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IDENTIFICATION OF BASIC TECHNOLOGY DIFFICULT TOPICS AS PERCEIVED BY UPPER BASIC EDUCATION TEACHERS AND STUDENTS IN IBADAN METROPOLIS

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Abstract

The study identified basic technology difficult topics in upper basic curriculum as perceived by teachers and students in Ibadan metropolis. A research question and one hypothesis guided the study. The study adopted a descriptive survey of the correlational research design using multi-stage sampling technique. "Questionnaire for Identification of Basic Technology Difficult Topics in Upper Basic Education" (QIBT-DTUBE) was the main instrument for data collection. Face and content validity of QIBT-DTUBE was established by three technology education experts. The reliability coefficient for QIBT-DTUBE yielded 0.91 using Cronbach Alpha reliability technique. Research questions were analyzed using Mean and Standard deviation while the null hypotheses were tested at .05 level of significance using t-test statistics. Result obtained indicated that teachers and students perceived ten topics as difficult to teach and learn while the students identified additional nine topics that are difficult to learn. More so, a significant difference exists between the mean ratings of upper basic education teachers and students on their perceived levels of difficulty of basic technology topics. Based on these findings, it was recommended among others that basic technology specialist teachers be supported with appropriate trainings and refresher courses on all the topics identified as difficult.

Keywords: *Difficult Topics, Basic Technology, Basic Education Curriculum, Teachers' Perception, Students' Perception*

1.0 INTRODUCTION

The study of Basic technology, which is under the new nomenclature, combined with other three related subjects and captioned "Basic science and technology" in a 9-year continuous schooling as at 2013, is requiring serious attention. This is highly necessary in building up knowledge, basic skills, attitudes and competencies to ensure the country is being driven towards technological advancement teaching. In this

case, basic technology is seen as an indispensable pre-vocational base on which future vocational choices are made.

Basic technology is a subject introduced in the year 2007 into the primary and junior secondary school levels of the present 9-3-4 system of education in Nigeria and offered at the upper basic levels. It was however known as introductory technology before then. The subject eventually became Basic science and technology in 2013. Basic science and technology therefore is a combination of subjects like Basic Science, Basic Technology, Physical and Health Education as well as Computer Science/Information Technology.

According to the Federal Ministry of Education (2013), specialist teachers shall be provided for each of the subjects. The implication is that each subject in Basic Science and Technology could be better handled effectively by a specialist teacher. For that reason, specialist teacher would be employed and committed to teach them.

In Nigeria today, the new syllabus of basic education for Basic Science and Technology was structured and organized into 3 levels which are lower level (primary 1 - 3), middle level (primary 4 - 6) and upper level (JSS 1 - 3). According to Olarewaju, Awofala, Ola-Oluwa and Fatade (2012), the philosophy of the 9-year Basic Education Curriculum (BEC) entails that every learner who has gone through 9 years of basic education should have acquired appropriate levels of literacy, numeracy, manipulative, communicative and life skills; as well as the ethical, moral, and civic values needed for laying a solid foundation for life-long learning as a basis for scientific and reflective thinking. Meanwhile, the main concern of this study is on the last phase of the group that is the upper level.

2.0 LITERATURE REVIEW

2.1 Basic Education Certificate Examination (BECE)

The Federal Ministry of Education (2011) explained that an examination will be taken at the end of the 9-year continuous education. This would lead to the award of Basic Education Certificate Examination (BECE). The Ministry of Education in each state is therefore saddled with the responsibilities to create a more standardized framework for the examination because BECE is an essential State examination. This examination is used for both certification and selection into Senior Secondary Schools and Technical Colleges.

Meanwhile, the major aim of basic technology education in Nigerian junior secondary schools is to explore the fundamentals and develop vocational competencies among youths. This would enable them to appreciate the technological world. By doing so, at the end of junior secondary school session, technological appreciation would have been attained and solid foundation has been laid for students' entrance into a vocation of their choice (NERDC, 2007). In this sense, Basic Technology could be seen as a critical part of Basic Science and Technology that constitutes a formidable base for future technological growth in Nigeria.

