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Chemistry Teachers' Perception of Professional Development Strategies

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ABTRACT

The study is a descriptive survey design on chemistry teachers' perception of professional development strategies. The population of the study comprised all chemistry teachers in the 13 public senior secondary schools in Ikwerre local government area in Rivers State, Nigeria .A sample size of 52 chemistry teachers was drawn at random from the population to respond to the researched structured questionnaire on teachers' perception of professional development strategies titled (QTPPDS). The questionnaire consist of 15 items covering in-service training, seminar and workshop professional development strategies .A reliability coefficient 0.86 was obtained using Cronbach's alpha method and the data collected were analyzed using mean and standard deviation. The findings of this study revealed that there is no significant difference between mean scores of chemistry teachers' perception of professional development strategies based on teachers' gender (t-call=0.243< t- tab =2.009) .There is no significant differences between mean scores of chemistry teachers' perception of professional development based on teachers' qualifications (t- cal = 0.695< t- tab = 2.009) . There is also no significant difference between mean score of chemistry teachers' perception of professional development strategies based on working experience (t- cal =0.78< t-tab =2.009). The study recommends amongst others that teachers should be encouraged to engage in diverse professional development activities that respond to the inadequacies in their professional competences.

Keywords: *profession, in-service, seminar, workshop chemistry, teaching*

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INTRODUCTION

People come together in business of occupation, employment, pursuit, or calling to do work. Peoples' work requires certain specialized knowledge skills, talents or abilities and that they must all have in common to make it possible for their association. Such association element possessed by people and that is bring about their coming together is their profession. The special knowledge and skill possessed by the members of the profession in most cases had seen acquired though prolong learning in reputable institution and recognized and generally accepted by the public or society where they operate. There is also the need of certificate so to prove that certain abilities have been acquired by such individual members of the group. The members of such group should equally to abide by the ethics and altruism of the group to concretize their togetherness. Because they work together to meet the needs of others, meaning that they render services that sometimes is for their livelihood therefore, a profession could be defined as a paid occupation. In some cases, the aim of the professional occupation is on the basis of supply disinterested service to other for a direct and definite compensation, wholly apart from expectation of other business gain. Some profession change slight in status though they may maintain the general profile in which case there could be significant difference in the salary for example in law, a

corporate defense lawyer who earns his salary on an hourly basis earn several times better than what a prosecutor or public defender earns. However, in some legal definition of a profession, the term is not used for a trade or an industry. As was known in the medieval and early modern tradition age, only three types of profession were recognized, these are; divinity, medicine and law that were referred to as learned profession and these were not typically occupations. A typical profession needs education qualification, certification, licensing, involves specialized knowledge from prolonged learning, and trainings and research while occupation focus on specific task, and activities and so broader in scope (https://www.indeed.com>what–is–a-profession).

A profession has certain characteristics by when it is identified, this includes:

- Acquire and master knowledge that is only known or have by members of such body
- Must be recognized by the government of the society where it exist or operate
- Must all abide by certain conduct as their ethics
- Should be able to take decision on its own and that should be respected by members within and also by others in the society.
- By special way come together and do their work whether for their own benefits or the benefits of others especially the society where they operate or belong to.
- special knowledge and skills acquired that makes them outstanding and different from others or like every other fields of work.(https://www.cs.uct.ac.za.

