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Nigeria Secondary School Science Teachers' Awareness and Preparation for the Challenges of Vision 20:2020

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Abstract

The study investigated the awareness and preparation of secondary school science teachers for the challenges of Vision 20: 2020 in South West, Nigeria. Using a survey research design, four research questions were used. A 50-item structured questionnaire with reliability index of 0.82 was used for data collection. Nine hundred science teachers were randomly selected from three South Western states in Nigeria. Descriptive statistics (mean and Chi-square), t-test and multiple regression analysis were used to analyse the data. The results showed that science teachers have low awareness of Vision 20: 2020 educational goals with Ogun state teachers having the least. A significant difference in awareness was noticed between public and private and also between rural and urban science teachers. No significant difference was observed in the level of preparation between rural and urban but there exist significant difference between public and private science teachers. Science teachers' computer illiteracy, inadequate infrastructures,

unfavourable school environment, weak coordination and lack of standardization have significant contributions to the level of preparation for Vision 2020 educational challenges. It is therefore, recommended that both federal and state governments should boost the level of awareness of vision 2020 goals and improve on science teachers' quality and development with adequate provisions of infrastructures and facilities for use in secondary schools' laboratories.

Keywords: Vision 20:2020, Science Teachers, Awareness, Preparation, Educational Goals, Secondary school

Introduction

It is now evident that capital is a result and product of the development process rather than its source. The true source and driving force for development is human capital- the values, attitudes, knowledge, skills, organization and motivation of the people. The current knowledge gap points to the vast underdevelopment and underutilization of that most precious of all resources, a resource which Nigeria possesses in greater abundance than all but one other nation (Bregman & Obanya, 2003). Accelerating the development of the country's human resource base by imparting greater knowledge and greater access to information should be the mainspring of our efforts to leap forward into a more prosperous future. Jacobs and Asokan (2003) asserted that education is the process of passing on to future generations in a concentrated and abridged form the essence of knowledge accumulated by past generations. Properly planned educational input can lead to increase the gross national product, enhance cultural richness, build greater receptivity to technology, and improve the quality and effectiveness of government. Education opens new horizons for the individual, releases new aspirations and develops new values. It strengthens competencies and develops commitment. Education generates in an individual a critical outlook on social and political realities and sharpens the ability for self-examination, self-monitoring and self-criticism.

In general, secondary education is divided into junior and senior cycle, each focussed on different age groups, and having vastly different pedagogical goals. Junior or upper basic secondary education provides schooling for age group roughly 10 – 13 years while senior or post basic secondary education for the age group of roughly 14-17 years. Most secondary education, especially at the senior secondary level, includes technical and vocational

education and training. Patterns of education structures in Africa depend largely on the region, but often country specific. By the end of the 1990s the most common structure was: 6+3+3[3]. However, in Mauritius, and some other (mostly Anglophone) African countries, the education structure followed the traditional 6+5+2. This includes 5 years of O-level (lower secondary) followed by 2 years of so-called 6th Form College. In some Francophone countries in West Africa, and in Madagascar, the patterns are 6+4+3 (ADB, 2003; Ndoye, 2003). In Nigeria in particular and in line with Education for All (EFA) Vision 2020, the education system is being restructured to 9+3+4 making the 9 years a mandatory universal basic education (UBE) for all Nigerian children and this is subdivided into 3-year lower basic, 3-year middle basic and 3-year upper basic (junior secondary). Also, a child is expected to proceed to 3 years post basic education (senior secondary or technical colleges) after which he would be admitted into tertiary institutions for 4 years.

In many African countries, junior secondary is now being included as the last basic education and government defined as free and compulsory. This is due to the worldwide Education for All initiative. Greenaway (1999) argued that this new movement to incorporate junior secondary into basic education raises questions concerning junior secondary education's focus on the development of future citizens and the balance between gaining knowledge, key competencies and personal and social skills. Senior secondary level in Africa is accessed by too few students and is only seen as platform for entering tertiary education. Traditionally, secondary education in Africa has catered for the elite, preparing them to enter higher education. Lewin (2003) asserted that adolescents from the richest 20% of population in Africa are 6 times more likely to be in grade 9 than those from poorest 40%. Secondary education has also functioned for 2-10% of secondary students as a vocational training for specific jobs in industry or the service sector (World Bank, 2002).

