Journal of Education and Leadership Development
Volume 13, Number 1, 2021
ISSN: 2277-0127
http://www.cenresinjournals.com

IDENTIFICATION OF STRATEGIES FOR ENHANCING THE TEACHING OF FOUNDRY TECHNOLOGY IN KANO STATE POLYTECHNIC, KANO

Munkaila Abdullahi Dokadawa
Department of Education (Technical)
Kano State Polytechnic, Kano
E-mail: munkailadokadawa@gmail.com

ABSTRACT

The study was designed to identify the strategies for enhancing the teaching of Foundry technology in Polytechnic. The study is a survey research design. A structured questionnaire of different strategies for teaching was used for data collection and was administered to 79 teachers of Foundry technology in Kano state Polytechnic, Kano. Based on the findings conclusion was drawn that the respondents accepted the needs for instructional strategies for enhancing the teaching of Foundry technology in Kano state Polytechnic, Kano. As this will result to producing Polytechnic graduates who are apart from been self-reliant and enterprising will also be jobs providers.

Keywords: Strategy, Enhancing, Foundry Technology, Polytechnic

INTRODUCTION

Technical and Vocational Education and Training (TVET) is an educational program dealing with skill acquisition which has been recognized as a life wire for the economic and technological development of any nation. TVET according to UNEVOC International Centre for Technical and Vocational Education and Training (2006) is a range of learning experiences which are relevant to the world of work and which may occur in a variety of learning context, including in educational institutions and workplaces. It includes learning designed to develop the skills for practicing particular occupations as well as learning designed to prepare for entry or re-entry into the world of work in general. Osuala, (2004) describes Technical education as an aspect of general education

that involves theoretical, scientific and practical skills. Osuala added that technical education is designed at upper secondary and lower tertiary levels to prepare middle level personnel. These middle level personnel are needed to develop and inculcate proper values for the survival of the society. Also, the personnel are to promote and encourage scholarship and community service (Federal Republic of Nigeria, FRN 2004). However, government emphasis on skill acquisition according to Ogbu, (2007) has led to the establishment of Technical and Vocational Education and Training institutions at all levels of the nation's educational system. These institutions include Universities, Polytechnics, Monotechnics, Colleges of Education (Technical) and Technical Colleges.

According National Board for Technical Education (NBTE) (2021) a Polytechnic is a technical institution offering post-secondary technical education programmes leadings to the award of diploma/certificates such as National Diploma (ND) and Higher National Diploma (HND). So, in Nigeria Polytechnic is established to train people as technologists, technicians, managers in courses leading to the awards of Certificate, ND, HND and Advanced Professional Diploma which are relevant to the needs, aspirations and the development of the nation's diverse economy and industries (Jahun, 2017). The products/graduates of Polytechnic are expected to acquire both physical and intellectual skills which will enable them to be self-reliant and useful members of the society (FRN, 2004). By extension Polytechnic graduates apart from being self-employed are expected to employ others thereby reducing the level of unemployment in the society. There are many areas of employment opportunities in Foundry technology as it is a branch of Metalwork Technology.

Metalwork Technology is one of the Technical education courses offered at the Colleges of Education (Technical). It includes trades such as General Metalwork, Sheet Metalwork, Welding and Fabrication, Foundry and Forging and Machine shop practice. Foundry technology is one of the

trades in Metalwork technology that involves casting of metal. It is a technical trade which deals with melting of metals and it's pouring into a mould to make parts for machines, tools etc. Jain, (2008) stated that Foundry technology is the area of metal working processes which involves melting a metal, pouring it into prepared cavity to take the shape and size of the mould. According to Heine, Loper and Rosenthal (2006) Foundry technology is the process of forming metal objects by melting and pouring it into a mould. Crawford (1979) earlier on explained that Foundry technology consists of introducing the molten metal into a cavity and molding of desired shape and allowing it to solidify. Foundry technology is made up of several practical skill areas namely: safety precautions, tools and equipment, pattern and core making skills, mould making skill and finishing skill. To effectively teach these Foundry technology skills theoretically and practically, teachers should have strategies that will enable them to be able to enhance the teaching of the subject.

