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DEVELOPMENT-ORIENTED TESTING MODEL: CASE STUDY OF THE WEST AFRICAN EXAMINATIONS COUNCIL AND CAMBRIDGE SCHOOL CERTIFICATE EXAMINATIONS

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ABSTRACT

Examination bodies wield great powers that could be harnessed to catalyze positive development. It is against this backdrop that the Development Oriented Testing [DOT] model was conceived. The questions addressed were: do the examination bodies realize the enormity of the power they have? If they do, to what extent are they pragmatically using this power to catalyze productivity and development in their domain of control? The case study and ex post facto research designs were adopted in this study. Comparative analysis of past West African Secondary School Certificate Examination [WASSCE] and General Certificate of Secondary Examination [IGCSE] was conducted. The outcome of the content analysis revealed that there were remarkable differences in the higher educational objectives examined in Cambridge and WAEC O-level examinations. Cambridge examinations furnished more application questions than WAEC examinations. It is therefore recommended that the Development Oriented Testing **[DOT**] Model should be adopted to redress this situation

KEYWORDS: Test, Examination, Assessment, Evaluation, Development, Productivity, Model, Certification

INTRODUCTION

Examinations tend to dictate the pace for Teachers and Students worldwide. It is not uncommon to find Teachers and Students at all levels/spheres of education focusing their learning efforts more on topics that are consistently being examined. Orado (2007), in her study of *factors influencing performance in chemistry practical work in secondary schools in Kenya*, concluded, among others, that the skills emphasised in teaching and assessment of practical work were the same as those assessed by Kenya National Examination Council [KNEC]. The trend is not too different in Nigeria. The researchers' observation of events in the secondary and tertiary school systems over the years tend to reiterate this finding.

This point nonetheless, it is almost becoming the norm in many developing nations like Nigeria for Teachers and Students not to devote enough time on real practical work. The reason could partly be traced to the Examining Boards. In testing Science practical, they often send instructions ahead of practical examinations to schools. This practice is often counterproductive as Teachers often use this information to prepare their students for such examinations. Worst still, millions of private candidates who are taking practical oriented subjects have been administered *alternative to practical*, which is largely an extension of essay examination. Over time, it appears the number of real application and practical-oriented questions fielded by examining boards is fast depleting. The consequence is the neglect of real practical work and low productivity being currently witnessed. To corroborate this point, Leigh and Ryan (2011) submitted that all too frequently, education policy debates tend to focus on inputs rather than outputs. Yet, from a policy-making perspective, what should matter most is school productivity.

It is however apparent that it is not only application questions that make for productivity. The foundation is knowing [*recall*] and understanding [*comprehension*] of the basic concepts/theories/principles. It is this basic knowledge, when properly comprehended, that is applied to create solutions [in form of goods and services] to solve prevailing societal problems. It is the depth of understanding/comprehension that empowers the learner to analyse and synthesize pre-existing products/solutions, thus further enhancing knowledge that could be applied to evolve better solutions.

Considering that the bedrock of productivity and national development is science and technology invention, the imminent danger of *not* consistently doing real practical work is apparent. Considering their current laser-faire attitude to this trend, it appears African Governments and a chunk of School Proprietors/Administrators are not conscious of this danger. Some are conscious of it but care less. For as long as a nation adopts this position, she can hardly experience true economic emancipation.

The African Union (2007) and International labour organisation, ILO (2008) posited that the *least developed countries*, mainly in sub-Saharan Africa, parts of Asia and small island countries face a vicious circle of low education, low skills, low productivity and consequently poverty. The priority of improving the quality and availability of training means that it is necessary to focus on reforming education and training systems so that they provide the skills and competencies needed to boost the growth of decent work in the formal economy. In the long term, productivity is the main determinant of income growth. The productive skill proposed by ILO and African Union could hardly be delivered without concerted and consistent practical work in schools.

With over twenty years of concerted practice in the field of education, during which one of the Researchers had opportunity to head an international school with ample resources to do real practical work, Teachers and Students were simply not intrinsically motivated enough to engage in concerted practical work. Even when they were literally forced to engage in *productive teaching,* which involved application of basic principles and laws gleaned from the various subjects to solve related life problems, they only succeeded in producing a round of useful products prototypes before engaging an uprising. They simply could not sustain it. Of course, there were genuine reasons why it was difficult to engage in real practical work that could lead to production of prototypes – such as the burden of overloaded curriculum that tend to place teaching staff on perpetual stampede for time and lack of tools/materials for practical works in many schools. In some schools, it is lack of technical prowess. Maebuta, Dorovolomo and Phan (2013) corroborated this assertion. However, despite these 'legitimate' excuses, the biographical reports on great inventors like Henry Ford, Wright Brothers and Thomas Edison somehow inspired in this Researcher a different mindset. Despite great limitations, they *persisted* and *perspired* through years of experimentation, '*failed'* several times, but eventually succeeded.

