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Teaching Strategies Needed for Enhancing Creativity in TVET for Industrialization in Imo State Nigeria

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Abstract: **The study adopted a survey research designed to determine the needed teaching strategies in enhancing creativity in TVET for industrialization in Owerri Education zone of Imo state. Three research question were developed coupled with two hypotheses to be answered. The questionnaire tagged "Teaching Strategies for Enhancing Creativity in TVET" (TSECTVET) was used for data collection from 59 Fine Art and Engineering lecturers in that zone. Intact population was used and 57 copies of questionnaire were obtained from respondents. Mean and standard deviation were used for answering the research 7questions while the two null hypotheses were tested at 0.05 level of significance using Z-test. The data of the study were collected using 32 items questionnaire validated by three expects. The findings of the study revealed that 11 items teaching techniques, 7 items process assessment and 11items evaluation needs were identified as needed strategies for the enhancement of creativity in TVET. The study recommended among others that; A particular product in use can be given to students to criticize and improve upon and Technical teachers should be patience with the learners during creativity training and production works, failing is not a negative end since it exposes them to other possible directions to follow, they are prone to make mistake, a leading way to the process of skill/creativity development.**

Keywords: **Industrialization, TVET, Creativity, Teaching, Engineering, and Fine Arts.**

I. INTRODUCTION

Industrialization involves a productive work, a complex process involving the re-construction of an economy through manufacturing of goods and services that transforms the country's social economic, technological and innovation's structures. Wikiped (2015) opined that industrialization is the period of social and economic change that transforms a human group from agrarian society into an industrial one, involving the extensive re-organization of an economy for the purpose of manufacturing. It is a well acknowledge fact that manufacturing/production of goods and services in industries can only be effective were there are technologically competent skillful workforce employed. Bamires (2013) opined that TVET is a tool for the production of technically competent vocationally oriented and skillful workforce. In the same vein Nwaijuba (2006) asserted that, the relationship between industrialization and TVET (Technical Vocational Education and Training) are the production of creative manpower needed in industries and raising of productivity in industries for economic growth.

TVET (Technical Vocational The Engineering Education and Training) is used as a comprehensive term referring to those aspects of the education process involving in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge of occupations in various sectors of economic and social life (FRN, 2013:16). Part of the goals of TVET is to provide trained manpower in the applied

science, technology, particularly at craft, advanced craft and technical levels and also to provide the technical knowledge and vocational skills. Part of curriculum of each trade in technical college should consist of workshop practice and industrial training/ productive work. (FRN 2013:17) Productive work in any technical college workshop involves creativity. The Engineering and fine Arts lecturers in Polytechnics and Colleges of Education respectively equally utilize these creative abilities. The Engineering and Fine Arts lecturers in Polytechnics and Colleges of Education respectively equally utilize these creative abilities. According to Bankole (2011) TVET cannot be separated from Art Education in that, the activities of professional technician is based on artistic creative abilities (Imagination Designing and Construction) Engineering practices also utilize creative abilities in designing and construction, (Ede, 1997).

Creativity is a process concerned with involving ideas and suggesting ways to turn these ideas into a product, in that to create is to design and to innovate. Burghardt (1999), outlined some of the characteristics of creativity as an act of taking risk, having vision or visionary thinking, others are mastering of the subject or technical abilities, concentration and determination; coupled with relaxed attention and open mindedness. In the same vein, Sawyer (2006) stated that creativity and invention are driven by series of little ahas and the basis for creative ideas are built on the tapestry of other ideas. In addition the guideline to be followed in enhancing creative abilities in the learners are: creating a conducive learning environment: identifying a problem, brainstorm, list ideas , promote risk taking/failure, others are allocated quiet time, think out of box, visioning, sketching, prototype and production (Michalko & Sawyer, 2006). Recognizing the above guidelines entails that creativity thinking can be generated and nurtured through teaching.