The teachers of foundry technology are trained in Polytechnics and Universities. The teachers are responsible for teaching both theories and practical's aspects of the foundry in Colleges of Education (Technical) (Abdullahi, 2010). Graduates of Universities are referred to as lecturers and those of Polytechnics as instructors. A lecturer handles the theoretical aspects of foundry work and an instructor is the one who teaches the practical parts of the subject. In an effort to make foundry teachers capable of teaching the theory and practical aspects of foundry processes a number of strategies must to be employed. Strategy is a planned series of actions for achieving something. Hornby (2004) defines strategy as a plan that is intended to achieve particular purpose or the process of planning something or carrying out something in a skillful way. According Davis (2001) strategy is a plan, a method or the series of maneuvers or stratagems for obtaining a specific goal or result. In this context strategy refers to a design employed by Foundry teacher in the classroom or

workshop, a series of activities and actions taken to facilitate effective teaching of Foundry technology. In the opinion of Aggarwal (2009) strategy in teaching requires comprehensive instruction that include attention to propositional knowledge (what to do), procedural knowledge (how to do it) and conditional knowledge (when and why to do it). Akuezuilo and Okon in Olowodun, (2006) states that teaching strategy include not only the manner of presentation that the teacher employs but everything that should be done in the way of arranging conditions, grouping students, guiding activities, making assignments and providing information to aid learning. However, for the teaching activities to be effective it has to be enhanced in order to achieve the desired end.

Enhancing is an act of improving something. It is a process of improving or making something better in terms of quality, values and usefulness. This can be made by ideas, objects or processes more desirable by adding or removing components (Aggarwal, 2009). It is no doubt that strategy for enhancing teaching will have a positive impact on the performance of foundry technology teachers. This is because use of non-enhanced strategies by teachers lead to poor performance (Olowodun, 2006). So, to make the delivery of lesson effective strategies must be devised to improve the pedagogical skills of Foundry technology teachers. It is highly needed due to the advancement and innovations in the aspects of foundry operations. The improvement will provide the teachers with relevant practical and theoretical training in order to enhance the skills and teaching pedagogy (Fore and Mbohwa, 2010). However, the pedagogical skills improvement must be centered on such areas as instructional strategies.

Instructional strategy is the procedure of how the act of teaching is to be carried out gradually. According to Saskatoon, (2009) instructional strategies determine the approach a teacher may take to achieve learning outcome. KameenuCernine, (2009) opined that instructional strategies

are methods that are used in the lesson to ensure that the sequence or delivery of instructions helps students learn. Merill, (2010) maintains that if an instructional experience or environment does not include the instructional strategies required for the acquisition of the desired knowledge or skill, then effective, efficient and appeal of the desired outcomes will not occur. In this context, therefore, Foundry technology teachers must acquire instructional strategies to make teaching effective, efficient and appealing to the objectives of Diplomas and Certificate program. This act will help to enhance the teaching of foundry operations when and consequently improve students' performance. The term instructional strategy is used to describe the process a Foundry technology teacher employ to sequence and organize content specify learning activities and decide how to deliver the content and activities (Dick & Cary, 2005). So, it is through instructional strategy that a Foundry technology teacher deals with how to actually teach students the different aspects of foundry work. Nwachukwu, (2006) views instructional strategies as decision about organizing people, material and ideas to provide learning. As such instructional strategies play vital role of promoting active engagement and participation of students in teaching-learning process which can result to enhanced teaching. Based on this background, the need arises for Foundry teachers to examine and employ various instructional strategies suitable to his situation in order to enhance the teaching of Foundry technology in the Polytechnic. Hence, it is importance to identify the strategies to be employed for enhancing the teaching of Foundry Technology.

However, the importance of orienting Foundry technology teachers in Polytechnic to acquire strategies for enhancing teaching will not be over emphasized. Basic Foundry functions which where hitherto carried out manually are nowadays undertaken using machines. In addition, Foundry can now be produced using specially designed and computerized pattern making machine. Chinda (2000) states that the application of

technology in the foundry technology brought about both improvement in quality, rate of production, reduced human labor and error in delivery time and rate of turnover. In addition, the growth of technology resulted to the need of multi-skilled workers by employers and the changes and innovations in aspects of Foundry work. In the view of Riodan & Rosas in Ogwo & Oranu, (2006) there is need for educational institutions to adjust to the technological changes and new forms of work organization in order to ensure production of employable labor force. Likewise, innovations in educational technology have produced a lot of new teaching strategies and methods which school teachers should master and use more especially in teaching technically oriented courses like Foundry technology (Lubis, 2010). As a result of this emerging trends in foundry processes and innovations in educational technology call for the need on Foundry technology teachers in Polytechnics to devise strategies for enhancing teaching to keep in pace with the new development.