It is our persuasion that nothing is strong/big enough to stop Teachers and Students from engaging in real practical work if only they set their heart to it. However, despite these inspiring stories, which have been shared with a crop of Teachers and Students, nothing significant seems to happening. It was out of determination never to give up on this crusade of *productive teaching* that a leeway was discovered – which is the discovery that *examination boards wield a great power*, power they hardly realise. This power could be gainfully harnessed to make Teachers and Students ultimately 'love' to make productive teaching/learning [another phrase for real practical work] a lifestyle. As mentioned earlier, the core hypothesis that prompted this study is that *Teachers and Students tend to concentrate on topics that examining boards focus on*. In other words, they dance to the beat/tune played by examining boards. It was further hypothesized that presently, a number of Nigerian Teachers and students are not doing much of real practical work because external

Examining Boards in Nigeria, when compared with their counterpart in developed countries [such as Cambridge Examination Syndicate] were *not* fielding enough true application/real practical questions that could provoke creativity, innovation and inventions. The hypothesis goes further to postulate that if the Examining Boards begin to consistently field more application questions of this nature, in a matter of years, Nigerians and indeed Africans, will begin to evolve witty inventions that will translate to indigenous productivity and development. This is what will serve as catalyst for genuine economic emancipation for the continent. The focus of this study is clearly not limited to Secondary School. If these hypotheses are confirmed, the findings can be gainfully applied in all tertiary and professional training institutions worldwide.

1.1 Statement of Objectives

- To evaluate the range of Educational Objectives assessed in WAEC and Cambridge School Certificate Examinations in Physics, Chemistry, Biology and Mathematics from 2011 to 2013.
- To verify the hypothesis that the bane of low productivity in Nigeria and many African nations could be traced to the practice of external examination bodies [like WAEC] of barely assessing true practical work and applied knowledge.
- To ascertain the current state of practical work in Nigerian Secondary Schools
- To propose a Development-Oriented Testing [DOT] Model.
- To present, based on findings, samples of development-oriented questions for possible adoption by Examination Boards and in secondary/tertiary institutions.

1.2 Research Questions

- What is the range of Educational Objectives assessed in WAEC and Cambridge School Certificate Examinations in Physics, Chemistry, Biology and Mathematics 2011 to 2013?
- What is the current state of practical work in Nigerian Secondary Schools?
- What is the bane of low practical work in Nigerian Secondary schools?
- What is the Nature [Sample] of the Proposed Development-Oriented Questions?
- What possible model of testing can be adopted by Institutional and Independent Examining Boards to enhance practical work and productivity in secondary and tertiary institutions in Nigeria?

METHODOLOGY

The *Ex-post Facto*, *Documentary Analyses* and *Survey* ***designs*** were utilized in this study.

There are two categories of ***population*** for this study. One is the secondary school Teachers/Students in Nigeria. Currently, this population is about 10,000,000. The second category is the External Examination Board staff. In the light of the research designs adopted in this study [*which is predominantly documentary analysis*], was purposive ***sampling technique***. In all, three secondary schools participated in this study – a private mission school [with student population of about 1500], an independent private school [with student population of about 250] and a public school [with student

population of about 10,000]. The Teachers of Physics, Biology, Chemistry, Mathematics and English Studies [i.e. 5 Teachers] and 4 Students [2 male, 2 female] in each of these schools constitute the sample for this study. In all, 15 Teachers and 12 students participated in this study.

The core ***instruments*** for this were *past examination questions* developed and standardized by the West African Examinations Council [WAEC] and the Cambridge Examination Syndicate [*See excerpts in Appendix A*]. Specifically, the study focused on 2011 to 2013 examination questions in Physics, Chemistry, Biology, Mathematics and English Studies. *Interview Guidelines* for Teachers and Students were also developed for the survey *[See Appendix B for excerpts*]. To capture the data from the interview session adequately, *iPad* was also used.