Teaching is an interaction between a teacher and a learner resulting in change of experience, reflecting in attitude, skill and knowledge of the learner. Teaching for creativity is the development of practical, aesthetic and; thinking skills through the conception and production of an individual works and an indepth engagement with materials (Law-Obi and Dara, 2014). The thinking involved in creativity generally requiring the thinker to generate new ideas and in designing in particular appears,to be more productive when knowledge is represented in working memory in a particular way (Middleton & Stevenson, 2011). Ogwo & Oranu (2006) affirmed that one of the teacher's responsibilities is in guiding students thinking during lesson delivery. Bringing out the most creative thinking from the learner entails the mastery of the subject, creation of appropriate learning environment, ability in determining various variables affecting teaching and learning (IOWA State University, 2015). Therefore, creative thinking can be achieved through problem solving, exploration, reflection, working in group in execution of task/project.

Nwachukwu (2001) stated that four steps in project method/creative teaching in technical workshop are identifying purpose (objective) planning execution and evaluation therefore, technical teachers prepares instructional sheet for a particular project or tasks to be carried in the workshop by the students. Ogwo and Oranu (2006) affirmed that an instructional sheet include the title of the job or operations, tools, materials, step and step procedures and the sketches. The use of sketches is a technique, a technical ability that strengthen intuition in that ideas/thoughts in the brain are in fluid (soft copy) and immediate sketching of the visual images enable the creation of the object on paper leading to actual production.

An obvious way of solving a particular problem does not promote creativity Lumseden & Lumseden, (2011). In this light, teachers should impart creativity skill through clarification of issues, framing and using reflective questions strategy in assigning tasks. Great Artists makes decision from both technical and creative perspective and display not only a mastery of technical skills-painting, glass blowing, sculpting – but also artistic judgement (Orlich Harder, Callahan and Gbison, 2001). In The same vein, (Burghardt, 1997), highlighed that designing and construction are engineering practices that involve creativity and the design portfolio assessment examines the process, final product and its originality. Reflecting from this, technical teachers should avoid too much specification, basing the assessment of the execution of task/project on the analysis on the design process/working drawing and evalution guided by satisfying the objectives, technical skill utilized, artistic and originality of the product inculcation of creativity skills. For instance, to impart the skill of creativity, a technical teacher can assign project to students on the construction of a power circuit (rectification) without providing the components and their ratings to be used having known that he/she has taught characterization and functions of semiconductor materials necessary electric current laws etc that may be utilized in modeling the circuit. Similarly, a teacher can assign a task to construct a reading table without specification, like the dimension, length, width, shape, coupled with the type of joints to be utilized. The product realized from this task will be of different design and outlook.

Statement of Problem

Teachers need to reflect to current realities of life in their teaching and learning. Developing individual creative field is an intrinsic worth producing factor for industrialization and economic revitalization. TVET Education is often neglected in area of enhancing creativity in educational setting because emphasis is built on manual skill, development of workforce that have competency on mastering of specified skill and associated tacit knowledge (Middle and Stevenson, 2011). Unfortunately, traditional education gives little room for students to develop their creativity and outside of box thinking beyond pre-determined boundaries. The solution that our creative mind conceived are tempered or ignited by our societal up-bringing. Hence, the teacher is a prime factor in a creativity ladder since he/she guides the learner to develop an orderly imagination so essential to all concerned with constructive work. The teacher being a prime mover converts natural forces (innate creative talent) into productive use. Therefore, it has become necessary to determine the teaching strategies needed for enhancing creativity in TVET for industrialization

Purpose of the Study

The major purpose of this study is to investigate the teaching strategies needed in enhancing creativity in TVET students of technical college for industrialization in Owerri Education zone of Imo State. Specifically, the study will see to:

Determine the teaching strategies need of technical teachers in the construction of project/productive work in the technical colleges in Owerri Education zone for enhancing creativity through;

1. Teaching Techniques
2. Assessment of the process of construction of project or production work.
3. Evaluation of completed project or production work.