According to Olaseni and Alade (2012), the Nigerian Vision 20:2020 is an outcome of a research by the American Investment Bank which predicted that Nigeria will be in the league of 20 top economies based on the assessment of her abundant natural and human resources with the assumption that these resources will be effectively managed. It is an articulation of the long-term focus to launch Nigeria on the path of sustained social and

economic progress and accelerate the emergence of a truly prosperous Nigeria. Recognising the extent of natural resources of the country, the blueprint is an expression of Nigeria's intent to improve the living standards and quality of living among the top 20 economies in the world with a minimum GDP of $9000 and a per capita income of no less than $4000 per annum (FGN, 2009).

Awareness (knowledge) has always been an essential and distinguishing characteristic of human society, for human beings are unique among all species in their extended capacity to formulate, systematize, preserve and consciously transmit organized bodies of knowledge from one individual, community, generation and location to another. That is the essence of all that is known as *education*. UNESCO/BREDA (1998) emphasised that the term 'knowledge society' has gained prevalence in recent years due to the revolutionary strides in technology and the rapid evolution of new systems for the gathering, transmission and application of information. A confluence of technologies- television, computers, networking, satellite communications and the internet- constitute the technological basis for the knowledge revolution. Their rapid proliferation over the past decade has made possible movement of information around the world at lightning speed. This dramatic acceleration in the development of information technologies; in the speed and extent of global knowledge accumulation, dissemination and exchange; in the blurring and transcendence of traditional boundaries between fields of knowledge; and in the emergence of new knowledge-based industries are defining characteristics of the knowledge revolution.

The knowledge revolution marks a fundamental shift in human development beyond the limitations imposed by *material processes* toward the unlimited, indeed, infinite creative potential, of *human processes*. In fact, this shift is really not as unusual as we may have thought. All resources, even land and minerals, are products of the human mind. Anything becomes a resource only when the human mind recognizes a valuable use for it. Development has always been based on the creative and imaginative capacity of the human mind. In this sense, the Knowledge Society is not really something that has just suddenly emerged out of nowhere. The awareness of teachers' Vision 2020 educational goals is an essential ingredient to fully prepare them for its challenges.

Science teachers' preparation against the challenges of vision 2020 would go a long way to achieve all its goals. Obanya (2002) when discussing on the issue of the need for quality teachers' recruiting, re-educating, motivation, and retraining described a revolutionary type of teacher as a person:

> who has wholeheartedly accepted the new vision of secondary education and who has internalised the underlying principles of its new pedagogy; whose teaching style is governed by flexibility and who can experiment in the face of new challenges; whose approach to specialisation is sufficiently broad to emphasise understanding and solving teaching-learning problems, in favour of merely distilling codified knowledge; and who will be a willing participant in the task of continuously improving the delivery of secondary education. p.57

For the system to have this type of science teachers, adequate preparation is necessary to intimate them of vision 2020 and its challenges. In order to face the challenges, Abdullahi (2007) suggested that the new education plan should endeavour to create viable and enabling programs amidst the challenges of private versus public education, funding, instructional methods, research, and teacher education, citizenship education programs, and activities that have become crucial to sustaining the goals, objectives, and aspirations of the nation. The challenges identified by the Education Sector National Technical Working Group (2009) includes inability to provide unfettered access to quality education at all levels, dearth of qualified and competent teachers, little or no relevant skills in ICT and poor motivation, low intrinsic value for education, inadequate number of schools and classrooms, security of teachers and increase in students' enrolment in senior secondary schools.

Science is a core subject at all levels of education in Nigeria. Science education is also to provide a more effective preparation for citizenship. In order to achieve this, qualified and highly scientifically literate teachers are required who are well aware of their global demands for teaching with a view to engendering scientific and technological values in learners. Omoifo (2012) emphasised that science teachers therefore, need to recognise the nature of scientific endeavours and how it relates to science teaching if they

are to help their students completely understand the content and underlying principles of science. Science teachers as a matter of interest need to be aware of national educational policies and goals in order to discharge their teaching activities towards achieving those goals whatever be their gender, type of school and school locations. Therefore, the paper examined awareness and preparation of science teachers for the challenges of vision 2020.

