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VIEWS OF NIGERIAN SCIENCE TEACHER EDUCATORS ON THE AMERICAN MINIMUM PROFESSIONAL KNOWLEDGE STANDARDS FOR SCIENCE TEACHER EDUCATORS

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Abstract

Efforts were made in this study to find out the views of science teacher educators in Nigerian Universities and Colleges of Education on the American minimum professional knowledge standards for science teacher educators. Ninety-three teacher educators participated in the study. Thirty three came from the Universities while 60 were from the Colleges of Education. The instrument was a questionnaire, comprising 27 statements. Findings from the study showed that respondents agreed with the inclusion of the cognitive aspects, and skills on moderation of higher degree science teacher education programme to be imparted to science teacher educators. Specific recommendations were made to address the implications of the views of the science teacher educators.

Keywords: Science Teacher Educators, Professional Knowledge Standards

Introduction

The efficiency of any higher institution depends on the academic competence of the teaching staff, which in turn, is predicated on the quality of the education received by the teachers, since no educational system may rise above the quality of its teachers (National Planning Commission, 2005). Science teacher educators train science teachers. The type of training received by them is automatically transferred to the science teachers they train. Therefore, professional development ought to be a process whereby education professionals regularly enhance their academic knowledge and pedagogical understandings, skills and attitude relevant to their work, as well as question the purposes and parameters of what they

do. Professional development ought to be viewed as a process of change and renewal. Successful educational improvement is intrinsically linked to professional development, therefore, policy makers, teachers, administrators, board of education members, and others interested in improving schools must view professional development as a comprehensive system.

The current emphasis on professional development comes from an emerging recognition of teaching as a dynamic professional field. As the professional knowledge base expands, new types of expertise are required of education at all levels. Although there is recognition of the importance of professional development in the context of school improvement, there is a dearth of literature regarding the nature of successful professional programmes, particularly, the essential qualification for the science teacher educator (Gage, 1972).

Therefore, the Association for the Education of Teachers in Science (AETS) developed six major standards that provided a clearly defined framework for the knowledge, skills, experiences, attitude, and habits of mind essential for the successful science teacher educator. Such standards are in the areas of content, nature of science, inquiry, context of science, pedagogy, the science curriculum, the social context, professional practice, learning environment and assessment strategies. They are aligned with goals and methods of instruction appropriate at the level of Students and conducive to continuous learning through science (AETS, 1997).

Since science teacher educators in Nigeria could benefit from this teacher education benchmark, it was thought that seeking their views on the benchmark could provide information on their teacher education preferences.

In this study, two questions were generated:

1. What are the views of Nigerian science teacher educators on the American minimum professional knowledge standards for science teacher educators?
2. How do the views of Nigerian science teacher educators on the American minimum professional knowledge standards for science teacher educators vary with their areas of specialization, type of teacher educators, gender, and teaching experience?

The following research hypotheses were also formulated:

1. There is no statistically significant difference in the views of educators with short, medium, and long teaching experience concerning the American professional knowledge standards for science teacher educators

2. There is no statistically significant difference in the views of Nigerian teacher educators on the American professional knowledge standards for science teacher educators based on their areas of specialization
3. There is no statistically significant difference in the views of male and female science teacher educators concerning the American minimum professional knowledge standards for science teacher educators.
4. There is no statistically significant difference in the views of the different types of science teacher educators on the American minimum professional knowledge standards for science teacher educators.

Methodology

This study was a descriptive type of the survey type using the questionnaire technique.

Sample and sampling technique. The population for this study included all science teacher educators in Nigerian higher educational institutions. Higher educational institutions that train science teachers in Nigeria are mainly universities and colleges of education. A few polytechnics do train science and technical teachers. These were not part of this study.

Five copies of the questionnaire were sent to each of One Hundred and Twenty-One science teacher educational institutions all over Nigeria, comprising sixty-eight universities and 63 colleges of education. The questionnaire was addressed to the Deans of Education of the Institutions. Feedback from the returned copies of the questionnaire indicated that 33 University science teacher educators and 60 Colleges of Education science teacher educators participated in the study.

Instrumentation. A questionnaire was prepared for this study. The questionnaire had two sections, A and B. Section A contained personal information on the science educators, whether he or she is a lecturer in a college of education or university. It also contained areas of specialization of respondents, their gender as well as their teaching experience. Section B contained 27 statements on minimum standards for science educators based on the Association for the Education of Teachers in Science (AETS) standards for the preparation of teachers, draft version of 21 January 1997.