2.1 Procedure for Data Collection

The first step was to source for the past questions. The required past questions were obtained from the Cambridge Examination Syndicate, United Kingdom; while the WAEC past questions were obtained from the bookshop. Thereafter, a team of professional Psychologists, which included a Psychometrician [*with over a decade work experience with the West African Examinations Council*] embarked on classification of question items based on Bloom's taxonomy of education educational objectives. In the process, the items were collated and categorised as either Recall [R]; Comprehension [C]; Application [Ap]; Analysis [An]; Synthesis [Sy] or Evaluation [E]. It is this exercise that furnished the tables of results presented below.

To obtain answers to the research questions raised for this study, three schools were visited – a public secondary school, a middle class private school and a high class Christian mission private school. The latter was a full boarding school with all the state of the art learning facilities. The public secondary school lacked basic learning facilities in many respect. Interviews were conducted with Teachers and Students in these schools. In the process, pictures of samples of their products were taken. The interview sessions were also recorded in video and audio formats and later transcribed.

2.2 Data Analysis

Simple descriptive statistics of frequency counts and percentages were utilised in the analysis of data obtained via documentary analysis while the pictures and audio recordings obtained were qualitatively analysed.

RESULTS

RQ1. ***What is the range of Educational Objectives assessed in WAEC and Cambridge School Certificate Examinations in Physics, Chemistry, Biology, Mathematics and English Studies from 2011 to 2013***?

Table 1: Distribution of Blooms Educational Objectives in WAEC and CAMBRIDGE School Certificate Examination for Physics from 2011 To 2013

Exam Board	Subject	Year	Paper	R	C	Ap	An	S	E
WAEC	PHYSICS	2013	OBJ	30[**60**%]	20[**40**%]	-	-	-	-
			THEORY	17[**55**%]	13[**42**%]	1[**3**%]	-	-	-
			PRACTICAL	-	3[**100**%]	-	-	-	-
CAMBRIDGE	PHYSICS	2013	OBJ	9[**23**%]	26[**65**%]	5[**12** %]	-	-	-
			THEORY	6[**25%**]	18[**75**%]	-	-	-	-
			PRACTICAL	-	29[**100**%]	-	-	-	-
WAEC	PHYSICS	2012	OBJ	27[**54**%]	23[**46**%]	-	-	-	-

			THEORY	10[**32**%]	19[**59**%]	3[**9**%]	-	-	-
			PRACTICAL	-	3[**100**%]	-	-	-	-
CAMBRIDGE	PHYSICS	2012	OBJ	8[**20**%]	27[**68**%]	5[**12** %]	-	-	-
			THEORY	5[**15**%]	29[**85**%]	-	-	-	-
			PRACTICAL	-	11[**100**%]	-	-	-	-
WAEC	PHYSICS	2011	OBJ	22[**44**%]	28[**56%**]	-	-	-	-
			THEORY	21[**43**%]	26[**53**%]	1[**2**%]	1[**2**%]	-	-
			PRACTICAL	1[**25**%]	3[**75**%]	-	-	-	-
CAMBRIDGE	PHYSICS	2011	OBJ	7[**18**%]	30[**75**%]	3[**8**%]	-	-	-
			THEORY	1[**4**%]	27[**96**%]	-	-	-	-
			PRACTICAL	-	11[**100**%]	-	-	-	-

Key: ***R*** *- Recall or knowledge;* ***C*** *– Comprehension;* ***Ap*** *– Application;* ***An*** *– Analysis;* ***S*** *– Synthesis;* ***E*** *- Evaluation*

The first *deduction* made from the classification of Physics examination question items for 2011 to 2013, as displayed in the result above, is that, in the WAEC examinations assessed, the *percentage of recall questions featured were consistently higher* [except in 2011] than comprehension and other higher domain questions. Cambridge featured more questions from the higher educational objective domains in virtually all its papers [i.e. from comprehension upward] than WAEC did. When compared with its objective papers, WAEC tend to feature higher domain questions in the theory and practical papers over the three year period assessed; but even then they were not as high as that of Cambridge, except in few instances. A comparison of percentage of recall and comprehension questions that Cambridge featured showed that the latter were consistently far higher with a difference as much as 92% as observed in their 2011 theory paper. Cambridge also featured more Application questions with many of their questions relating to real life issues. This implies that on the overall assessment, WAEC featured recall questions more than in Cambridge did.

These findings tend to support the hypotheses that perhaps one of the core secrets of the development trend in developed countries like the United Kingdom could be traced to the Certifying Examining Boards like Cambridge consistently fielding questions in the higher domains of education objectives as ascertained in this study for Physics. This singular practice is apt to motivate Teachers and Students to tilt more towards this level of learning in preparing for the examination, hence better practical exercises leading to productivity and development.

