

Extent of Utilisation of Challenge-Based Pedagogical Strategies for Teaching of Vocational and Technical Education (VTE) Courses in Tertiary Institutions in Delta State

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Abstract

This study determined the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State. One research question was raised and two hypotheses were tested at 0.05 level of significance. Descriptive survey design was adopted. The entire population of 170 VTE lecturers in five public-owned tertiary institutions was studied without sampling. The instrument for data collection was a validated self-administered questionnaire with a Cronbach's alpha reliability of 0.79. The researchers administered the instrument with the help of five research assistants to the respondents. Mean and standard deviation were used to answer the research question and determine the homogeneity or otherwise of the respondents while t-test and Analysis of Variance were used for testing the null hypotheses. The study revealed that VTE lecturers utilised challenge-based pedagogical strategies to a low extent for teaching vocational and technical education courses in tertiary institutions in Delta State. There is no significant difference in the mean ratings of VTE lecturers in Delta State on the extent of utilisation of challenge-based pedagogical strategies based on their gender and years of experience. It was concluded that the absence of vocational training and practical workplace experiences among VTE lecturers is responsible for the low extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State. Among others, it was recommended that professional conferences and in-service seminars should be organised for VTE lecturers to update their instructional competency on challenge-based pedagogical strategies to enable them design teaching and learning experiences capable of stimulating skills acquisition among VTE students in tertiary institutions.

Keywords: Vocational, technical education, challenge-based pedagogical strategies, VTE

Introduction

Vocational and Technical Education (VTE) is an aspect of the total education programme offered in universities and polytechnics as well as colleges of education (technical). According to the Federal Republic of Nigeria (2013), vocational and technical education refers to those aspects of educational processes involving, in addition to general education, the study of

technologies and related sciences and acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. The range of courses in vocational and technical programmes includes accounting education, office technology and management, auto mechanics, mechanical trades, wood trades, building trades, painting and decoration, welding, electrical installation and maintenance work, radio, television and electronic work and appliances repair. Hence, graduates of vocational and technical education are expected to become highly skilled craftsmen, technicians and enterprising job creators in the society.

Unfortunately, graduates of the programme are finding it difficult to handle complex technological projects due to the traditional based pedagogical strategies used in teaching vocational and technical education courses (Hassan, 2016). According to Hassan, the traditional instructional strategies used for so many years in the teaching of vocational and technical courses seems inadequate for equipping students with creative skills, higher order thinking skills and problem solving skills to thrive as craftsmen, technicians and job creators in the 21st century workplace. The industrial-based nature of vocational and technical education programmes calls for active, stimulating and innovative teaching strategies so as to cope with the rapid transformation of technologies being used in the industries when they graduate.

In order to get students in tune with the current requirements of complex workplace, emphasis must shift from the teacher, being a knowledge provider to student, becoming the discoverer of knowledge. Positioning students in the course of discovering knowledge propels them to actively acquire knowledge and skills on their own and apply them in different contexts without pressure. Hence, the call for innovative teaching strategies that would allow the VTE students to think and solve problems in order to make teaching and learning a long lasting experience. It is with this understanding that, Mannison (2009) identified challenge-based strategies, activity-based strategies and interactive strategies as innovative and effective pedagogical strategies for teaching skill-based courses. Challenge-based pedagogical strategies are used to encourage students to device ways of developing, designing and implementing solutions for identified problems. The challenge-based teaching and learning framework emerged from the "Apple Classrooms of Tomorrow—Today" (ACOT2) project initiated in 2008 by Apple, Inc. to identify the essential design principles of a 21st century learning environment (Apple, Inc. 2008).

According to Clegg and Dille (2019), Challenge-based learning (CBL) is a new learning strategy that build on the problem-based learning practice, in which students work on real-world problems in collaborative teams. CBL can be implemented along with online interaction to help improve students' communication skills and provide assistance, if students are facing difficulties in finding a proper solution to the challenges addressed. In the same vein, Swiden (2013) maintained that challenge-based learning strategies are extended form of problem-based learning that have some components of experiential, project-based and decision-based learning perspectives. Challenge-based pedagogical strategies are used to make connections between real world activities and the content students learn in the classroom. The use of challenge-based pedagogical strategies by educators put students in a position to create and present a group project in the classroom from collaboration setting with a touch of personal autonomy.