2.2 Students' Performance in BECE Examination

Students' performance as indicated in Table 1 from the year 2012 until 2017 unveiled the fact that the credits obtained from the results did not seem to be entirely satisfactory. Persistent decline in the performance of students in this BECE examination conducted by the state's Ministry of Education was becoming obvious. Students' academic performance in any school subject is an important index for measuring the effectiveness of teaching and learning and the extent to which the objectives of the subjects

are being achieved. However, the students' performance in the past examinations as obtained and indicated in the Table 1 was not encouraging.

Table 1: Students' Performance Rate in Basic Education Certificate Examination (BECE) Basic Technology from 2013 – 2017 in Oyo State

Year	Total candidates	No. of % Distinction (A)	No. of % Credit (C)	No. of % Pass (P)	No. of % Failed (F)
2012	84,980	20,650 (24.30%)	46,802 (55.07%)	9, 226 (10.86%)	8.302 (9.77%)
2013	76,020	259 (0.3476%)	38,349 (50.45%)	22,990 (30.24%)	14,442 (18.97%)
2014	85,408	5,927 (6.94%)	75.055 (87.88%)	4, 223 (4.94%)	203 (0.24%)
2015	96,421	11,348 (11.77%)	64,541 (67.97%)	18.407 (19.09%)	1,125 (1.17%)
2016	92,465	18,798 (20.33%)	56,333 (60.92%)	16,968 (18.35%)	366 (0.40%)
2017	101,440	34, 224 (33.74%)	60,956 (60.09%)	6,222 (6.13%)	66 (0.40%)

Source: Evaluation Department, Ministry of Education, Science and Technology, Oyo State, 2017

The rise and fall in the percentage of students who had distinction from 2012 until 2017 fell between 0.35% and 33.70% which eventually dropped below 1% in 2013 across the state. Though more than 50% of the students passed at credit level in each year, the trend was declining right from 2012 up to 2017. The percentage of students that fell into the categories of pass and failure in the year 2013 was 49.21%. The nature of the results obtained from a pre-survey of teachers' generated data in the five schools randomly selected from each of the three senatorial zones of the state was not too different. These data revealed that the pass rate was relatively low and in fluctuate form. This situation is worrisome and assuming a disturbing dimension.

2.3 Causes of Students' Poor Performance

This perennial poor performance in this subject has had far-reaching consequences for Nigeria as a country that is still yearning for technological development. Many reasons could be adduced as to these poor performances. Studies indicated poor teaching method adopted by the teacher (Jimoh, Abd-El-Aziz & Oguche, 2014); flaws in the multiple-choice items during examination (Abd-El-Aziz & Jimoh, 2016); and lack of professional development for enhancing teachers' effectiveness (Abd-El-Aziz & Hassan) among others which may be responsible for this poor performance. More so, poor performance in Basic Technology of the students might probably be attributed to difficulties experienced or perceived by the teacher to teach and students to learn some topics of the subject.

2.4 Teachers and Students' Perception of Topics in Basic Technology

Teachers' perception or personal concern about the curriculum they are implementing may be another indicator of students' poor performance (Olarewaju et al., 2012). Olarewaju et al. (2012) identified teachers' difficulties in identifying the contents to be learnt by students within a particular strand; and lack of knowledge on the topics and terminologies used in the contents of the curriculum among others as possible factors that may lead to students' poor performance. On the other hand, Elom and Okolie, (2014) and Olarewaju et al. (2012) explained that students' perceptions of things around them (especially school subjects) became their frame of reference and remotely control their behaviour.

Consequently, subjects or topics so perceived to be difficult or not easy to learn might eventually end up as a difficult subject or topic even though they are simple. In this case, identification of whether basic technology topics or fractional parts of its components are difficult or easy to teach and learn may be desirable in a bid to address students' learning difficulties and the rising failure rate. Meanwhile, little or no study has ever been conducted on difficulties experienced or perceived by the teacher to teach and students to learn some topics of Basic Technology as a school subject.