Table 2: Distribution of Blooms Educational Objectives in WAEC and CAMBRIDGE School Certificate Examination for Chemistry from 2011 To 2013

Exam Board	Subject	Year	Paper	R	C`	Ap	An	S	E
WAEC	CHEMISTRY	2013	OBJ	30[**60**%]	14[**28**%]	6[**12**%]	-	-	-
			THEORY	26[**55**%]	19[**41**%]	1[**2**%]	1[**2**%]	-	-
			PRACTICAL	1[**2**%]	31[**80**%]	7[**18**%]	-	-	-
CAMBRIDGE	CHEMISTRY	2013	OBJ	21[**55**%]	12[**32**%]	5[**13**%]	-	-	-
			THEORY	7[**46**%]	2 [**13**%]	5 [**34**%]	1[**7**%]	-	-
			PRACTICAL	-	-	16[**100**%]	-	-	-
WAEC	CHEMISTRY	2012	OBJ	38[**76**%]	12 [**24**%]	-	-	-	-
			THEORY	29[**64**%]	15[**33**%]	-	1[**2**%]	-	-
			PRACTICAL	2{**28**%}	5{**72**%}	-	-	-	-
CAMBRIDGE	CHEMISTRY	2012	OBJ	15{**37**%}	19{**47**%}	6[**16**%]	-	-	-
			THEORY	15{**37**%}	18{**42**%}	9{**21**%}	-	-	-
			PRACTICAL	-	-	16[**100**%]	-	-	-
WAEC	CHEMISTRY	2011	OBJ	35{**70**%}	15{**30**%}	-	-	-	-

			THEORY	28{**45**%}	22{**36**%}	**11**[18%]	-	-	-
			PRACTICAL	3{**37**%}	5{**62**%}	-	-	-	-
CAMBRIDGE	CHEMISTRY	2011	OBJ	23[**58%**]	16{**40**%}	1[**2**%]	-	-	-
			THEORY	11[**30**%]	17[**48**%]	8[**22**%]	-	-	-
			PRACTICAL	-	-	13[**100**%]	-	-	-

Source: *Documentary analysis of past School Certificate examination questions of WAEC & Cambridge*

Except in few instances where Cambridge tended to feature more recall questions than comprehension questions, the same pattern found for Physics above holds here. Comparatively, Cambridge fielded more questions in the higher domains of educations objectives than WAEC, thus lending support to the inference drawn from the findings above. These points will be more appreciated when it is realised that it is the application of the principles and laws in Physics, Chemistry, Biology and related science/ technology subjects that birthed many of the goods and services that are enhancing standard of living today. These are the things that make for human, capital and economic development worldwide.

Table 3: Distribution of Blooms Educational Objectives in WAEC and Cambridge School Certificate Examination for Biology from 2011 To 2013

Exam Board	Subject	Year	Paper	R	C	Ap	An	S	E
WAEC	BIOLOGY	2013	OBJ	35[**59**%]	19[**32**%]	5[**8**%]	-	-	-
			THEORY	19[**82**%]	4[**18**%]	-	-	-	-
			PRACTICAL	8[**45**%]	9[**50**%]	-	1[**5**%]	-	-
CAMBRIDGE	BIOLOGY	2013	OBJ	24[**60**%]	5[**12**%]	8[**20**%]	3[**8**%]	-	-
			THEORY	17[**70**%]	2[**8**%]	4[**17**%]	1[**5**%]	-	-
			PRACTICAL	2[**16**%]	2[**16**%]	6[**52**%]	-	2[**16**%]	-
WAEC	BIOLOGY	2012	OBJ	30[**50**%]	28[**47**%]	2[**3**%]	-	-	-
			THEORY	7[**30**%]	16[**66**%]	1[**4**%]	-	-	-
			PRACTICAL	4[**31**%]	9[**69**%]	-	-	-	-
CAMBRIDGE	BIOLOGY	2012	OBJ	20[**50**%]	14[**35**%]	4[**10**%]	2[**5**%]	-	-
			THEORY	16[**67**%]	2[**8**%]	2[**8**%]	3[**13**%]	1[**4**%]	-
			PRACTICAL	-	5[**46**%]	4[**36**%]	2[**18**%]	-	-
WAEC	BIOLOGY	2011	OBJ	32[**54**%]	25[**41**%]	3[**5**%]	-	-	-
			THEORY	7[**65**%]	13[**3**%]	-	-	-	-
			PRACTICAL	2[**20**%]	8[**80**%]	-	-	-	-
CAMBRIDGE	BIOLOGY	2011	OBJ	15[**38**%]	20[**50**%]	5[**12**%]	-	-	-
			THEORY	5[**21**%]	13[**55**%]	4[**16**%]	2[**8**%]	-	-
			PRACTICAL	1[**11**%]	1[**11**%]	6[**67**%]	1[**11**%]	-	-