In Nigeria, Polytechnic is a TVET educational institution saddled with the responsibilities of producing graduates who are expected to serve as technologists, technicians and managers also to be self-employed and employ others (FRN, 2004). But it is unfortunate to note that the performance of these graduates is below expectation. This trend is associated with untrained and unqualified teachers at all levels of education both in quality and quantity which resulted in low quality graduates (Jen, 2010). According to the conference of Ministers of Education of the African Union (COMEDAF) (2007), the delivery of quality TVET is dependent on the competence of the teachers. Competence is measured in terms of theoretical knowledge, practical skills and pedagogical skills as well as being abreast with technologies in the world of workplace. COMEDAF explains that taking into account the key strategic issues and guiding principles, the main goal of the strategy may be to promote skills acquisition through competency-based training with proficiency testing for employment, sustainable livelihoods and

responsible citizenship. Against this background therefore, it has become imperative to evolve identification of strategies for enhancing the teaching of Foundry technology in Kano State Polytechnic in order to address this occurring shortcoming.

Statement of the Problem

The current technological advancement taking place globally resulted in changes in operations, concepts, materials and techniques employed in the industrial sector of the economy. The advancements came up with refinement in aspects of foundry works. Basic Foundry operations which were hitherto carried out manually are nowadays undertaken using machines. Likewise, cast components can be produced using specially designed and computerized pattern making machine. Chinda (2000) contended that the application of technology has brought about both improvements in quality, rate of production, reduced human labor and error in delivery time and rate of turnover. According to Lubis, (2010) innovations in educational technology have produced a lot of new teaching strategies and methods which school teachers should master and use in teaching. This emanate from the type of training they received during the pre-service period. The curriculum on which the long serving foundry teachers were trained is inadequate in terms of modern teaching pedagogy strategies (Onyemachi, 2004). This menace gave birth to producing non competent Diplomas and Certificate graduates whose performance is below expectation. In reality, the Foundry technology teachers in Polytechnic need to acquire concepts, principles and procedures of the new teaching strategies in order to teach the course efficiently and effectively.

Ideally the purpose of tertiary institutions is to provide the recipients with both physical and intellectual skills which will enable individuals to be self-reliant and useful member of the society (FRN, 2004). But, it is unfortunate to note that this noble objective is not fully realized taking

into consideration the caliber of Diplomas and Certificate graduates. This is so because it appears that the teachers in Polytechnic are not competent enough to teach the course. One of the major constraints is the untrained and unqualified nature of teachers at all levels of education both in quality and quantity resulting in the low production of qualitative graduates (Jen, 2010). The above situation came up due to the fact that Foundry technology teachers in Polytechnic have deficiencies in terms of teaching pedagogical skills of technical and vocational education courses. This situation need to be addressed when viewed in line with the saying that no system of education can rise above the quality of its teachers (FRN, 1998). It then follows that teachers involved in TVET program must possess the requisite teaching skills. Bridging this shortfall is the focus of the study: identification of strategies for enhancing the teaching of Foundry technology in Kano State Polytechnic.

Purpose of the Study

The study is aimed to identify the strategy for enhancing the teaching of Foundry Technology in Kano State Polytechnic. And specifically it is set to identify the instructional strategies required for enhancing the teaching of Foundry technology.

Research Questions

1. What are the instructional strategies required for enhancing the teaching of Foundry technology?

METHODOLOGY

The Study adopted survey design research design. The area of the study was North Western states of Nigeria. There were two (2) Departments in Kano state Polytechnic offering Foundry Technology. The total population of the study was twenty (20). Fifteen (15) were lecturers while five (5) were instructors in the respective Departments. There was no sampling because the size of population was manageable. The instrument

used for data collection was a structured questionnaire made up of seventy-two (72) items. A five points Likert scale response mode was used and the Numerical value was assigned to options as thus; Strongly Agree (A) = 5, Agree (B) = 4, Undecided (C) = 3, Disagree (D) = 2 and strongly disagree (E) = 1. Three experts in the Department of Science and Technology Education, Bayero University, Kano validated the instrument. Rank order correlation was used to determine the internal consistency of the instrument and yielded a coefficient of 0.86. All the seventy-nine questionnaires copies were distributed to the respondents. All the questionnaires were retrieved showing 100% return rate. The data was analyzed using mean and standard deviation. For items with Mean of 3.50 or above were considered as agree; while items with Mean rating less than 3.50 were considered as disagree.