Procedure for data collection. Copies of the questionnaire were posted to the science educators through their Deans of Education, and retrieved with the help of research assistants.

Data analysis technique. Chi-square statistics was used to analyze the data for differences in the respondents' views on the American minimum professional knowledge standards for science teacher educators based on their teaching experience, area of specialization, gender, and type of teacher educators.

Results

In this study, two research questions and four research hypotheses were generated:

Research question one was answered using the result of X^2 analysis of the data that were collected, while research question two metamorphosed into four research hypotheses, which were tested using X^2 statistics.

Research question one can thus be answered that the views of Nigerian science teacher educators were generally supportive on almost all the items; their views, therefore, were not different from the views of American science teacher educators on the minimum professional knowledge standards necessary for science teacher educators.

As for research question two, all the respondents in this study agreed with items; 1; 2; 4; 5; 6; 7; 8; 10; 11; 12; 13; 15; 18; 21; 22; 23; 24; 25; 26; 27 (20 statements out of 27), irrespective of experience, area of specialization, gender, and type of teacher educator. This implies that they agreed with 74.07% of the statements.

Table I shows the X^2 results of all the hypotheses. For hypothesis 1, only questionnaire item 10, 17 and 19 were statistically significant. This implies that the views of science teacher educators based on their teaching experience were statistically significantly different for all three items. Majority of those who had teaching experience of over ten years agreed with the statements.

The views of science teacher educators based on gender were not statistically different except for items 14 and 16, which are on expertise in traditional assessment approaches and knowledge of relationship among cognitive learning outcomes, respectively. For items 14 and 16, hypothesis 3 is rejected. In this case, the number of males that agreed was overwhelmingly higher than the number of females.

The views of science teacher educators on the basis of type of teacher educator were not statistically significant, except for items 8, 14 and 26, which are respectively, on knowledge of sociology of science, expertise in traditional assessment approaches and expertise in implementation of professional development workshop. In this case, Colleges of

Education lecturers were neutral about the sociology of science; they agreed with traditional assessment approaches as well as implementation of professional development workshops.

Item 27 is a free choice, where respondents were to suggest other things and 30 out of the 93 respondents, 28 of them were University lecturers with Ph.D., suggested that the qualified science teacher educator must have experience in moderating science teacher education programmes. Moderation of examination papers is a system, which is not available in the United States teacher education system. The results are displayed in Table 1.

Table 1

X^2 Analyses of the Responses of Nigerian Science Teacher Educators

Summary of Major Findings

S/N	Item	Teaching Experience		Area of Specialization		Gender		Type of Teacher Educator	
		X^2	Prob.	X^2	Prob.	X^2	Prob.	X^2	Prob.
1.	Subject matter knowledge beyond High School	1.41	0.843	5.91	9.433	0.38	0.828	4.94	0.139
2.	Possession of science skills beyond High School	1.98	0.739	5.71	0.457	1.85	0.397	4.71	0.319
3.	Possession of research experience	4.96	0.292	5.99	0.424	1.43	0.490	1.96	0.743
4.	Strong functional knowledge of other science	5.60	0.161	10.56	0.103	0.97	0.617	1.20	0.879
5.	Deep knowledge of science subject matter and process skills	5.43	0.246	2.72	0.843	1.56	0.459	5.02	0.285
6.	Wide knowledge of science subject matter and process skills	6.43	0.175	5.53	0.478	1.86	0.394	3.49	0.479
7.	Knowledge of philosophy of science	6.03	0.197	12.15	0.059	2.55	0.280	5.62	0.230
8.	Knowledge of sociology of science	8.42	0.077	6.14	0.408	2.94	0.230	9.76	0.045*
9.	Knowledge of history of science	3.92	0.417	10.29	0.113	4.81	0.090	3.00	0.558
10.	Knowledge of science pedagogy	8.68	0.70	2.83	0.829	0.06	0.972	5.91	0.206
11.	Possession of skills of science pedagogy	8.63	0.70	2.83	0.829	0.06	0.972	5.91	0.206
12.	Expertise in the	2.56	0.635	5.18	0.521	1.06	0.58	4.22	0.3