The problem

Secondary education is important to national development because it builds on the educational gains of basic education with a view to preparing students for higher learning in tertiary education level. In accordance with the goals of Education For All (EFA), the Federal Government developed a working document for education sector against vision 20: 2020. In view of the present deplorable state of post basic schools, low level of teachers' development and inadequate teachers' commitment to teaching and ill-equipped laboratories, it is doubtful if science teachers are aware of the educational goals of vision 2020 and whether they are well prepared for its challenges. Therefore, the study focused on assessing the awareness and preparation of science teachers for the challenges of vision 2020.

Research Questions

1. To what extent are science teachers aware of the educational goals of vision 20: 2020?

2. Is there any significant difference in awareness of vision 2020 by the science teachers from south western states in Nigeria?

3. Is there any significant difference in the preparation for challenges of vision 2020 between (i) public and private (ii) rural and urban science teachers?

4. What are the composite and relative contributions of barriers against the preparations of science teachers for the challenges of vision 2020?

Methodology

Research design

The study adopted survey research design for it allows respondents to speak for themselves. The method, though criticised for its relevance on self report instruments is a useful fact-finding tool for education (Kerlinger & Lee, 2000).

Sampling procedure and sample

The population for the study comprised all senior secondary school science teachers in South West, Nigeria. Three states that happened to be Oyo, Ogun and Ondo were randomly selected. Three hundred teachers were randomly sampled from each state based on school type (public or private). A total of nine hundred science teachers were used for the study.

Instrumentation

An instrument titled Science Teachers' Preparation for Vision 2020 Questionnaire (STPVQ-20) was constructed by the researcher to collect data for this study. The questionnaire was validated by test experts from the Institute of Education, University of Ibadan, Ibadan. The Cronbach Alpha reliability index yielded 0.82. It was divided into two sections A and B. Section A requested for teachers' bio-data. Section B had 50 structured items divided into four categories. Items 1 to 10 elicit information on the level of science teachers' awareness of vision 2020 educational goals with responses Highly Aware (HA)-3, Moderately Aware (MA)-2 and Not Aware (NA) – 1. Items 11 to 20 were on strategies to make curriculum relevant with responses: Very Important (VI)-3, Important (I) – 2 and Not Important (NI)-1. Items 21 to 40 were drawn on four Likert Scale of Strongly Agree (SA)-4. Agree (A)-3, Disagree (D)-2 and Strongly Disagree (SD)-1 to find out the level of preparedness for challenges of vision 2020. Items 41 to 50 contained barriers to teaching effectiveness in achieving vision 2020 goals with responses: Most often (MO)-3, Often (O)-2 and Never (N)-1. The researcher, with other two research assistants was involved in the collection of the data for the study.

Data analysis

The data collected were analysed using descriptive statistics (mean, chi square), t-test and multiple regression analysis.

Results

Table 1: Mean rating of Science Teachers Responses to the Level of Awareness of Vision 2020 Educational Goals

Sn	Goals	HA	MA	NA	Mean	SD	Rank	Rem.
1.	Facilitate access to senior secondary by 70%	158	366	376	1.76	.732	7	Not aware
2.	Ensure teacher competence in areas ICT in all discipline	249	337	314	1.93	.788	4	Aware
3.	Provide quality education for all	371	298	231	2.16	.803	1	Aware
4.	Produce competent workforce for national development	228	239	433	1.77	.827	6	Not aware
5.	Encourage creativity in the teaching styles adopted	207	237	456	1.72	.813	8	Not aware
6.	Cultivate good reading culture	235	228	437	1.78	.835	5	Not aware
7.	Ability to pass the internal and external examination	320	272	308	2.01	.836	3	Aware
8.	Having dignity of labour	211	229	460	1.72	.818	8	Not aware
9.	Prepare students for useful living within society	310	294	296	2.02	.821	2	Aware
10.	Ensure more openness in PBE financial accountability	161	283	456	1.67	.761	10	Not aware

Table 1 shows that science teachers are aware of four out of ten vision 2020 educational goals, for they have mean rating above the cut-off point of 1.87. The most aware goals are provision of quality education for all, preparation of students for useful living and ability to pass internal and external examination and ensuring teacher competence in areas ICT in all discipline with mean responses 2.16, 2.02, 2.01 and 1.93 respectively. It could also be deduced that science teachers were not aware of the goal of openness in PBE financial accountability, having dignity of labour, encourage creativity in the teaching styles adopted and facilitate access to senior secondary school by

70% for their mean responses were below the cut-off. The level of awareness of vision 2020 educational goals was low among the science teachers.