Table 1: Mean and Standard Deviation of the respondents on the area of instructional strategies for enhancing the teaching of foundry technology

S/NO	Items	X	SD	Remark
1	Use Cluster Instructional Material	4.26	.729	Agreed
2	Teach Lower level subordinate skills followed by the higher one until the main goal is achieved	4.44	.656	Agreed
3	Present skill after presenting all related subordinate skills	4.10	.847	Agreed
4	Describe learning components for a set of instructional materials	4.36	.683	Agreed
5	Select delivery system along with the media to present the information in the instruction	4.10	.672	Agreed
6	Group students to motivate and keep them interested in the lesson	4.50	.575	Agreed
7	Use the learners' capabilities, resources available, nature of curricular content and objectives to be achieved	4.27	.693	Agreed
8	Adopt appropriate reinforcement to serve as a motivating factor	4.10	.841	Agreed
9	Evolve appropriate maxims of teaching in the teaching process	4.11	.716	Agreed
10	Develop basic and advanced skills by clear objectives, breaking instructions into steps and reinforcing progress	4.44	.713	Agreed
11	Enable students to reflects on learning that occurs in work settings, internship, travels or outdoor activities	3.97	.920	Agreed
12	Share information and work cooperatively on projects	4.29	.705	Agreed

13	Identify important principles, key concepts and big ideas from the curriculum and apply across major topic in the subject content	4.32	.611	Agreed
14	Provide students with temporary support for learning new knowledge and skill and reduce it gradually as they move toward independence	3.85	1.145	Agreed
15	Teach students to follow specific set of procedures to use a process or device	4.34	.749	Agreed
16	Adopt work based teaching – learning principles	4.29	.686	Agreed
17	Divide process into group of skills and teach one at a time	4.32	.798	Agreed
18	Involve students in the actual skill practice immediately after demonstration	4.51	.658	Agreed
19	Employ instructional material/devices and job sheets	4.18	.828	Agreed
20	Consider the timing and planning of the first attempt of teaching skill to be practiced	4.08	.747	Agreed
21	Make students practice any new skill learnt repeatedly until actual perfection is obtained	4.46	.636	Agreed
22	Make good judgments in the choice of instructional projects to determine the level of actual skills students should carry to the real world of work	4.18	.844	Agreed
23	Outline the skills students are to master in a particular lesson and design type of practice activity that will involve these skill	4.14	.780	Agreed
24	Make use of the real job for teaching – learning certain skills	4.12	.882	Agreed
25	Analyses each instructional project to determine whether the skills involve are those previously stated in the course content	4.04	.669	Agreed
26	Know how to lead and cooperate with students and colleagues	4.28	.767	Agreed
27	Provide a high support to the panic and unsecure students no matter what	3.72	1.068	Agreed
28	Set out materials to be taught in an interesting and attractive summary form before the lesson commence	4.35	.680	Agreed
29	Adopt continuous orientation of students to the skills taught by repetition of the whole demonstration; illustration or explanation	4.10	.826	Agreed
30	Give students short break and allow them to think over the lesson and to digest and process what they were taught/learnt	4.22	.842	Agreed

Table 1 indicates that on the Instructional strategies required by teachers for enhancing the teaching of Foundry technology indicates that all the 30 items are required. Items have mean value from 3.72 and above for teachers in Colleges of Education (Technical).

FINDINGS AND DISCUSSION

The identified strategy for enhancing the teaching of Foundry technology in Polytechnic was analyzed and ascertained as it was found relevant. This finding is a clear indication that this strategy is complementary for efficient and effective teaching of Technical, Vocational Education and Training in general and Foundry technology in Particular for achieving the desired teaching outcomes. The result showed that an instructional strategy presented in table one has means ranging from 3.72 and 4.51. The respondents realized that possessing the instructional strategies is essential for the successful achievement of the objectives of teaching of Foundry technology. This is in line with the opinion of Merill, (2010) who states that if an instructional experience or environment does not include the instructional strategies required for the acquisition of the desired knowledge or skill, then effective, efficient and appeal of the desired outcomes will not occur. In addition, the findings showed that the respondents appreciated the necessity of instructional strategy as an approach through which they can teach students the procedures on how to apply the practical aspects of Foundry works. And this understanding coincided with the view of Aggarwal (2009) that instructional strategies should aim at providing opportunities to students to apply practically the knowledge that has been acquired by them.