Research Questions

1. What are the teaching technique needs of technical teachers for enhancing creativity in the construction of project/production work of technical college students for industrialization?
2. What are the process assessment needs of technical teachers for enhancing creativity in the construction of project/production work of technical college students for industrialization?
3. What are the evaluation needs of technical teachers for enhancing creativity in the judgment of completed project/production work of technical college students for industrialization?

Research Hypotheses

Two null hypotheses were tested at 0.05 significant levels as follows.

1. There is no significant difference on the mean ratings of Fine Art Education lecturers from College of Education and Engineering Lecturers from polytechnic on the teaching techniques of technical teachers for enhancing creativity.

2. There is not significant difference on the mean rating of Fine Art Education Lecturers from College of Education and Engineering Lecturers from polytechnic on the evaluation needs of technical teachers in the judgment of completed final product.

II. METHOD

The study adopted survey research designed to determine the needed teaching strategies in enhancing creativity in technical college students or industrialization in Owerri Education Zone of Imo state. The population of the study was 59 respondents comprises of 23 Fine Arts Lecturers/teachers and 36 Engineering Lecturers in the two higher institutions from the zone. There was no sampling due to smallness of the population. An intact population was used. The questionnaire titled, "Teaching strategies for enhancing creativity in TVET (TSECTVET) was used for data collection. The reliability of the instruments was 0.81 establish using Cranbach Alpha. The questionnaire items were generated from the review of the related literature, which consisted of four sections, A, to D. Section A solicited for information on the personal data of the respondents, Section B, sourced for data on the needed teaching technique, section C was based on the needed process assessment while section D is centered on the evaluation needs for judgment of completed product.

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All these are directed towards assessment improvement of creativity for construction of project/production work. The instrument made use of five point Likert types scale – Highly needed (HN), Needed (N), barely needed (BN), Not Needed (NN). Highly Not Needed (HNN). The response categories values were assigned 5,4,3,2 and 1 respectively. The instrument was validated by 3 experts from Fine Arts Department and Engineering Department, outside the area of the study mean and standard deviation were used to answer each of the three research questions while Z-test was used to answer the hypothesis and any item with a mean of 3.50 or above was considered needed . All hypotheses were tested at 0.05 level of significance. Out of 59 questionnaires administered, only 57 were completed and returned.

$\overline{X}$ = mean, SD – Standard deviation

Table 1: Respondents' Mean Rating of Technical Teachers Teaching Technique for enhancing of creativity in the construction of project or production work

S/N	Items	X(Mean)	SD	Remark
1.	Create a conducive learning environment in the workshop.	361	0.97	N
2.	Identify a problem to solve.	478	0.88	N
3.	Brainstorm the student negatively and positive to find solution to problem.	3.81	0.83	N
4.	List ideas/solution without editing.	3.91	0.77	N
5.	Promote risk taking and failure in the solution of problem.	3.74	0.89	N
6.	Allocate time to students for the problem	3.86	0.98	N
7.	Guide the students to imagine and vision the solution to the problem.	3.97	0.83	N
8.	Guide the student to sketch works/ drawing on the paper for the solution of the problem.	4.36	0.79	N
9.	Use a prototype or model to guide the creation of the solution.	3.68	0.82	N
10.	Demonstrate the key idea/skill in the construction / production work in the workshop.	4.02	0.81	N
11.	Give students questions or tasks stating stipulated dimensions criteria	2.14	0.45	NN
12.	Prepares instructional sheet	4.25	0.78	NA

The data presented in table 1 revealed that 10 items had mean range of 361 to 4.78 above the minimum cut off point of 3.50. Therefore, the items are needed, teaching techniques by technical teachers for enhancing creativity while one of the items giving specification while given students projects is not a needed teaching techniques for enhancing creativity in technical college for industrialization.