Table 2: Awareness of Vision 2020 Goals among Science Teachers according to States

State	Awareness						χ^2	Df	P
	Not Aware		Moderately Aware		High Aware				
	Freq	%	Freq	%	Freq	%	16.056	4	.003*
OYO	124	41.3	115	38.3	61	20.3			
OGUN	148	49.3	112	37.3	40	13.3			
ONDO	104	34.7	139	46.3	57	19.0			

* $= \chi^2$ is significant at P<0.05

Table 2 presents the existing differences in awareness of teachers in the three states under investigation. 41.3%, 49.3% and 34.7% were not aware of vision 2020 educational goals from Oyo, Ogun and Ondo respectively while 20.35%, 13.3% and 19.0% were highly aware in Oyo, Ogun and Ondo respectively. There exist significant difference ($\chi^2_{(4)}$ =16.056, P<0.05) in the level of awareness of vision 2020 educational goals in Oyo, Ogun and Ondo states. Science teachers from Oyo state had highest awareness, followed by Ondo state while teachers from Ogun state had the least awareness.

Table 3: t-test statistic on Awareness of Vision 2020 Educational Goals between Public and Private Science Teachers

School Type	N	Mean	Std Dev'n	Std Error	t value	Df	Sig.
Public	520	19.30	5.091	.223	5.302	898	.000*
Private	380	17.49	5.060	.260			

* = Significant at P<0.05

Table 3 elicits that the mean awareness of science teachers was 19.30 while that of their private counterparts was 17.47. It means that the level of awareness of the public school teachers was greater than the private schools. An independent t-test shows that the difference in awareness between public and private school science teachers was significant ($t_{(898)}$ = 5.302, P<0.05).

Table 4: t-test Statistic on Awareness of Vision 2020 Educational Goals between Rural and Urban Science Teachers

School Location	N	Mean	Std Dev'n	Std Error	t value	Df	Sig.
Rural	400	18.14	5.158	.258	-2.082	898	.038*
Urban	500	18.86	5.134	.230			

* = Significant at P<0.05

Table 4 shows that the mean awareness score (18.86) for urban science teachers is slightly higher than that of their rural counterparts (18.14). This implies that urban teachers had better awareness of vision 2020 educational goals. Also, the difference in awareness was significant ($t_{(898)}$ = -2.082, P<0.05).

Table 5: Summary of Multiple Regression and ANOVA of Science Teachers' Preparation for Challenges of Vision 2020 by Barriers

R = 0.612					
R^2 = 0.375					
Adjusted R^2 = 0.363					
Standard Error = 8.718					
Model	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	3643.359	10	364.336	4.796	.000 *
Residual	67540.801	889	75.974		
Total	71184.160	899			

*= Significant at P<0.05

There was a significant contributions of all the enumerated barriers to science teachers' preparation ($F_{(10,889)}$= 4.796, P<0.05). It could also be deduced that the barriers listed have moderate positive relationship (R = .612) with teachers' preparation for vision 2020 challenges and that they explained 36.3% variance (adjusted R^2= .363) in teachers' preparation for challenges of vision 2020.

Table 6: Parameter Estimate Explaining Relative Contribution of Barriers to Science Teachers' Preparation for Challenges of Vision 2020

Barriers	Unstandardized Coefficient		Standardized Coefficient	t	Sig. t
	B	SEB	Beta		
Lack of conducive science environment	-.562	.285	-.069	-1.971	.046*
Direct and indirect costs that make education unaffordable for the poor	.468	.350	.050	1.337	.182
Dearth of quality and competent science teachers	.311	.292	.040	1.066	.287
Low intrinsic value for science education by some communities	.400	.385	.042	1.040	.299
Inadequate number of classrooms	-.253	.385	-.028	-.656	.512
Low esteem and remuneration for science teachers	-.682	.419	-.072	-1.628	.042*
Weak coordination of senior secondary schools	1.576	.395	.172	3.988	.000*
Inadequate science infrastructure and facilities in schools	.909	.402	.100	2.259	.024*
Lack of standardization of science education	-.659	.320	-.084	-2.060	.040*
Science teachers' computer illiteracy	-.661	.298	-.080	-2.218	.027*
Constant	58.146	1.443		40.289	.000

