

Full Length Research Paper

Causes of science and technical teachers' attrition and strategies for retention in Adamawa State Secondary Schools

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This study investigated the causes of science and technical teachers' attrition and strategies for retention in Adamawa State Secondary Schools. Attrition refers to exit of teachers without replacement. Survey research design was adopted for the study. Three research questions guided the study and hypotheses were tested at 0.05 level of significance. The sample of the study was 785. The entire population of principals and technical teachers were studied while science teachers were sampled and selected by stratified random sampling technique. Instrument for data collection was questionnaire which was face validated and Cronbach alpha was used to determine the coefficient of internal consistency which yielded 0.71. Mean was used to answer the research questions while ANOVA was used to test the hypotheses. The study revealed that poor conditions of service, poor salaries and wages contributed to the teachers' attrition rates which resulted in shortage of the teachers, overloading of existing teachers, and poor performance of students in examinations among others. The strategies for retention include provision of attractive conditions of service, provision of facilities for teaching and learning. It was recommended that Adamawa state government should provide good incentives, enough teaching and learning materials to schools as mechanism for accretion.

Key words: Teaching, attrition, retention, strategies.

INTRODUCTION

Attrition and retention of teachers are concepts that have implications for the teaching profession. Each concept has its own effect on the profession through the roles each plays in teaching-learning process. Attrition of teachers refers to exit, retirement, quit, resignation and

transfer of teachers without replacement (Smit, 1991; Towe, 2001). Going by the meaning of teachers' attrition, it implies that there is reduction in the teaching force.

In other words, some teachers have withdrawn their services for other establishments like the industries,

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private jobs, return-to-school, and stay home with young children, self-employment or taking up non-teaching positions (Anekwe, 2009).

In its contemporary sense, teachers' attrition is synonymous with the popular brain-drain syndrome which has seriously affected the Nigerian economy in recent times by the nation losing experts in various fields to other countries of the world like; Western Europe, North America, Australia, and Germany (Mohamoud, 2005; Wandiya, 2014). Some of these experts are science and technical teachers who were formerly teaching in Nigerian Schools including Adamawa state. Boe et al. (1997) reported that the most troublesome component of turn-over is teachers' exit or attrition because it represents a reduction in the teaching force that requires a compensating in-flow of replacement of teachers. In most cases, the teachers withdraw without replacement leaving their places of work vacant. For example, Adamawa State lacks technical teachers like; skilled technicians, bricklayers, carpenters, painters, auto mechanics and electrical/electronic technicians (Dike, 2009; Wandiya, 2014). These categories of technical teachers teach these skills in the State schools. With teachers' attrition or brain-drain the schools suffer from their absence because the teachers are no longer on the jobs and no appreciable replacements are made (Dike, 2009).

The same experience is observed for science teachers in Adamawa State schools, more especially Biology, Chemistry, Mathematics and Physics teachers. There is lack of Biology, Chemistry, Mathematics and physics teachers in State Secondary Schools (Obe, 2007). Obe (2007) also observed that some schools in Adamawa State lack teachers in mathematics and physics in particular while a few of the schools have biology and chemistry teachers. Consequently, teachers have left schools in Adamawa state because they found some lucrative jobs elsewhere. This is what Dovic (2004) called push factor which moved them to other places to work.

Why do our technical and science teachers leave Adamawa State (Nigeria) teaching service? The major reason is poor motivation of the teachers which causes low morale because poor salary and wages are provided for the teachers. Other reasons include; lack of promotion, inadequate staff development, low image of teachers, and poor conditions of service (Aleyideino, 2000; Wandiya, 2014).

The next contrasting issue is teachers' retention. Teachers' retention is the process of ensuring that teachers are kept in jobs for stability and long-term use through proper maintenance (Uwaifo, 2010). The process of retaining teachers helps to keep good quality teachers on ground. Some of the strategies to be used in retaining teachers include: provision of attractive working conditions, making resources (human and material) for teaching available, good staff development policy, mutual understanding between superior and subordinates, fair

appraisal process, teacher security (Uwaifo, 2010; Adegbesan, 2011). From literature, some causes of science and technical teachers' attrition have been identified. However, the impact of teachers' attrition on schools is not known.