Education is a profession that supplies services to the public via the institution based on expert knowledge gain and specialized skills acquired which is also sustained through rigorous and life-long training and research. In education though the learner is the focus of the knowledge and skills provided, but the lasting benefit is usually on the larger society. In the field of education, the main actor is the teacher, whose roles are very special and crucial and can either make or mar the entire system at the slightest step either in positive or negative direction.0ne of the most influential role player in the success of teaching and learning process is the teacher. It is even the teacher that comes first before the leaner, if the learner must be successful in his studies. The implication being that the quality of the teacher should be taken into very serious consideration. Secondly, what the teacher teaches and how he teaches to a very great extent is determined on how the learner learns. To this end, it is pertinent that the teacher being a main roles player, develop himself to be effective and efficient in his duties as a professional teacher through engagement in professional development programs/activities of the types as is organize by the governing body of profession and professional (Speck & Knipe, 2015). Professional development is a continuous process of learning, reflection and involvement to enhance the knowledge and skills of the teacher as he remains in the teaching job. This is to enable him impact the learners with every new information, ideas, technology, to equip the learner to fix into the bigger society after his program years. Our world today is undergoing dynamics revolution and in the line with these changes, nations all over the world are welcoming measures to commensurate with these changes so as to adjust to them. Therefore, new skills are being acquired; new ways of doing things are emerging every day, the field of education should not be the only one left out in this event of things. Teachers should due to this pressure mounted on them by the changes in the environment likewise avail themselves with training and retraining and knowledge development practices. Hargreaves (2017), appealed to chemistry teacher to learn new skills of teamwork, thinking on a higher level and successful use of new and relevant information technology to adjust in chemistry teaching styles. Scott (2016), ascertain that chemistry teachers' productivity is perceived as the ability to use high tech model to help lively up the classroom and improve the learning experience for the young mind. For a chemistry teacher to be productive, he must acquire his professional skills to determine his capacity so as to use those abilities and skills to keep his classroom lively and interesting to the learner. A classroom that is lively has the capacity to induce the interest of the learner for him to take up his task such that can emerge into development of higher order skills, critical thinking and problem solving skill (Malik & Rizvi, 2018).These skills as acquired through professional development activities determines the abilities of the teacher to use latest technology to improve his classroom with all proficiency .This lively classroom is possible because the teacher engagement in professional development activities exposes him to new and innovative ideas which are usually shared amongst colleagues which in most cases are from experiences gather through research work and so are capable of changing the orientation of the teacher in doing his job from the same day-to-day ancient approach to a new and latest style. Professional development focus is on making the teacher who has the teaching responsibilities to develop new perspectives to his teaching approach. The professional development of the teacher is capable of helping him to effectively deliver and implement the curriculum. To this end, Nsofor (2015), pointed that the success of science, technology and mathematics education (STME) and achievement of development in Africa depends critically on the availability of technological and scientifically training manpower. By this implication, the professional development programs are capable of equipping the science teachers in Africa to

achieve this commendable education goal. Researchers have identified that it is imperative practice for teachers in terms of professional development practice to adjust to changing classroom practice, improving schooling and ameliorating pupils learning outcomes (Borko,2014). Professional learning in education brings about ultimate change in the classroom practice. Bryk et al, 2016, opined that strong teacher communities result into higher student achievement. Professional development activities is a panacea to advancement and enhancement in classroom teaching and learning even when it is gotten from informal setting, such as professional development programs, teaching research groups and formal setting such as mentoring programs (Timperly, 2018). One of the components of professional programs is the offer of opportunity for professional to come into collaboration as this creates an avenue for the teachers to interact through their experiences from discoveries in research works and from others that describe collaboration.

The international survey in teaching and learning (The teaching and learning international survey, (TALIS), 2013) revealed that teachers who engage in collaboration practices are more innovative in classroom, gain higher role satisfaction as well as achieving higher levels of self-efficiency beliefs (European commission,2013). Research on teachers' professional development also indicates that team work positively influence teachers' engagement particularly in their approach to new instructional styles (Garet et al., 2016). Professional development practices can lead to improvement in teachers' critique, reflection and collaboration through participation and conversations and usually the outcomes of such learning are impressive. Ezeani & Oladele (2013) said that the objectives of training and retraining teachers in the school sector is majority to enable them perform their task well in the school as the efficiency and productivity of the teacher lye on training and retraining hence this will be greatly express itself on the overall academic and job achievements for both teacher and students and the entire organization business will improve. According to Nkemakolam (2015), constant training including organization of seminar, workshop and other courses for teacher would improve to a great extent their effectiveness and efficiency as teacher. Furthermore, Nkomo & Abdi (2023) puts it that training sometimes may be undertaken to provide knowledge, acquisition of skills and shape attitudes empower employees' self-esteem, boost staff moral and thereby improve organizational climate, especially in the school environment. Nkomo and Abdi (2023) further categorized training and retraining as follows:

1. Pre-service training comes before the employment and it is intended to equip the employee for the job as well as serve as a pre-requisite for the employment.