	development of curriculum and instructional materials						7		77
13.	Expertise in the implementation of curriculum and instructional materials	2.56	0.635	5.18	0.52	1.06	0.587	4.22	0.377
14	Expertise in traditional assessment approaches	3.85	0.426	4.82	0.567	8.51	0.014*	10.62	0.031*
15	Expertise in alternative assessment approaches	8.01	0.091	1.31	0.971	4.67	0.097	2.26	0.688
S/N	**Item**	**Teaching Experience**		**Area of Specialization**		**Gender**		**Type of Teacher Educator**	
16.	Knowledge of relationships among cognitive learning outcomes	6.09	0.193	5.97	0.447	10.7	0.005*	6.60	0.159
17.	Knowledge of relationships among cognitive instructional approaches	10.98	0.027*	11.95	0.063	0.03	0.986	1.83	0.766
18.	Knowledge of relationships among cognitive evaluation approaches	16.97	0.002*	7.66	0.64	1.13	0.569	1.65	0.799
19.	Skills in varied research approaches	2.15	0.708	15.80	0.015*	1.56	0.458	2.10	0.718
20.	Expertise in the development of research approaches	1.82	0.768	5.89	0.436	0.03	0.862	4.16	0.384
21.	Expertise in the development of research-based professional programmes	4.52	0.340	2.39	0.881	2.26	0.323	4.47	0.315
22.	Skills in writing successful research proposal	4.66	0.324	2.63	0.853	0.45	0.799	4.93	0.294
23.	Knowledge of design of professional development workshops	4.34	0.362	9.27	0.159	2.61	0.271	0.63	0.960
24.	Knowledge of implementation of professional development workshops	5.31	0.251	10.38	0.109	0.69	0.708	1.75	0.782
25.	Experience in the design of professional	7.20	0.126	12.15	0.059	1.85	0.397	3.46	0.485

	development workshops								
26.	Experience in the implementation of professional development workshops	2.58	0.630	4.39	0.625	2.16	0.340	10.21	0.037*
27.	Others (Please specify (cell counts too small)	--	--	2.24	0.897	0.44	0.801	--	--

Summary of Major Findings

In this study, efforts were made to find out the views of Nigerian science teacher educators on 27 statements concerning the American minimum professional knowledge standards for science teacher educators. There were 2 research questions and 4 research hypotheses.

1. Research question one showed that the views of Nigerian science teacher educators were generally supportive on almost all the items; their views, therefore, were not different from the views of American science teacher educators on the minimum professional knowledge standards necessary for science teacher educators.
2. As for research question two, the views of Nigerian science teacher educators on the American minimum professional knowledge standards did not vary with their teaching experience, area of specialization, gender, and type of science teacher educator. All the respondents agreed with 20 out of the 27 items, which is 74.07% of the items.
3. Science teacher educators with experience above ten years overwhelmingly agreed with the statements on evidence aspect of learning, that is statements 10, 17 and 19.
4. Biology educators agreed with statement 20, on skills in varied research approaches.
5. Male science educators overwhelmingly agreed with statements, 14 and 16, which are respectively on expertise in traditional assessment approaches as well as implementation of professional development workshops. These are items 8, 14 and 27.
6. Thirty out of the 93 respondents (28 of them are University lecturers with Ph.D. with experience of above ten years) suggested that qualified science teacher educators must have experience in moderating science teacher education programmes.

Discussion and Recommendations

The findings of this study are worthy of note by science education researchers. Beginning science teacher educators need specialist support, encouragement and multiple opportunities for professional growth (Plummer, & Barrow, 1998). Beginning science teacher educators should be assigned less difficult jobs and they should be assigned mentors and interactions between mentors and such beginning educators should be maximized through observations, classroom visitations and opportunities for advice.

To improve the standard of science teacher educators in Nigeria, as it is being advocated in the U. S., there is the need for science educators in Nigerian universities to be exposed more to the contents of science subjects they intend to teach to make them familiar with the contents.

Ample opportunities should be given to pre-service science teacher educators on skills involved in varied research approaches to enable them conduct various types of researches upon graduation.

Science teacher educators should be exposed to the knowledge of sociology of science during their training years. This requires that if university science teacher educators find this desirable, it should be included in a revised science teacher education programme in Nigeria. For science teacher educators who had already missed it in their training, implementing workshops on professional development should assist.

Science teacher educators are required at all times to moderate tertiary institutions science teacher education programmes. Therefore, efforts should be made to groom pre-service science teacher educators in this aspect as well.

Faculties of Education in Nigerian universities need to devote part of their attention to science teacher educators' development through which they will directly and officially involve themselves in providing short-time in-service education (during vacation) for practising science educators to upgrade their knowledge and improve upon the minimal interaction between experienced and beginning science teacher educators.

A country that aspires to scientific and technological development needs to pay attention to the education of its science teacher educators as the future of the country rests in the hands of the students such educators teach.

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