Challenge-based strategy is an instructional strategy that encourages students to mutually generate ideas and knowledge in handling classroom exercises. Challenge-based learning or independent teaching strategies according Mannison (2009), include questioning technique, read and practice instruction and inquiry based instructional techniques such as guided inquiry

and open inquiry among others. As submitted in Clegg and Dille (2019), some of the instructional strategies embedded in challenge-based learning include structured inquiry, case studies, paper seminar critical debates, structured problem solving and graphic organizers among others. At the centre of challenge – based pedagogical strategies in the course of teaching vocational and technical courses, there is a call to action that inherently requires students to make something happen, as they are compelled to research and brainstorm on their topics, and provide solutions that could be both credible and realistic (Hassan, 2016).

The utilisation of challenge – based pedagogical strategies for teaching VTE courses could be influenced by the gender and year of experience of VTE lecturers. Gender is the behavioural characteristics distinguishing between males and females in any society. Gender according to Okeke (2008), is a socio-cultural construct of ascribing characters and roles to sex of male and females. In this regard, Akinmusire (2012) is of the view that female teachers could utilise innovative pedagogical strategies more than their male counterparts, but this assertion needs to be supported by empirical evidence. Lecturers' years of experience is another variable that could influence their utilisation of challenge – based pedagogical strategies for teaching vocational and technical education courses. Here, the experience of lecturers is judged based on the number of years of professional service in the classroom. It is believed that the more years lecturers spend in teaching, the more they become more knowledgeable in the utilisation of challenge – based pedagogical strategies. It is with this understanding that, Olisa (2009) asserted that the experienced educators could utilise challenge – based pedagogical strategies than the less experienced educators. Again this assertion needs to be supported by empirical evidence. It is against this backdrop, that this study determined the extent of utilisation of challenge-based pedagogical strategies by VTE lecturers for teaching of vocational and technical education courses in tertiary institutions in Delta State.

Statement of the Problem

Vocational and technical education graduates will find it difficult to adjust to the numerous demands of today's complex industrialized and business world, if urgent steps are not taken to ensure that novel and effective pedagogical strategies are utilised across all levels of instruction in VTE programmes. Researchers have been pressing for reforms in teaching and learning. One of such reforms is the shift from the traditional teacher-centred teaching strategies that usually lead to passive learning and consequent low industrial productivity to the more robust student-centred instructional strategies that could lead to active learning and the acquisition of skills leading to higher industrial productivity. The problem of this study sought to solve, therefore is, the extent to which VTE lecturers utilise challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State is not clearly known.

Purpose of the Study

The major purpose of this study is to determine the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State. Specifically, the study determine the extent to which lecturers in tertiary institutions in Delta State utilised:

Challenge-based pedagogical strategies for teaching vocational and technical education courses

Research Question

To what extent do VTE lecturers utilise challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State?

Null Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of male and female VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses.
2. VTE teachers do not differ significantly in their mean ratings on the utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses based on their years of experience (1 – 5, 6 – 10, above 10 years).