This study therefore aimed at investigating the areas of basic technology topics that teachers and students consider as posing difficulty in their teaching and learning. Specifically, the study sought to determine the perceived difficult topics in Basic Technology by upper basic education teachers and students in Ibadan metropolis. In line with this, the study provided answer to the question: What are the perceived difficult topics in Basic Technology by upper basic education level teachers and students in Ibadan metropolis? The hypothesis, which is there will be no significant difference in the mean ratings of upper basic education teachers and students on the perceived levels of difficulty of basic technology topics in Ibadan metropolis, was equally tested at 0.05 level of significance in the study.

3.0 METHODOLGY

3.1 Design of the Study

This study was a descriptive survey. Descriptive survey research aims at obtaining information concerning current status of phenomena using a survey. A survey studies and describes the characteristics of a population of people or situation (Oliver & Okoye, 2013). As such, the researcher was therefore availed the opportunity to obtain information concerning current status of the list of topics in the Basic Technology curriculum and described the situation as it was with the teachers and students who were the chief implementers and consumers of this curriculum respectively.

3.2 Population, Sample and Sampling Techniques

The study was conducted in all upper basic education schools otherwise referred to as junior secondary schools up until date in eleven local government areas of Ibadan metropolis in Oyo state. There are 523 Basic Technology specialist teachers and 42,331 students in all the upper basic education schools in eleven local governments of Ibadan metropolis in Oyo State. This figure constitutes the population for the study (population of students obtained from TESCOM, Zone A).

The sample size for the study consists of 222 teachers and 397 students selected across all schools in the eleven local governments. The sample size for the two categories of respondents was determined using Singh and Masuku's (2014) model on a 2.5% marginal error to arrive at the figure of 397 out of 42,331 students and 222 from 523 teachers. Multi-stage sampling technique was used for the study.

In the first stage, purposive sampling technique was used to select 402 permanent teachers out of the three categories of teachers in the schools, that are, teachers employed by the parents and teachers' association, teachers who were on their National Youth Service Corps and permanent teachers employed by the state government. Proportional sampling technique was used to allocate the percentage of respondents who participated in the study from each local government.

Simple random sampling technique was used in the last stage to select 250 out of 402 permanent teachers who are the real respondents. More so, proportional sampling technique was used to allocate the percentage of students who participated in the study for each local government. Simple random sampling technique was used in the last stage to select 420 students who are the real respondents.

3.3 Instrument for Data Collection, Validation and Reliability of the Instrument

The instrument used for data collection was a 34-items questionnaire titled: "Questionnaire for Identification of Basic Technology Difficult Topics in Upper Basic Education" (QIBT-DTUBE). QIBT-DTUBE consists of a checklist with the list of all topics in Basic Technology curriculum for upper basic education. The mode of response consisted of a 5-point Likert scale; Very easy = 1 (topic understood first time with little effort), Easy = 2 (topic understood after a little work), Moderate = 3 (topic understood after a moderate amount of work), Difficult = 4 (topic only understood after hard work and efforts), and Very difficult = 5 (topic never understood and will need to be re-taught).

Face and content validity were conducted on QIBT-DTUBE by three technology education experts from the Departments of Science and Technology Education, University of Lagos, Akoka. The comments and suggestions of the experts on the clarity and scope of the contents were incorporated in building the final draft of the instrument. QIBT-DTUBE was trial tested on 56 students in Ogbomoso South local government area of Oyo state. The internal consistency of QIBT-DTUBE using Cronbach alpha reliability technique was 0.82.

Copies of QIBT-DTUBE were administered and collected through direct approach by the researcher and five research assistants. The consent of the principals and basic technology specialist teachers of schools involved in the study were sought and secured. The principals and basic technology specialist teachers equally assisted the researcher by controlling and soliciting for the cooperation of students in their respective schools. The researcher and five research assistants administered 750 copies of questionnaires and 735 copies were retrieved. Mean and standard deviation were used to answer research question and the hypothesis was tested using t-test.