* = Significant at P<0.05

Table 8 elicits the significance of contributions of each barrier to preparation of science teachers for Vision 2020 challenges. It is observed that six out of the ten barriers - lack of conducive science environment (β=-.069, t = -1.971, P<0.05), low esteem and remuneration for science teachers (β=-.072, t = -1.628, p<0.05), weak coordination of senior secondary schools (β=.172, t=3.988, P<0.05), inadequate science infrastructure and facilities in schools (β=.100, t=2.259, P<0.05), lack of standardization of science education (β=-.084, t = -2.060, P<0.05) and science teachers' computer illiteracy (β= -.080, t= -2.218, P<0.05) significantly contributed to

preparation of science teachers for Vision 2020 challenges while others did not.

Discussion

One of findings of the study was that there was low awareness of Vision 2020 educational goals and that there were discrepancies in level of awareness between science teachers from public and private schools. The public schools science teachers receive up-to-date information on necessary changes in the educational system through memorandum, distribution of posters to schools and meetings with schools administrators more than those in private schools. These teachers also are often sent on training in seminars and workshops by the government to update their knowledge in current issues on educational development.

The existing significant difference between public and private school science teachers in their preparation for vision 2020 challenges is evident in view of greater monitoring of public school teachers by government inspectors, improvement on physical facilities through ETF Projects and also parent teachers association contributions whereas the proprietors of private secondary schools are more profit minded at the expense of sponsoring their science teachers for trainings, seminars and workshops that would build their capacity to make them more prepared for vision 2020 challenges. Science teachers' computer illiteracy, inadequate science infrastructures and facilities in schools, unfavourable science environment in schools, low science teachers' remuneration, weak coordination and lack of standardization of science education were hindrances to effective preparation of science teachers for vision 2020 challenges. Most of the senior secondary schools have classrooms without students' chairs and tables, teachers' salary scale (TSS) pronounced by the Federal government have not been implemented in most states in Nigeria and inspection of schools by both federal and state inspectorate have not been effective to maintain standard and quality of teaching and learning in schools.

Conclusion

The paper examined the awareness and preparation of secondary science teachers for the challenges of Vision 2020 in three South Western states, Nigeria. Science teachers' responses confirmed that the level of awareness and preparation of science teachers for the challenges of Vision 2020 were

not encouraging. Due to their low level of awareness, lack of adequate preparations, insufficient teaching facilities, low and unpaid teachers' remunerations and lack of adequate training on Information Communications Technology (ICT), it becomes very necessary for all education stakeholders to rise to the challenges of building science teachers' capacities to achieve educational goals. A quantitative expansion of the educational system will provide access to more young people, but it will not ensure that the education provided is of adequate quality to keep them enrolled or dramatically improve their capacity for social adaptation, achievement and technological development. Many of the methods commonly adopted in the nation's schools are based on practices developed in the distant past that have outlived their value and utility. Simultaneous with the quantitative expansion of the educational system, there needs to be a concerted effort to experiment with new approaches to science education that will increase the quality and speed of knowledge transmission for vision 2020.

Recommendations

It is therefore, recommended that awareness of vision 2020 educational goals should be made on public media like radio, television and print media to intimate science teachers. Seminars and workshops should also be organised for science teachers by both federal and state government through their ministries of education to explain vision 2020 goals and to acquaint them of their central position in the achievement of Vision 2020: 20 goals especially in the area of scientific and technological advancement. Vision 2020 cannot be achieved without adequate use of computers in schools; consequently, effective ICT facilities should be provided for schools with science teachers being trained and having access to them for use in their classroom teaching learning processes. A fundamental policy decision should be made to fully utilize the capacities of computer for general education, not just for computer training, and to launch a major initiative to convert the entire school science curriculum to computer-based, CD-Rom teaching materials. The gap between federal and state teachers' remuneration should be closed by mandating the state government to implement the Teachers' Salary Scale (TSS). Science teachers should be well motivated through appropriate welfare package, professional support, and opportunities for self development. Vision 2020 educational goals should be pasted in conspicuous places within the school environment to draw teachers' attention to them. A tremendous expansion in the number of schools and classrooms would be required to support a

quantitative and qualitative improvement in the country's secondary school system. Science laboratory should be well equipped with relevant apparatus, chemicals and facilities to make teachers develop students for technological development which is central to Vision 2020:20.

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