Method

This study adopted a descriptive survey design. The study was conducted in Delta State. The population comprised 170 VTE lecturers in the five public-owned tertiary institutions (College of Education, Agbor; College of Education, Warri; Federal College of Education (Tech.) Asaba; Delta State College of Physical Education, Mosogar and Delta State University, Abraka) running vocational and technical education courses. The entire population was studied without sampling. The instrument for the data collection was a validated questionnaire containing 10 items on a 4 point rating scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE). The instrument for data collection was subjected to face validation by three experts; one expert in business education from Nnamdi Azikiwe University, Awka and Delta State University, Abraka, respectively and one expert in Measurement and Evaluation from Nnamdi Azikiwe University, Awka, Anambra State. A pilot test was conducted to establish the reliability of the instrument by administering it to 20 VTE lecturers from tertiary institutions in Edo State which were not part of the study and the data collected were analyzed using Cronbach alpha to obtain a reliability coefficient of 0.79 for the instrument. One hundred and seventy copies of the questionnaire was administered to the respondents in their institutions with the help of five research assistants. Mean and standard deviation were used to answer the research question and determine the homogeneity or otherwise of the respondents' views. Decisions on the research questions were based on the grand mean in relations to the real limits of numbers. Therefore, items with mean ratings of 1.00 - 1.49 are rated Very Low Extent, those with 1.50 - 2.49 are Low Extent, items with mean ratings of 2.50 - 3.49 are rated High Extent and those with 3.50 - 4.00 are rated Very High Extent. The t-test was used to test hypothesis one while ANOVA was used to test hypothesis two. A hypothesis was accepted where the p-value is equal to or greater than the alpha level of 0.05 ($p > 0.05$), at a degree of freedom; otherwise, the null hypothesis was rejected. The analysis was carried out using SPSS version 23.0

Research Question 1

To what extent do VTE lecturers utilise challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State?

Data relating to this research question are analysed and presented in Table 1.

Table 1**Mean ratings and standard deviation of respondents on the extent of utilisation of challenge-based pedagogical strategies for teaching VTE courses**

| S/N | Curriculum related factors | \bar{X} | SD | Remarks |
|---------------------|----------------------------|-------------|------------|-------------------|
| 1 | Structured inquiry | 1.38 | .75 | Very Low Extent |
| 2 | Guided inquiry | 2.11 | .43 | Low Extent |
| 3 | Open inquiry | 2.26 | .88 | Low Extent |
| 4 | Case Studies | 2.02 | .65 | Low Extent |
| 5 | Paper seminar | 3.47 | .29 | High Extent |
| 6 | Critical debates | 1.28 | .74 | Very Low Extent |
| 7 | Structured problem solving | 1.10 | .51 | Very Low Extent |
| 8 | Learning Cell | 1.19 | .82 | Very Low Extent |
| 9 | Send a Problem | 2.07 | .60 | Low Extent |
| 10 | Cognitive organizers | 1.21 | .47 | Very Low Extent |
| Cluster mean | | 1.81 | .61 | Low Extent |

Data in Table 1 show that out of the 10 items listed on challenge-based pedagogical strategies, VTE lecturers utilized five items (items 1, 6, 7, 8 and 10) to a very low extent with mean ratings ranging from 1.10 to 1.38. Four items (item 2, 3, 4 and 9) are utilized to a low extent with mean ratings ranging from 2.02 to 2.26 while the remaining one item is utilized to a high extent with mean rating of 3.47. The cluster mean for this cluster 1.81 is regarded as low extent. The range of standard deviation (0.29 – 0.88) revealed that the respondents are not far apart in their ratings. This therefore means that, VTE lecturers utilised challenge-based pedagogical strategies to a low extent for teaching vocational and technical education courses in tertiary institutions in Delta State.

Hypothesis 1

There is no significant difference in the mean ratings of male and female VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses.

Table 2**t-test comparison of the summary of mean ratings of male and female VTE lecturers in Delta States on the extent of utilisation of challenge-based pedagogical strategies**

N=161 (Male =94; Female =

67)

| S/N | Items Statement | X ₁ | SD ₁ | X ₂ | SD ₂ | df | t-cal | Sig. | Remarks |
|-----|----------------------------|----------------|-----------------|----------------|-----------------|-----|-------|------|---------|
| 1 | Structured inquiry | 1.11 | .46 | 1.34 | .63 | 159 | 1.24 | .23 | NS |
| 2 | Guided inquiry | 1.73 | .33 | 2.17 | .61 | 159 | 2.05 | .01 | S |
| 3 | Open inquiry | 1.64 | .76 | 1.98 | .89 | 159 | .67 | .11 | NS |
| 4 | Case studies | 1.83 | .52 | 2.09 | .40 | 159 | 1.03 | .42 | NS |
| 5 | Paper seminar | 3.28 | .26 | 2.76 | .35 | 159 | 3.22 | .00 | S |
| 6 | Critical debates | 1.12 | .73 | 1.43 | .90 | 159 | .62 | .28 | NS |
| 7 | Structured problem solving | 1.09 | .31 | 1.17 | .26 | 159 | .91 | .07 | NS |
| 8 | Learning cell | 1.06 | .29 | 1.15 | .44 | 159 | .56 | .43 | NS |
| 9 | Send a problem | 1.84 | .14 | 2.06 | .22 | 159 | .22 | .31 | NS |
| 10 | Cognitive organizers | 1.32 | .52 | 1.22 | .30 | 159 | .70 | .19 | NS |