Though Cambridge presented more higher cognitive questions than WAEC in Biology, yet on the overall, it appears both examining Boards featured more recall questions in the years assessed, except in 2011 and practical papers. Could it be that, being a life science, Biology tends not to have more applicable questions at his level? This appears to be the view of many of the respondents who also tend to have virtually nothing to show as product of application of knowledge in this subject. The Researchers are convinced that, if properly handled by the examining boards and Teachers, a lot of life applicable questions and classroom activities can also be generated in Biology.

Table 4: Distribution of Blooms Educational Objectives in WAEC and CAMBRIDGE School Certificate Examination for Mathematics from 2011 to 2013

Exam Board	Subject	Year	Paper	R	C	Ap	An	S	E
WAEC	MATHS	2013	OBJ 1	2[**4**%]	43[**86**%]	5[**10**%]	-	-	-
			THEORY	-	26[**74**%]	7[**21**%]	-	2[**5**%]	-
CAMBRIDGE	MATHS	2013	THEORY 1	3[**4**%]	35[**54**%]	27[**42**%]	-	-	-
			THEORY 2	-	22[**40**%]	33[**60**%]			
WAEC	MATHS	2012	OBJ	4[**8**%]	38[**76**%]	8[**16**%]	-	-	-
			THEORY	-	23[**71**%]	8[**26**%]	-	1[**3**%]	-
CAMBRIDGE	MATHS	2012	THEORY 1	3[**5**%]	45[**78**%]	10[**17**%]	-	-	-
			THEORY 2	1[**2**%]	57[**85**%]	7[**10**%]	-	2[**3**%]	-
WAEC	MATHS	2011	OBJ	2[**4**%]	34[**69**%]	9[**19**%]	4[**8**%]	1[**2**%]	-
			THEORY	-	25[**59**%]	16[**38**%]	-	1[**3**%]	-
CAMBRIDGE	MATHS	2011	THEORY 1	5[**9**%]	36[**62**%]	17[**29**%]	-	-	-
			THEORY 2	1[**2**%]	47[**74**%]	14[**22**%]	1[**2**%]	-	-

In all the WAEC and Cambridge mathematics examinations assessed, the higher domains of educational objectives were featured far more than recall questions. Mathematics presented fewer recall questions than all the subjects assessed. The possible explanation for this finding is that Mathematics is the language of the sciences and often involves the ***application*** of formulas to solve problems. In the same vein, many of the mathematical problems tend to relate to real life issues. However, this does not imply that the assessment of Mathematics is perfect as there are quite a number of concepts and formulas like quadratic equation, surd, simultaneous equation, calculus, integration that Teachers and Examiners often fail to show their usage/relevance in real life situations. This is apt to make learning more meaningful/interesting and so make for greater inspiration for productivity and development, than when taught abstractly. *This is the spirit of the proposed Development-Oriented Teaching and Testing [DOTT] Model.*

RQ2. What is the Current State of Practical Work in Nigerian Secondary Schools?

Data obtained in the course of interview and observation, which were captured in video, audio and picture formats, revealed virtually the same trend – though few products and practical activities were done in some of the schools visited [e.g. *Prototype of Periscope, school magazine and story books written by Teacher and Students at the Middle class school; books written by Teachers in the public school; and liquid soap, disinfectant, and books written by a Teacher and a Students in the High Class Private School*; *and some of the schools did titration and few gas production*], Teachers and Students predominantly have not been consistently engaging in real practical work over the years. Many of the Teachers and Students interviewed concurred to this submission. For instance, in response to the question: '*How do you prepare for WAEC practical exams*? The students said: '*The past questions are used as guides and teachers provide specimens [from the instruction sent by WAEC] for the practical sessions'*. One of the Vice Principals [Academics], who is also a Chemistry Teacher informed the Researcher that the slot allotted in the scheme for practical was few, barely twice in a term.

RQ3. What is the Bane of Low Practical Work [If Confirmed] in Nigerian Secondary Schools?