4.0 RESULTS AND DISCUSSION

4.1 Results

Table 2: Mean Ratings and *t-test* Analysis of Teachers and Students on their Perceived Level of Difficulty of Upper Basic Education Basic Technology Topics

S/N	Topics	Teachers			Students					
		N	Mean	SD	N	Mean	SD	*t-value*	Sig. (2-tailed)	Dec
1.	Understanding Technology	227	1.08	.26	245	1.50	.745	-8.03	.000	S
b.	**Safety**									
2.	Safety Guidelines	227	1.08	.26	245	1.20	.424	-3.94	.000	S
3.	Workshop Safety	227	1.08	.26	245	1.12	.375	-1.58	.014	S
4.	First Aid	227	2.38	.13	245	1.12	.364	-1.62	.007	S
5.	Rescue Operation	227	1.08	.26	245	3.50	.638	-35.11	.000	S
c.	**Material and Processing**									
6.	Properties of Materials	227	1.08	.002	245	1.08	.371	-3.15	.002	S
7.	Building Materials	227	1.08	.26	245	3.53	.650	-52.93	.000	S
8.	Materials and their common Uses	227	1.08	.27	245	1.11	.314	-1.32	.018	S
9.	Processing of Timber	227	1.08	.26	245	1.12	.348	-1.52	.012	S
10.	Processing of Metal	227	1.08	.27	245	3.88	.360	-96.04	.000	S
11.	Processing of Clay, Ceramics and Glass	227	1.08	.26	245	3.98	.311	-132.47	.000	S

12.	Processing of Plastics and Rubber	227	1.08	.26	245	3.89	.331	-101.43	.000	S
d.	**Drawing Practice**									
13.	Drawing Instruments and Materials	227	1.06	.02	245	1.04	.209	-2.65	.008	S
14.	Board Practice	227	1.02	.13	245	1.05	.225	-2.07	.039	S
15.	Freehand Sketching	227	1.02	.036	245	1.04	.198	-3.10	.002	S
16.	Geometric Construction	227	2.54	1.09	245	3.99	.902	-22.84	.000	S
17.	Plane Figures	227	2.51	1.09	245	3.99	.509	-22.58	.000	S
18.	Isometric Drawing	227	2.51	1.09	245	3.98	.594	-22.29	.000	S
19.	Oblique Drawing	227	3.40	1.09	245	3.92	.559	-22.81	.000	S
20.	Orthographic Drawing	227	3.58	1.24	245	3.99	.699	-24.11	.000	S
21.	One-point Perspective Drawing	227	3.58	1.24	245	3.58	.235	-24.19	.000	S
22.	Scales and Scale Drawing	227	2.91	1.13	245	2.70	.133	-3.103	.002	S
e.	**Tools, Machines and Processes**									
23.	Woodwork Hand Tools	227	1.07	1.11	245	2.00	1.203	.56	.050.	S
24.	Metalwork Hand Tools	227	1.16	.45	245	1.20	.473	-.78	.044	S
25.	Maintenance of Tools and Materials	227	1.16	.44	245	3.59	.632	-48.03	.000	S
26.	Woodwork Machines	227	1.18	.46	245	1.40	.561	-4.63	.000	S
27.	Belt and Chain Drives	227	1.16	.45	245	3.48	.624	-46.02	.000	S
28.	Hydraulic and Pneumatic Machines	227	2.94	1.20	245	3.54	.637	-14.76	.000	S
29.	Gears	227	2.70	1.09	245	3.51	.634	-13.58	.000	S
30.	Woodwork Projects	227	3.17	1.20	245	3.17	.880	-10.40	.000	S
31.	Metalwork Projects	227	3.10	1.42	245	3.49	.638	-15.66	.000	S
32.	Soldering and Brazing;	227	1.16	.44	245	3.49	.638	-45.79	.000	S
33.	Machine motion	227	1.18	.46	245	1.27	.503	-1.91	.053	S
34.	Rotary motion	227	1.16	.45	245	1.33	.527	-3.62	.000	S

Key: S – Significant; NS – Not Significant

4.2 Discussion

The data in Table 2 revealed that the mean ratings for Plane Figures, Isometric Drawing, Oblique Drawing, Orthographic Drawing, One-point Perspective Drawing, Scales and Scale Drawing, Hydraulic and Pneumatic Machines, Gears, Woodwork Projects, and Metalwork Projects were rated by the teachers and students above the cut-off point of 2.5, indicating that the two categories of respondents identified these topics as difficult to teach by the teachers and difficult to learn by the students. In addition, the mean ratings for Rescue Operation; Building Materials; Processing of Metal; Processing of Clay, Ceramics and Glass; Processing of Plastics and Rubber; Maintenance of Tools and Materials; Belt and Chain Drives; and Soldering and Brazing were rated above the cut-off point of 2.5 by the students only indicating that students further identified these topics as difficult to learn by the students.