Key: X₁= Mean of male VTE lecturers; X₂ = Mean of Female VTE lecturers; SD₁= Standard Deviation of male VTE lecturers; SD₂= Standard Deviation of female VTE lecturers; Sig. = probability value (2 tailed); t-cal= calculated values; S= significant; NS= Not Significant

The result in Table 2 shows the summary of mean ratings of male and female VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies. The data revealed that two items with p-values of .00 and .01 are less than the significant value of 0.05 at 159 degree of freedom. This indicates that there is significant difference in the mean ratings of male and female VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses with respect to those two items (2 and 5). Therefore, the hypothesis of no significant difference in the mean ratings of VTE lecturers in Delta State on items 2 and 5 was rejected. On the other hand, hypothesis of no significant difference for items 1, 3, 4, 6, 7, 8, 9 and 10 was accepted since the Sig values of these items ranged from .07 to .43 are greater than 0.05. Therefore, the null hypothesis of no significant difference in the mean ratings of male and female VTE lecturers in Delta State on the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses was accepted. This is with respect to all the items on table 2 except item 2 and 5.

Hypothesis 2

VTE teachers do not differ significantly in their mean ratings on the utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses based on their years of experience (1 – 5, 6 – 10, above 10 years).

Table 3

ANOVA comparison of the summary of respondents' mean ratings in Delta State on the extent of utilisation of challenge-based pedagogical strategies based on experience

| | | N=161 (1-5 =54; 6-10 = 38; above 10 = 69) | | | | | | | | | |
|-----|----------------------------|---|-----------------|----------------|-----------------|----------------|-----------------|-----|-------|------|---------|
| S/N | Item Statement | X ₁ | SD ₁ | X ₂ | SD ₂ | X ₃ | SD ₃ | df | F-cal | Sig. | Remarks |
| 1. | Structured inquiry | 1.12 | .64 | 1.23 | .42 | 1.07 | .57 | 158 | .86 | .65 | NS |
| 2. | Guided inquiry | 2.25 | .91 | 2.43 | .63 | 1.88 | .42 | 158 | 2.57 | .00 | S |
| 3. | Open inquiry | 1.63 | .52 | 1.59 | .27 | 1.74 | .35 | 158 | 1.12 | .27 | NS |
| 4. | Case studies | 1.78 | .43 | 2.09 | .15 | 2.02 | .26 | 158 | 1.33 | .19 | NS |
| 5. | Paper seminar | 3.09 | .86 | 2.84 | .60 | 3.11 | .53 | 158 | 2.46 | .00 | S |
| 6. | Critical debates | 1.27 | .71 | 1.09 | .91 | 1.16 | .68 | 158 | .99 | .54 | NS |
| 7. | Structured problem solving | 1.02 | .29 | 1.10 | .52 | 1.07 | .10 | 158 | 1.45 | .26 | NS |
| 8 | Learning cell | 1.14 | .63 | 1.27 | .44 | 1.09 | .28 | 158 | 1.28 | .51 | NS |
| 9 | Send a problem | 2.11 | .17 | 2.35 | .09 | 1.63 | .34 | 158 | .77 | .32 | NS |
| 10 | Cognitive organizers | 1.05 | .33 | 1.26 | .52 | 1.10 | .51 | 158 | 1.04 | .58 | NS |