The impact (result) of teachers' attrition includes poor performance of students in examinations, lack of full coverage of school work with a bleak of students' future careers. These results or shortcomings arise from the fact that the good quality teachers have left with little or no appropriate replacements by the authorities (Dike, 2009; Wandiya, 2014). Wandiya (2014) also found out that the impact of technical teachers' attrition includes: poor performance of students in examinations (theory and practice), demoralization and over loading of remaining teachers, mass employment of unqualified teachers and examination malpractice. Umaru (2006) found out that Adamawa State government has poor conditions of service for teachers from the responses of biology and English teachers. There is also delay in the payment of salaries and wages which result in incessant strike action by the teachers. Umaru (2006) further found out that between 1999 – 2005 Adamawa State recorded 359 teachers' attrition while data from Adamawa State post Primary Schools Management Board (2010), showed that between 2007 and 2012, 130 teachers in science and technical colleges were retired, withdrawn and some died without full replacements. Wandiya (2014) found out that technical teachers' retention or technical teachers' brain-drain reduction can be achieved by appreciating teachers' efforts, adequately rewarding teachers and provision of enough teaching aids. Wandiya also found out that there is no significant difference between the mean ratings of technical teachers on the causes of brain-drain, effects of brain-drain and strategies needed to solve the problem in Adamawa State.

Literature has revealed the causes and impact of science and technical teachers' attrition including the strategies used for the retention of the teachers. Therefore, this study attempted to investigate the present situation of the problem. The problem of this study is: What would be the present causes and impact of science and technical teachers' attrition and the strategies for the retention of the teachers in Adamawa State Secondary Schools?

Purpose of the study

The main purpose of the study was to investigate the causes and impact of science and technical teachers' attrition and strategies to be used for retaining the teachers in Adamawa State Secondary Schools.

The specific purposes of the study were to determine:

1. The causes of science and technical teachers' attrition in Adamawa State Secondary Schools.

2. The impact of the attrition rates on schools.
3. The strategies to be adopted in retaining the teachers.

Research questions

The following research questions were posed to guide the study:

1. What are the causes of science and technical teachers' attrition in Adamawa state secondary schools?
2. What are the impacts of attrition on secondary schools in Adamawa State?
3. What are the strategies to be used in order to retain science and technical teachers in Adamawa State Secondary Schools?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance to guide the study.

H₀₁: There is no significant difference in the mean responses of principals, science and technical teacher on the perceived causes of science and technical teachers' attrition in Adamawa State Secondary Schools.

H₀₂: There is no significant difference in the mean responses of principals, science and technical teachers on the perceived impact of science and technical teachers' attrition in Adamawa State Secondary Schools.

H₀₃: There is no significant difference in the mean responses of principals, science and technical teachers on the strategies to be adopted to retain science and technical teachers in Adamawa State Secondary Schools.

RESEARCH METHOD

The research design used for the study was opinion survey research design. The survey research design is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group (Nworgu, 2006). The opinion survey design was adopted with the use of questionnaire to elicit responses or opinions of the respondents on the problem of the study.

The population of the study was 270 principals, 1036 science teachers in Mathematics, Physics, Chemistry and Biology, and 308 technical teachers from the five educational zones in Adamawa State. Namely, Ganye, Gombi, Numan, Mubi and Yola (Planning, Research and Statistics Division of Adamawa State, 2010).

The sample of the study was 270 principals, 207 science teachers and 308 technical teachers. The entire population of principals was studied and likewise technical teachers while 20% of science teachers were studied because of the size of the population which is a few thousands (Nwana, 2005). The science teachers were selected using stratified random sampling technique in the five educational zones as strata. The Principals were included in the study because they are both the academic and administrative

heads of the schools. Hence, they can provide relevant information for the study.

The instrument used for data collection was questionnaire constructed by the researchers titled: Causes and Effects of Attrition of Science and Technical Teachers and Strategies for their Retention Questionnaire (CEASTTSRQ). The questionnaire was made up of 12 items for each section of causes of attrition, impact of attrition and strategies for retention of the teachers. On the whole, there were 36 items constructed on a four point scale. The response modes on the instrument were strongly agree 4, agree 3, disagree 2, and strongly disagree 1, for positive statements while the negative statements of the response category were reversed. The questionnaire was organized in four sections A, B, C and D. Section A was for demographic data comprising Name of school, and Status. Section B was for causes of attrition, section C for impact of attrition while section D was for strategies for retention of the teachers.

The instrument was validated by three experts in the fields of science and technology education and educational measurement and evaluation from the school of Technology and Science Education, Modibbo Adama University of Technology, Yola for face validation. The validates were requested to assess the instrument in terms of the purpose of the study, clarity of expression and suitability of the items. They were also requested to make amendments where necessary. No item was rejected by the validates after validation except for minor corrections which were effected.