2 2 In-service training goes on while on the job for to continue as refreshing the abilities of the worker to remain efficient and effective. The training being a continuous one is throughout educational life of the employee.

Professional development earns the teachers' credentials such as academic degrees, certificate, license which can elevate his status, authority and earning added to skills acquired, recognition and knowledge gain, all of which could serve as motivation and accumulate into job satisfaction. There are various forms of professional development programs. Some of which include:

Seminar: whereby participates are expected to discuss in a given topic. Conference: this may sometimes go on for a whole week, it is an avenue for research, lecture, administrators and technical staff to present their findings or share their knowledge on some particular subject with other participants. Workshops are practical sessions to demonstrate or show, discuss or solve problem. Taught courses, this could be in the form of regular education or part-time or certain hours of multiple sessions or even a long period is dedicated to it. It could be in a classroom teaching or online learning. Self-study course: sometimes learning material can be made available for the learner to access and utilize for his personal learning at his own time. Network where the learner has the opportunity to learn from colleague and also can contribute to the learning of other especially suitable for skill acquisition in an organization. Mentoring one's real-life situation in most cases that of the mentor can be used as an example to bring the lesson that will benefit both the learner and the mentor. Job shadowing two collogues can shadow each other. It could be in a similar or completely different job. A colleague serving as a good learning experience as he offers insight into a typical working day for the other colleagues.

Job rotation: where two colleagues swap duties either in the same area or different areas. These two colleagues could come from the same organization or different fields. It creates the opportunity for diversification in that new knowledge outside your area can be gained. Conversional education; a type of tailor-made course which could be from within or outside the organization (https://www.upeducators.com).

Some formal and informal professional development programs for teacher in Nigeria include: Teachers Professional Development Program (TPDP) implemented by World Bank in collaboration with ministry of education. Teachers of Nigeria programs; a non-profit making organization which has taken up the responsibility to train young people to go to across the nations to teach other.

National Teachers' Institution (NTI) this body also serves as a means of examining and certifying teachers. Science Teachers Association of Nigeria (STAN) a body that has been in existence for a longtime and has taken upon itself the responsibility of organizing different professional development programs such as annual conference for science teachers, quiz competition and exhibitions for science students and many similar activities. Teachers Professional Development (TPD) is a unit that is assigned for disbursement and utilization of Federal Government of Nigeria Universal Basic Education (UBE) intervention fund for teachers' professional development. They carry out this responsibility in collaboration with SUBED & FCT (UBEB). TEP center is a leading education consulting firm in Nigeria responsible for designing complete teachers' professional development programs which focus is on skills acquisition. Federal government teachers' induction programs targeted on teachers' skills acquisition & knowledge gain in their job. Though these laudable programs are in place and with numerous benefits in training teachers to be professional teachers in the necessary knowledge & skills, sadly, it has been observed that there are still some who have not yet availed themselves with this opportunity. Though they call themselves teachers but because they are void of the elements required for professional teachers especially in the field of science, they are quakes. In the teaching and learning of science, the science process skill acquisitions is prerequisite and complement the ethics of the profession of science teaching. Therefore, any science teacher that is a non-professional and that cannot exhibit such ethic causes mitigation and a drawback to the generally progress in the teaching and learning process of science.

Research question

The following research question guided the study:
1. What is the mean score difference of chemistry teachers' perception of professional development strategies based on gender in Public Senior Secondary School in Ikwerre local government area of Rivers State?
What is the mean score difference of chemistry teachers' perception of professional development strategy based on qualification in Public Senior School in Ikwerre local government area of Rivers State?

3 What is the mean score difference of chemistry teachers' perception of professional development strategies based on working experience in Public Senior Secondary School in Ikwerre local government area in Rivers State?

Research hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

HO1: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on gender in Public Senior Secondary School in Ikwerre local government area of Rivers State.

HO2: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on qualification in Public Senior Secondary School in Ikwerre local government area of Rivers State.

HO3: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on working experience in Public Senior Secondary School in Ikwerre local government area of Rivers State.