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Table 2: Respondents' Mean Rating of the technical teachers process assessment needs for enhancing creativity in the construction of project/production work

S/N	Items: Teachers should find out if the students:	X(Mean)	SD	Remark
1.	Identified the solution to the problem through the process stipulated.	3.70	0.88	N
2.	Listed alternative solution from thought processes	3.81	0.81	N
3.	Selected a particular one and indicating the reasons that justify the selection.	3.92	0.83	N
4.	Provided working drawing to the solution chosen with basic detail and dimensioning.	4.05	0.73	N
5.	Listed the tools a and material needed for constructing the project.	3.77	0.82	N
6.	Demonstrated the correct skill in using hand tool during the process of construction.	3.66	0.79	N
7.	Demonstrated the good use of material in the production process.	3.82	0.80	N
8.	Worked with the teachers dimensions specified	2.25	0.47	NN

N = 57

The data presented in Table 2 indicated that only one item had mean 2.25, below the cut off mean of 3.50. It shows that this item is not needed while other items having mean range from 2.66 to 4.05 are needed process assessment for enhancing creativity in the construction of project /production were in technical college for industrialization.

Table 3: Respondents' Mean Rating in the Evaluation needs of Technical Teachers in judging the completed project/production work.

S/N	**Items: Teachers should rate the final products based on the extent to which it has:**	**X(Mean)**	**SD**	**Remark**
1.	Been reported orally and in writing.	3.51	0.97	N
2.	Exhibited the skill learnt	3.79	0.78	N
3.	Fulfilled the objective of the construction or design.	4.55	0.67	N
4.	Originality and creativity displayed.	3.91	0.96	N
5.	Introduced a change of design on testing the functionality.	2.35	0.89	NN
6.	Reflecting of its dimension on the working drawing.	3.89	0.78	N
7.	Been completed within the stipulated period of time.	3.78	0.79	N
8.	Quality finishing and packaging.	3.70	0.82	N
9.	The cost of production within a reasonable limit.	3.59	0.88	N
10.	Easy maintenance	3.67	0.83	N
11.	Triggered fresh insight into the modification of the functional product to serve another purpose.	3.82	0.82	N
12.	Been constructed based on lay down principles.	3.62	0.79	N

N = 57

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The data presented in table 3 revealed that 11 items had range o 3.51 to 4.55 above the minimum cut off point 3.50, showing that they are evaluation needs of technical teachers for judging completed project or production work in enhancing creativity while one of items is not needed that has the mean of 2.35.

Table 4: Z-test of difference between the mean responses of Fine Art Education Lecturers and Engineering Lecturers on Teaching Technique needed by Technical Teachers

Lecturers	Mean	Standard Deviation	n	df	Standard Error	ά-Level	Z cal	Zcrit	Remark
Fine Arts Education.	3.78	079	23	128	0.712	0.05	0.525	196	Accept
Engineering	3.92	0.84	34						

The Z-test analysis summarized in Table 4 reveals that there is no significant difference between the mean rating of Fine Art Education lecturers and Engineering Lecturers on the needed teaching techniques needed by technical teachers for enhancement of creativity. Tested at 0.05 ά-level and degree of Freedom 128, the calculated Z value (0.525) is less than the critical Z value (1.960). This led to the decision that the null hypothesis should not be rejected.

Table 5: Z-test of difference between the mean responses of Fine Arts Education Lecturers and Engineering Lecturers on the needed evaluation of final product/production work by technical teachers.

Lecturers	Mean	Standard Deviation	n	df	Standard Error	ά-Level	Z cal	Z cnt	Remark
Fine Arts Education	3.70	0.931	23	128	0.73	0.05	0.556	196	Accept
Engineering	2.88	0.894	34						

The Z-test analysis summarized in the above table reveals that there is no significant difference between the mean ratings of Fine Art Education Lecturers and Engineering Lecturers on the evaluation needs of technical teachers for judging final product or production work. Tested at 0.5 α-level and degree of freedom, 128. The calculated Z-value (0.456) is less than the critics Z-value (1.96). This led the decision that the null-hypothesis should not be rejected.