The reliability of the instrument was estimated with Cronbach alpha method which was used to determine the coefficient of internal constituency of the items. Pilot study with 30 students in one school outside the ones used for the study was used to collect data. The schools have similar characteristics. The reliability coefficients of the sections B, C and D were 0.72, 0.73 and 0.69 respectively. The average gave the coefficient of internal consistency of the whole three section of the instrument as 0.71.

The instrument was administered on the Principals, science and technical teachers in the 270 schools in the State. The questionnaires were administered and collected after four days with the help of six research assistants. Screening of the questionnaires was done at home and all the questionnaires were completed in useable forms.

Method of data analysis

Data were analyzed using mean and standard deviation to answer the research questions while analysis of variance (ANOVA) was used to test the hypotheses. Decision rule applied for the research questions was that: an item with mean score of 2.50 and above was taken as agree (lower limit of 3) while an item with less than 2.50 was regarded as disagree. For the hypotheses, if F-calculated is greater than F-Critical, the hypothesis was rejected and if less than F-critical, the hypothesis was accepted (Table 1).

RESULTS

The following results were obtained from the study.

Research Question 1: What are the causes of science and technical teachers' attrition in Adamawa State Secondary Schools?

Table 2 shows the responses of the principals, science teachers and technical teachers on causes of attrition of

Table 1. Scale rating for research questions for decision rule.

Scale	Point	Lower Limit	Upper Limit
Strongly Agree	4	3.50	4.00
Agree	3	2.50	3.49
Disagree	2	1.50	2.49
Strongly Disagree	1	0.50	1.49

Table 2. Mean and standard deviation of the responses of Principals, Science teachers and Technical teachers on the perceived causes of attrition of teachers in Adamawa State Secondary Schools.

S/N	Items	\bar{X}_1	\bar{X}_2	\bar{X}_3	$G \bar{X}$	$G \bar{X} SD$	Remarks
		n=207	n=207	n=308			
1	Science and Technical Teachers are paid enough salaries and wages	2.00	1.50	2.00	1.94	0.96	D
2	The teachers are always promoted as at when due	1.50	1.06	1.56	1.41	0.84	D
3	Teachers are always Sponsored for seminars, Workshops, and conference to update their knowledge	2.04	1.84	1.43	1.75	0.84	D
4	Teachers are regarded as poor people in the society	3.66	3.63	3.80	3.71	1.10	A
5	Staff quarters are provided for science and technical	2.00	2.04	1.60	1.85	0.96	D
6	Science and Technical teachers enjoy high prestige in the society	1.90	2.26	1.54	1.85	0.84	D
7	Science and technical teachers' allowances are paid to the teachers	1.87	2.09	2.08	2.01	0.75	D
8	Housing loan is given to the teachers to build their own houses	2.15	2.16	1.66	1.96	0.99	D
9	Teachers enjoy good conditions of service	1.84	1.36	2.09	1.81	0.88	D
10	Instructional materials are enough for teaching	2.06	2.32	1.76	2.01	0.84	D
11	Laboratories are well quipped for science teaching	2.09	2.32	2.04	2.13	0.81	D
12	Workshops are well equipped for technical education teaching	1.68	2.00	2.38	2.04	0.79	D

A = Agree, D = Disagree, \bar{X}_1 = Mean response of principals, \bar{X}_2 = Mean responses of science teachers \bar{X}_3 = Mean responses of technical teachers, $G \bar{X}$ = Grand mean responses. $G \bar{X} SD$ = Grand mean of standard deviation.

the teachers in Adamawa state secondary schools. Apart from item 4 which showed agree, the rest of the items revealed disagree.

Research question 2

What are the impacts of attrition on the secondary schools in Adamawa state?

Data in Table 3 show that all the respondents returned agree to all the items

Research question 3

What are the strategies to be used in order to retain the science and technical teachers in Adamawa State Secondary Schools?

Table 4 indicates the results of the strategies to be used in order to retain the teachers. The results show agree to all the items.

Hypotheses testing

The null hypotheses were tested using the data from the research questions as responded to by the principals, Science teachers and technical teachers (Tables 2 – 4).

H₀₁: There is no significant difference in the mean responses of principals, science and technical teachers on the perceived causes of science and technical teachers' attrition in Adamawa State Secondary Schools.

Data in Table 5 indicate that F-calculated is less than F-critical at 0.05 level of significance, so the null hypothesis one (H₀₁) is accepted. F-calculated is not significant at 0.05 level of significance.