In addition, in the *t*-test conducted for the 34 items on the mean ratings of teachers and students, all the items had their *p-values* less than the alpha value of 0.05. In this case, the null hypothesis is rejected while the alternate hypothesis is not rejected. Hence, a significant difference exists in the mean ratings of upper basic education teachers and students on the perceived levels of difficulty of basic technology topics.

The findings of the study indicated that Plane Figures, Isometric Drawing, Oblique Drawing, Orthographic Drawing, One-point Perspective Drawing, Scales and Scale Drawing, Hydraulic and Pneumatic Machines, Gears, Woodwork Projects, and Metalwork Projects were both identified by teachers and students as the topics that are difficult to be taught by teachers and difficult to be learned by students. In these topics, both teachers and students shared a common view. More so, Rescue Operation, Building Materials, Processing of Metal, Processing of Clay, Ceramics and Glass, Processing of Plastics and Rubber, Maintenance of Tools and Materials, Belt and Chain Drives, and Soldering and Brazing were also identified as difficult topics to learn by the students in addition to those topics that were coincidentally identified as difficult by teachers and students.

The findings from this study indicate that students perceived more than 50% of the topics in the upper basic education basic technology curriculum as difficult, out of which teachers perceived 62.5% of the topics identified as difficult to learn by the students as difficult to teach. The results of the study were in line with the study by Ogunkola and Samuel (2011) who discovered that certain topics were both identified as difficult by both teachers and students but claimed that unlike the students, the teachers indicated little difficulty in teaching most of the listed topics than the students did. Moreover, in a report on identification of difficult topics in Chemistry investigated in England, Sheehan (2011) explained that students' perception of most difficult topics may not necessarily coincide with teachers' view of difficult topics. The study also revealed a significant difference between the mean ratings of upper basic education teachers and students on their perceived levels of difficulty of basic technology topics. This is in contrast to the findings by Adegun and Adegun (2013) who discovered no significant difference in the perceived levels of difficulty of Mathematics topics by Mathematics teachers and students.

5.0 CONCLUSION

5.1 Conclusion

The conclusion that could be drawn from the findings of this study is that both teachers and students identified Plane Figures, Isometric Drawing, Oblique Drawing, Orthographic Drawing, One-point Perspective Drawing, Scales and Scale Drawing, Hydraulic and Pneumatic Machines, Gears, Woodwork Projects, and Metalwork Projects as difficult topics to teach and learn. In addition to these topics, students only further identified Rescue Operation, Building Materials, Processing of Metal, Processing of Clay, Ceramics and Glass, Processing of Plastics and Rubber, Maintenance of Tools and Materials, Belt and Chain Drives, and Soldering and Brazing as other topics that are difficult to learn. It was also concluded that a significant difference exists between the mean ratings of upper basic education teachers and students on their perceived levels of difficulty in Basic Technology topics.

5.2 Recommendations

The followings were recommended based on the findings of the study that:

1. Basic Technology specialist teachers should be supported with appropriate trainings and refresher courses such as workshops, conferences, organized lectures and other forms of professional development programmes in a bid to expand their knowledge and understandings on all the topics identified as difficult to teach by the teachers. This should be done periodically by the Post-Primary Teaching Service Commission both at Zonal and State levels and attendance should be made compulsory to all basic technology specialist teachers.
2. Teachers should endeavour to improve themselves academically, be more committed, proactive in their dealings, and see their job as a service to humanity. This is important for the sake of

sound and formidable technological foundation for Nigeria as a country that is still yearning for technological development.

3. Teachers should re-examine and evaluate their teaching strategies as at present. They should buckle up and reacquaint themselves with new and innovative strategies to be effective in their teaching.
4. The policy framework on professional training or development for teachers as contained in the National Policy of Education should be implemented in pragmatic sense and not just remain a mere blue print for the sake of "we equally have it". This would to a far extent help in the enhancement of teachers' knowledge and competence in teaching most topics identified as difficult to teach.

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