III. DISCUSSION OF RESULTS

It was found out from the first research question that 11 items were needed teaching techniques to effect creativity by technical teachers. The findings affirmed that characteristics of creativity of Burdhardt (1999) and in line with the guideline stated to enhancing creativity in learners (Michalko and Sawyer, 2006). Identifying a problem to solve attracts the highest mean, showing that the teacher ignites creativity thinking in learners. The acts of sketching preparation of instructional sheet and demonstration of the key ideas/skills by the technical teacher attract high means 4.56, 4.25 and 4.02 respectively confirming the word of Ogwu and Oranu (2006) that they are techniques, that strengthens intuition, Also Middleton and Stevenson, (2011), stressed that designing becomes productive when knowledge is represented in working memory. The stating of stipulated dimension on giving student task to construct is not needed being in agreement with Lumesden and Lumesden (2004), who maintained that a standard way of solving a particular problem does not promote creativity.

The findings of research question 2 indicate that 7 process assessments needs enhance creativity. The students choose his/her specifications/dimension so far the creative solution to assigned problem is provided. The solution is based on the experiences (Principles & Law) relating to the problem agreeing with the word of Lawyer (2006), who stated that creative ideas are built on tapestry of others ideas. The student needs to brainstorm within (in box) imagining, visioning and drafting the sketches to reflect the picture of the product. Choosing the tools, correct skills and materials, the production then commences in the workshop as declared Law-Obi, and Dara (2014), creativity is the development of thinking skills through the conception and production of an individual work, and in-depth engagement with materials. It was found out from the study that fulfilling the objective, functionality, originality and creativity of the construction were rated higher than other showing the importance as evaluation needs, Burghardt [1997] declares that design assessment portfolio examines creativity originality and functionality of the product. Introduction of change of design on testing the functionality is not needed because it denotes failure to achieve the objective. But triggering of fresh insight into more creative work is a credit.

Every creative work must be based on already establish principles or Law. There is no significant difference established indicates that creativity and designing are the works of Fine Art and Engineering Lecturers and therefore they possess the teaching techniques, process and final product evaluation techniques of technical work. Both of them have creative abilities – imagination visioning, designing and construction skills likewise, a technical teacher. These characteristics correspond with views of Bankole (2011) who stressed that TVET cannot be separated from Art Education in that the activities of a professional technician is based on artistic creative abilities while craftsmen and technician are members of Engineering family.

IV. CONCLUSION

The teaching techniques, assessment of process of construction and final evaluation of criteria identified will go a long way in helping the technical teachers in different technical colleges to achieve the creativity challenges. This is true, since Nigerian Policy of Education indicated that production work should be practiced and each trade should have a mini-industry coupled with their show room to enable them display their products. Training the student to have competency in mastering of specified skill is not enough. Teaching for achieving creativity skill is very important, because it is a component of problem solving skill. It is a necessary skill for designing , manufacturing of goods and services : a basic skill for a workplace knowhow; being relevant for employment and innovation. It helps in creation of self-reliance, entrepreneurship and industrialization.

V. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Technical teachers should teach students based on previous knowledge and expository teaching is needed in the technical workshop through the encouragement of students to emulate and imitate other sample products ; this will help them to build their imagination clearly and creatively using prior gains.
2. Technical teachers should use demonstration and illustration in teaching, providing prototypes or models of the expected production.
3. Technical teachers should give students task or project that will not require standard specifications and dimensions of parameters needed to avoid constraints; a wider horizon is needed to exercise their creativity prowess.
4. Using word problems in describing questions are encouraging because it ignites brainstorming, suggesting alternative solutions to questions.
5. A particular product in use can be given to students to criticize and improve upon.
6. Rating scale or checklist should be used by technical teachers for the assessment of process and final product evaluation and no zero mark should be awarded to any practical project or production work.
7. Technical teachers should be patience with the learners during creativity training and production works, failing is not a negative end since it exposes them to other possible directions to follow, they are prone to make mistake, a leading way to the process of skill /development.

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