H₀₂: There is no significant difference in the mean responses of Principals, Science and Technical Teachers on the perceived impact of Science and Technical Teachers' Attrition in Adamawa State Secondary Schools.

Table 3. Mean and standard deviation of responses of principals, science and technical teachers on the impact of attrition on secondary schools in Adamawa State.

S/N	Attrition Leads to:	\bar{X}_1	\bar{X}_2	\bar{X}_3	$G\bar{X}$	$G\bar{X} SD$	Remarks
		n=207	n=207	n=308			
1	Shortage of science and technical teachers	3.50	3.62	3.50	3.53	0.91	A
2	Poor performance of students in examination	3.72	3.70	3.76	3.85	0.84	A
3	Overload of the remaining teachers	3.88	3.86	3.81	3.85	0.83	A
4	Low morale of the remaining teachers	3.60	3.55	3.56	3.57	0.72	A
5	Employment of unqualified science and technical teachers	3.84	3.78	3.72	3.78	0.80	A
6	Students drop-out of school	3.40	3.24	3.42	3.36	0.66	A
7	Low standard of education	3.20	3.18	3.16	3.67	0.62	A
8	Brain drain of science and technical teachers	3.80	3.66	3.54	3.66	0.67	A
9	Strike action by the remaining teachers	3.50	3.52	3.48	3.50	0.68	A
10	Low turn-over of science and technical teachers	3.42	3.46	3.26	3.37	0.60	A
11	Examination malpractice by students	3.55	3.46	3.41	3.50	0.65	A
12	Waste of resources	3.80	3.75	3.74	3.76	0.81	A

Table 4. Mean and standard deviation of the perceived strategies to be used in order to retain science and technical teachers in secondary schools in Adamawa State.

S/N	Perceived strategy	\bar{X}_1	\bar{X}_2	\bar{X}_3	$G\bar{X}$	$G\bar{X} SD$	Remarks
		n=207	n=207	n=308			
1	Science and technical teachers should be given good salaries and wages	3.64	3.50	3.56	3.57	0.76	A
2	Provision of adequate facilities for teaching e.g. library and teaching aids	3.58	3.62	3.62	3.61	0.84	A
3	Well science laboratory provided	3.50	3.48	3.69	3.57	0.81	A
4	Well-equipped workshops provided	3.54	3.64	3.50	3.55	0.73	A
5	Sponsoring the teachers for conferences and seminars	3.70	3.75	3.53	3.65	0.74	A
6	Granting the teachers housing loans	3.48	3.61	3.66	3.58	0.76	A
7	Fair appraisal of the teachers' performance e.g. avoid victimization	3.62	3.54	3.57	3.58	0.82	A
8	Promotion of teachers when due	3.43	3.70	3.72	3.61	0.83	A
9	Create high image for the teachers e.g. regard them as builders of the nation	3.52	3.52	3.51	3.52	0.84	A
10	Science and technical teachers' allowances should be paid	3.26	3.27	3.28	3.27	0.68	A
11	Good working conditions for the teachers	3.50	3.55	3.56	3.54	0.74	A
12	Reduction of workload	3.48	3.50	3.58	3.52	0.71	A

Table 5. Analysis of variance (ANOVA) of mean responses of principals, science and technical teachers on the perceived causes of science and technical teachers' attrition in Adamawa State Secondary Schools.

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-crit	Remarks
Between groups	0.7	2	0.35	0.028	3.28	NS
Within groups	415.2	33	12.58			
Total	415.9	35				

NS = Not significant at 0.05 level of significance.

Table 6. Analysis of variance (ANOVA) of mean responses of principals, science and technical teachers on the perceived impact of science and technical teachers' attrition on Adamawa State secondary schools.

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-crit	Remarks
Between groups	0.10	2	0.05	0.048	3.28	NS
Within groups	6.65	33	0.202			
Total	6.75	35				

NS = Not significant at 0.05 level of significance.

Table 7. Analysis of variance (ANOVA) of mean responses of principals, science and Technical teachers on the perceived strategies to be used to retain the science and technical teachers in Adamawa State Secondary Schools.

Source of variation	Sum of Square	df	Mean Square	F-cal	F-crit	Remarks
Between groups	0.20	2	0.10	0.185	3.28	NS
Within groups	17.80	33	0.539			
Total	18.00	35				

NS = Not significant at 0.05 level of significance.

Data in Table 6 reveal that F-calculated (0.248) is less than the F-critical (3.28) at 0.05 level of significance, so H_0_2 is accepted.