From the findings above, there are indications that real practical work [*borne out of applied knowledge*] that could birth indigenous productivity and development is lacking in many Nigerian secondary schools, including affluent private schools that have what it takes to engage in concerted practical works The Teachers and Students interviewed adduced the

following as some of the reasons for this trend: *Lack of practical equipment and materials in schools; low competence of Teachers in terms of conducting real practical works; poor electricity and overloaded curriculum often leading to lack of time to do real practical work; over-population of students in public schools [e.g. a teacher currently teaches over 1000 students at the Final Year of the Senior Secondary in the public school visited; poor funding of public schools more because of the politicised 'Free' or Universal Basic Education.*

However, when pointedly asked, '*Do you agree with the notion that Teachers and Students focus more on topics and activities tested by WAEC?'* The response was a clarion '**YES'** in all the schools visited. When further asked, *'Despite your current challenges, what will you do if WAEC begins to field more questions assessing application and practical oriented questions?*' Again the consistent response from everyone interviewed was, '*we shall be left with no choice than to study more around application questions and look for ways to do more practical work'*

From this finding, it can be argued that one of the strong precursors of poor practical work in schools is not necessarily lack of materials, time or expertise but lack of *willpower*. It appears the 'willpower' can be ignited by WAEC via consistently fielding more questions that assesses higher levels of educational objectives, and especially application questions relating to real life issues. With such willpower in place, no 'mountain of challenge/ will be too high to surmount for Teachers and Students to perform their responsibilities – which is learning for productivity and development, even if at prototype level. Henry Ford, Thomas Edison, Wright Brothers, among other great inventors, is testimonies to this assertion.

RQ4. What is the Nature [Sample] of the Proposed Development-Oriented Questions?

Physics: 1) A micrometer is used to measure the diameter of a uniform wire [*Diagram of Micrometer gauge gripping a rod displayed*], *what is done to obtain an accurate answer*? [*Source*: Cambridge May 2013 Paper 1 Q 2]; ***2***). Irregular power supply is a major problem in Nigeria today, from your knowledge of electricity generation, profer a solution to this problem. [*Source*: Odukoya (2014)]

Chemistry: 1) This term, you were taught the principle of ***saponification***, explain in a step-wise fashion how you will produce soap for your household usage. State all challenges you will likely encounter and how you will overcome such [*Source*: Odukoya (2014)]. ***2)***. Describe, with the aid of an equation, how ethanol is manufactured by fermentation [*Source*: Cambridge May 2013 Paper 1 – Q B7e]

Biology: 1) From your understanding of the factors responsible for growth in plants, explain how weed can be effectively controlled apart from using cutlass, uprooting or herbicide [*Source*: Odukoya (2014)]*;* ***2)***. Crops can be grown under controlled conditions in large buildings. Describe and explain how such buildings can provide the conditions needed for maximum crop production [source: Cambridge May 2013 Paper 1 Q 6a].

Mathematics: 1) *The exchange rate is $1 to €0.72.* Eddie travels from the USA to Germany. He changes $300 into euros (€). How many euros does he receive? [*Source*: Cambridge May 2013 Paper 2 – Q 5ai]; 2). You are thinking of investing 1,000,000 naira your uncle recently sent to you. If Treasury Bill offers 3% within a period of three months and your bank offers a fixed deposit interest of 11% per annum, decide on the best line of investment. Support your decision with clear mathematical calculations [Source: Odukoya (2014)]

RQ5. What Possible Model of Testing Can be Adopted by Institutional and Independent Examining Boards to Enhance Practical Work and Productivity in Secondary and Tertiary Institutions in Nigeria

RECOMMENDATIONS AND CONCLUSIONS

There is clearly a need to conduct further study on the *DOT Model* to ascertain its veracity in delivering its promises, chiefly that of provoking productivity and development, all things being equal. But for 'all things to be equal', it is imperative that Examination Bodies and outfits wake up to their responsibility. There are continuous dynamic changes in nature and nurture, of which all things are birthed.

If we refuse to move with the tide of time one may be lost with time. With the advent of the ICT, there is clear information explosion all over the world. We cannot afford to be static in our approach, hence the urgent need to review current teaching and testing strategies in developing countries like Nigeria. One major driving force in the world today is the quest for productivity and development.

The shelf life of technological, medical and related product is fast thinning out. Consequently, following Watts and Wilson's (2013) submission that "the purpose of practical science in upper secondary school is formative; that is, to assist students to understand [*comprehend*] the science which they are studying, and how [*comprehension*] scientific ideas are developed*" c*ould be misleading. While this is truly essential, it is definitely not enough at this time and age.

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