METHODOLOGY

The research adopted the descriptive survey research design for this study. The population of the study comprised of 52 chemistry teachers from 13 Public Senior Secondary Schools in Ikwerre local Government Area of Rives State, Nigeria. The sample size of this study constituted all 52 chemistry teachers in the area adopting census sampling technique to select the entire population since this size was small. The research instrument for the collection of data was a researcher' self-structure questionnaire titled: chemistry teachers' perception of professional development strategies questionnaire (TPPDSQ). It consisted of 15 associated items for in-service training, seminar and workshop (professional development strategies) of which four-point Likert scale of strongly agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and strongly disagree (SD) = 1 was used for the responses. Reliability coefficient 0.86 of the instrument was obtained using Cronbach alpha. Data collected was analyzed using mean and standard deviation for the research questions and t-test for the null hypotheses.

RESULTS

Research Question 1: What is the score difference of chemistry teachers' perception of professional development strategies based on gender in Public Senior Secondary School in Ikwerre local government area of Rivers State?

Table 1 shows the responses of the perception of male and female chemistry teachers on professional development strategies (in-service training, seminar and workshop). The table indicates that for the 15 items on perception of male and female chemistry teachers on

Table 1: Mean and standard deviation of teachers' perception on professional development strategies based on gender

S/N	Item	Male		Female	
A	**In-service training**	**mean**	**SD**	**mean**	**SD**
1	In-serving training of teachers promotes job satisfaction.	1.01	0.01	1.08	0.28
2	In-serving training improves teaching methods	2.59	1,13	2.57	1.26
3	Teachers' productivity is significantly related to in-service training.	3.70	0.48	3.75	0.46
4	In-service training of teachers enhances teachers' performance on the job.	3.21	2.81	3.27	2.90
5	Lack of in-service training program contributes to the fallen standard of education.	2.90	1.10	3.01	1.11
B	**Seminar**				
6	Seminar contributes to understanding of my subject.	3.15	2.73	3.19	2.77
7	Regular attendance to seminar instills confidence in the teacher when duty calls.	3.39	0.58	3.04	
8	Seminar attendance improves scientific attitude in the teacher.	3.39	1.03	3.33	0.70
9	Teachers can apply knowledge gained from a seminar when teaching.	2.40	1.24	1.98	1.15
10	Seminar improves research skills.	3.45	0.50	3.19	0.69
C	**Workshop**				
11	Regular attendance to workshop enhances teachers' practical skills.	2.81	2.49	2.87	2.46
12	Teachers' participation in workshop can add to their teaching achievements.	3.29	2.87	3.08	2.69
13	Teachers' lack of interest to workshop inhibits effective teaching.	2.48	2.12	2.40	1.24
14	Workshop program with the right facilities is beneficiary to teachers.	3.55	0.69	3.63	0.62
15	Workshop attendance has improved my teacher-teacher relationship.	3.58	0.83	3.30	0.73
Grand mean		2.99	1.38	2.91	1.30

Table 2: mean and standard deviation of teachers' perception on professional development strategies based on qualification

S/N	Item	Bachelor' Degree		Masters' Degree	
A	**In-service training**	**mean**	**SD**	**Mean**	**SD**
1	In-serving training of teachers promotes job satisfaction.	2.08	1.44	1.01	1.00
2	In-serving training improves teaching methods	2.59	1,61	2.35	1.53
3	Teachers' productivity is significantly related to in-service training.	3.80	1.95	3.65	1.91
4	In-service training of teachers enhances teachers' performance on the job.	3.21	1.79	3.27	1.81
5	Lack of in-service training program contributes to the fallen standard of education.	3.0	1.73	3.01	1.74
B	**Seminar**				
6	Seminar contributes to understanding of my subject.	3.15	1.77	3.19	1.79
7	Regular attendance to seminar instills confidence in the teacher when duty calls.	3.39	1.84	3.04	1.74
8	Seminar attendance improves scientific attitude in the teacher.	3.39	1.84	3.33	1.83
9	Teachers can apply knowledge gained from a seminar when teaching.	2.40	1.54	1.98	1.41
10	Seminar improves research skills.	3.40	1.84	3.19	1.79
C	**Workshop**				
11	Regular attendance to workshop enhances teachers' practical skills.	3.81	1.95	2.87	1.69
12	Teachers' participation in workshop can add to their teaching achievements.	3.29	1.81	3.08	1.76
13	Teachers' lack of interest to workshop inhibits effective teaching.	2.48	1.58	2.40	1.55
14	Workshop program with the right facilities is beneficiary to teachers.	3.65	1.91	3.63	1.91
15	Workshop attendance has improved my teacher-teacher relationship.	3.68	1.92	3.30	1.82
Grand mean		3.15	1.78	2.89	1.70