H_0_3 : There is no significant difference in the mean responses of principals, science and Technical Teachers on the perceived strategies to be adopted to retain the science and Technical Teachers in Adamawa State Secondary Schools.

Data in Table 7 show that F-calculated (0.185) is less than F-critical (3.28) at 0.05 level of significance, so H_0_3 is not rejected. F-calculated is not significant at 0.05 level of significance.

Major findings of the study

The following major findings resulted from the study.

1. The principals, science and technical teachers agreed on the perceived causes of attrition as reflected on table1.
2. There is no significant difference in the mean responses of the three groups on the perceived causes of science and technical teachers' attrition in Adamawa State Secondary Schools (Table 4).
3. The Principals, Science and technical teachers agreed on the perceived impact of science and technical teachers' attrition on Adamawa State Secondary Schools as presented on Table 3. Their responses did not show any significant difference (Table 7).
4. The three groups (Principals, Science and Technical teachers) agreed on the perceived strategies to be used in retaining the teachers. Their responses did not

show any significant difference at 0.05 level of significance (Table 7).

DISCUSSION

The result of this study revealed the perceived causes and impact of science and technical teachers' attrition and the strategies for the retention of the teachers. From Table 2, most of the items centred on welfare of the teachers, conditions of service, provision of facilities for teaching and learning, and others which were poorly provided for the teachers. As a result of this situation, most of the teachers either down their tools or withdrew from the service and move to other countries where conditions of service were better and more attractive. This finding agreed with those of Mahmoud (2000), Aleyideino (2000) and Wandiya (2014) whose findings centred on poor conditions of service for science and technical teachers as causes of their attrition rates. The poor conditions of service resulted in the society looking down on the teachers and regarding them as poor people. This situation created a low image of the teachers in the society. Since there is no significant difference in the mean responses of the three groups used for the study this implies a consensus opinion of the groups on the issue.

The impact of attrition of teachers on Adamawa State Secondary Schools spelt out itself on Tables 3 and 6. The impact of the attrition of the teachers as found out in this study include: shortage of teachers in schools, overloading of existing teachers, employment of unqualified teachers to make up, wastage of resources, poor performance of students in examination among others. This

finding agreed with that of Wandiya (2014) that these variables stated are the effects of science and technical teachers' attrition in Adamawa state Secondary Schools. There is no significant difference in the mean responses of the three groups used for the study on the problem showing also consensus opinion.

The strategies for the retention of science and technical teachers also followed the same trend with the findings on the causes and impact of the problem. This is because, like the other two variables, the responses of the three groups used for the study in the strategies to be used for retention showed no significant difference. The implication is that the three groups agreed on the strategies to be adopted for solving the problem of retention. This finding agreed with those of Uwaifo (2010), Adegbesan (2011) and Wandiya (2014). Some of the measures to be adopted include making the conditions of service attractive, fair appraisal process, good staff development policy, appreciating teachers' efforts, providing adequate facilities for teaching and learning among others (Table 4). These strategies identified for the retention of the teachers will contribute to the promotion of the much needed scientific and technological development because these teachers are at the centre of imparting the skills of science and technology on our students.

Conclusion

The causes and impact of science and technical teachers' attrition in Adamawa State are numerous as revealed by the findings of this study (Table 2 ad 3). The causes of the attrition could be summarized under poor conditions and poor welfare of the teachers including lack of facilities for teaching and learning (Table 2). The impact of attrition could be summarized with the adage that when two elephants fight it is the grass that suffers. The grass is our students who by so doing will receive poor quality education in this circumstance. Addressing the problem is by providing the lacking facilities and conditions of service which in turn will be of benefit to all consumers of education with the possible reduction of science and technical teachers' attrition or brain drain in the society.

Recommendations

The following recommendations resulted from the findings of this study.

- Adamawa State Government should provide attractive conditions of service for science and technical teachers in order to prevent science and technical teacher attrition or brain drain.
- The government should provide enough facilities for teaching and learning (Table 4).
- The low image of teachers as the teachers are being perceived as poor people in the society should be tackled by giving the teachers good salaries and wages.
- Allowances like: housing loans, car loans should be provided so that the teachers can own these facilities for themselves.
- Promotion of science and technical teachers at higher grade should be given as at when due.
- These recommendations (1 – 5) are some selected ones but the findings made on Table 4 should be a guide for the recommendation in order to enhance productivity and also to reduce the attrition problem in the school system.

Conflict of Interests

The authors have not declared any conflict of interests.

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