CONCLUSION

It is through effective technical teacher training program that the objectives of the nation's technological development can best be realized. This is obvious since training is one of the conditions through which teachers' effectiveness can be influenced. The following conclusions were made based on the result of study. From the findings there is the conclusion that there were shortages in the desired strategy for enhancing the teaching Foundry Technology. As a result of this, teachers' performances on efficient and effective teaching of various Foundry processes were limited. Furthermore, the shortages of adequate strategies

for enhancing teaching of Foundry in Polytechnic resulted to producing incompetent Diplomas and Certificate graduates. As such, the few strategies teachers possessed were utilized in teaching the foundry technology works to students. In nutshell, therefore the purpose of this research work has been met. This is due to the discovering that the requirements of strategies to enhance the teaching of Foundry technology in Colleges of Education (Technical) were glaringly visible.

REFERENCES

Abdullahi, S. (2010). Electrical installation competencies required by Electrical/Electronic teachers in Bauchi and Gombe states technical Colleges. *Unpublished M.Ed. thesis*, University of Nigeria, Nsukka

Aggarwal, J.C. (2009). Principle, methods & technique of teaching New Delhi: *Vikas Publishing House PVT Ltd.*

Chinda, J.N. (2000). The contemporary technology engineer and society. Warri: *Mindcon Press.*

COMEDAF. (2007). The Conference of Ministers of Educations of the African Union. Adis-Ababa.

Crawford, S. (1979). Basic engineering processes. London: *The English University Press Ltd.*

Dick & Cary (2005). Developing an instructional strategy

Davis, J.R. (2001). Better teaching, more learning (Phoenix: *American Council on Education/Oryx Press.*

Federal Government of Nigeria (1998). National Policy of Education (3rd ed.). Lagos: *NERDC Press.*

Federal Government of Nigeria (2004). National Policy of Education (3rd ed.). Lagos: *NERDC Press.*

Fore, S. & Mbohwa, C.T. (2010). Cleaner Production for Environmental Conscious Manufacturing in the Foundry industry, Journal of Engineering, Design and Technology, 8 (3) 314-333.

Heine, R.W., Loper Jr., C.R. & Rosenthal, P.C. (2006). Principles of metal casting. New York: *McGraw Hill Publishing Co. Ltd.*

Jahun, I. S. (2017) The Roles and Contributions of Nigerian Polytechnics in the Development of Survey and Geo-Informatics Education; Issues, Prospects and Challenges: A Global Perspectives. *Helsinki, Finland*

Jain, R.K. (2008). Production Technology. New Delhi: *Khanna Publishers.*

Jen, S.U. (2010). Meeting the challenges of education sectors in an era of technological changes. Lead Paper at the NERA 2010 Annual Conference. Held at Faculty of Education, University of Nigeria Nsukka.

Kameenui & Carnine (2009). Effective teaching strategies that accommodate diverse learner: Teaching Resources for Florida. ESE

Lubis, S. (2010). Concept of implementation of Vocational pedagogy in TVET teacher education. Universitas Negeri Padang.

Merill, M.D. (2010). Instructional strategies that Tech. ID_2 Research Group.Utah State University.

National Board for Technical Education (NBTE), (2021). Approved Federal Polytechnics Retrieved 24/04/2021

Nwachukwu, C.E. (2006). Designing appropriate methodology in vocational and technical education for Nigeria. Nsukka, Enugu: University Trust Publishers.

Ogbu, R.O. (2007). Assessment of the utilization level of facilities for teaching and learning of Metalwork Technology in Vocational Technical Colleges in Benue State of Nigeria. Unpublished M.Ed. thesis, University of Nigeria, Nsukka

Ogwo, B.A. &Oranu, R.N. (2006). Methodology in formal and non-formal Technical/Vocational Education. Enugu: Ijejas Printers and Publishers Company.

Olowodun, Y.L. (2006). Strategies for effective teaching and learning of accounting in senior secondary school in Kwara State.Unpublished M.Ed. thesis, *University of Nigeria, Nsukka*

Onyemachi, G.A. (2004). Management skills required by teacher for improvement in operating Woodwork laboratory in Technical Colleges of Abia and Enugu States.*Unpublished M.Ed. thesis*, University of Nigeria, Nsukka

Osuala, E.C. (2004). Foundation of vocational education. Enugu: *Cheston Agency Ltd.*

Saskatoon, P.S. (2009). Instructional strategies online.*htm*

UNEVOC (2006). Development of Technical and Vocational Education. A comparative study in Vocational Education, Paris.