Key: X₁= Mean of VTE lecturers (1-5 years); X₂ = Mean of VTE lecturers (6-10 years); X₃ = Mean of VTE lecturers (above 10 years); SD₁= Standard Deviation of VTE lecturers (1-5 years); SD₂= Standard Deviation of VTE lecturers (6-10 years);SD₃= Standard Deviation of VTE lecturers (above 10 years);Sig. = probability value; f-cal= calculated values; S= significant; NS= Not Significant

The result in Table 3 shows the summary of mean ratings of VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies based on their years of experience. The data revealed that two items with p-values of .00 and .00 are less than the significant value of 0.05 at 158 degree of freedom. This indicates that there is significant difference in the mean ratings of VTE lecturers in tertiary institutions in Delta State on the extent of utilisation of challenge-based pedagogical strategies based on their years of experience with respect to those two items (2 and 5). Therefore, the hypothesis of no significant difference in the mean ratings of VTE lecturers on items 2 and 5 was rejected. On the other hand, hypothesis of no significant difference for items 1, 2, 3, 4, 6, 7, 8, 9 and 10 was accepted since the Sig values of these items, ranging from .13 to .65 are greater than 0.05. Therefore, the null hypothesis of no significant difference in the mean ratings of VTE lecturers based on their experience on the extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses was accepted. This is with respect to all the items on table 3 except item 2 and 5.

Discussion of Results

Finding of the study revealed that vocational and technical education lecturers utilised challenge-based pedagogical strategies to a low extent for teaching vocational and technical education courses in tertiary institutions in Delta State. The study disclosed that vocational and technical education lecturers utilise structured inquiry, critical debates, structured problem solving, learning cell and cognitive organizers to very low extent. The findings of this study agrees with that of Capps and Crawford (2013) which reported that structured inquiry instructional strategies are rarely used in the classroom because educators lack the knowledge and understanding of these innovative strategies. The study further disclosed that vocational and technical education lecturers utilise guided inquiry, open inquiry, case studies and send a problem to a low extent. This finding is in tandem with Kazempour and Amirshokoohi (2014) which reported that the curriculum of technology and engineering programmes do not fully encourage the use of guided inquiry, open inquiry, case studies and send a problem instructional strategies in tertiary institutions.

However, the study revealed that vocational and technical education lecturers utilise paper seminar to a high extent. This finding tallies with Amaechi and Thomas (2016) which discovered that paper seminar was utilized by vocational and technical educators in form of students' assignment because they have the necessary competencies to organize paper seminar exercises for their students in tertiary institutions.

In addition, the study disclosed that VTE lecturers in Delta State do not differ significantly in their mean ratings on the extent of utilisation of challenge-based pedagogical strategies based on their gender and years of experience. This is in line with the study of Pedaste, Lazonder Raes, Wajeman, Moore and Girault (2016) which reported that gender and years of experience of educators did not influence their mean ratings on the utilisation of challenge-based pedagogical strategies on the premise teacher training colleges are yet to improve teachers' knowledge and attitudes toward the use of these instructional strategies. This implies that vocational and technical education lecturers are not exposed to challenge-based pedagogical strategies during their teacher training days. Perhaps the very low extent of utilisation of structured inquiry, critical debates, structured problem solving, learning cell and cognitive organizers among other challenge-based pedagogical strategies means that VTE lecturers in Delta State are not instructional experts in the use of challenge-based pedagogical strategies.

Conclusion and Recommendations

The researchers concluded that, the absence of vocational training and practical workplace experiences among VTE lecturers is responsible for the low extent of utilisation of challenge-based pedagogical strategies for teaching vocational and technical education courses in tertiary institutions in Delta State. The study recommended among others that,

1. Professional conferences and in-service seminars should be organized for VTE lecturers to update their instructional competency on challenge-based pedagogical strategies to enable them design teaching and learning experiences capable of stimulating skills acquisition among VTE students in tertiary institutions
2. Innovative teaching strategies such as challenge-based, activity-based and interactive pedagogical strategies should be reflected in vocational and technical education curriculum to build the awareness and facilitate the utilization of these strategies by VTE lecturers in tertiary institutions.

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