Classroom Environment as Correlate academic performance of girls in science in Oji, River LGA of Enugu State. Paper presented at the annual conference of women in college of Education. (WCE), October 27- 30/

Federal Government of Nigeria (2004). National policy on Education Lagos: NERDC

Franko, L.G. (2005). Global Corporate competition. "Who's Winning, Who's Losing and the R & D factor as one reason Why" Strategic Management Journal. September/October, pp. 449-474.

Fromm E.G and R.G Quinn (1989). An experiment to enhance the educational experience of Engineering Students. Engineering education 79, (3), 424- 429

Grawe, S.J. (2009). Logistics innovation. A literature-based conceptual framework. International Journal of Logistics Management. The 20(3), 360-377.

Hatting C. D.U Plessis J. (2004), Computer internet use by children, adolescents in 2001, Washington: Washington DC: national centre for education statistics.

Hill. G.C & Yamada, K. (2012). "Motorala, Illustrates How an Aged Giant can remain vibrant" Wall Street Journal December 9, pp. A1-A14.

Ivowi U.M (2005). An address of welcome on curriculum implementation and re-thinking Nigeria education forum 5(1), 1- 5

Jackson, P.W. (1992). Handbook of Research on Curriculum N.Y Macmillan.

Joassen, D. (2003). Using cognitive tools to represent problems, Journal of Research on Technology in Education. 35(3), 362-381.

Kiran Banga Chhokar, citation; Kiran Banga Chhokar, (2010), centre for environment Education, New Delhi, India. "higher education and curriculum innovation for sustainable development in India" international journal of sustainability in higher education, Vol, 11 Iss:2, pp, 141

Lin, C. (2006). The study on the organizational innovation in Taiwan's logistic industry. The business review, Cambridge, 5(1) 270.