professional development strategies with a mean score and standard deviation of 2.99±1.38 for male teachers and mean score and standard deviation of 2.91± 1.30 for the female teachers.

Research Question 2: What is the score difference of chemistry teachers' perception of professional development strategies based on qualification in Public Senior Secondary School in Ikwerre local government area of Rivers State?
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Table 2 shows the responses of the perception of bachelor degree and master's degree of chemistry teachers on professional development strategies (in-service training, seminar and workshop). The table indicates that for all the 15 items on perception of bachelor degree and master's degree of chemistry teachers on professional development strategies with a mean score and standard deviation of 3.15±1.78 for bachelor degree and mean score and standard deviation of 2.89± 1.70 for master's degree teachers.

Research Question 3: What is the score difference of chemistry teachers' perception of professional development strategies based on working experience in Public Senior Secondary School in Ikwerre local government area of Rivers State?

Table 3 shows the responses of the perception of 0 – 10 years and 11 years above working experience chemistry teachers on professional development strategies in (in-service training, seminar and workshop).The table indicates that for all the 15 items on perception of 0 – 10 years and 11 years above working experience of chemistry teachers on professional development strategies with a mean score and standard deviation of 3.15±1.77 for 0 – 10years and mean score and standard deviation of 2.82± 1.66 for 11 years and above working

Table 3: mean and standard deviation of teachers' perception on professional development strategies based on working experience

S/N	Item	0 -10 years		11 1nd above	
A	**In-service training**	mean	SD	mean	SD
1	In-serving training of teachers promotes job satisfaction.	2.08	1.44	1.01	1.00
2	In-serving training improves teaching methods	3.59	1,89	2.35	1.53
3	Teachers' productivity is significantly related to in-service training.	3.80	1.95	3.65	1.91
4	In-service training of teachers enhances teachers' performance on the job.	2.21	1.48	3.27	1.81
5	Lack of in-service training program contributes to the fallen standard of education.	3.0	1.73	2.01	1.42
B	**Seminar**				
6	Seminar contributes to understanding of my subject.	3.15	1.77	3.19	1.79
7	Regular attendance to seminar instills confidence in the teacher when duty calls.	3.39	1.84	3.04	1.74
8	Seminar attendance improves scientific attitude in the teacher.	3.30	1.82	3.33	1.82
9	Teachers can apply knowledge gained from a seminar when teaching.	2.45	1.57	1.98	1.41
10	Seminar improves research skills.	3.40	1.84	3.19	1.79
C	**Workshop**				
11	Regular attendance to workshop enhances teachers' practical skills.	3.81	1.95	2.87	1.69
12	Teachers' participation in workshop can add to their teaching achievements.	3.29	1.81	3.08	1.76
13	Teachers' lack of interest to workshop inhibits effective teaching.	2.48	1.57	2.40	1.55
14	Workshop program with the right facilities are beneficiary to teachers.	3.65	1.91	3.63	1.91
15	Workshop attendance has improved my teacher-teacher relationship.	3.68	1.92	3.30	1.82
Grand mean		3.15	1.77	2.82	1.66

Table 4: t-test analysis on teachers' perception of professional development based on gender

Gender	N	Mean	SD	df	t-cal	t-tab	Decision
Male	32	2.99	1.38				
Female	20	2.91	1,30	50	0.243	2.009	retained

Table 5: t-test analysis on teachers' perception of professional development based on qualification

Gender	N	Mean	SD	df	t-cal	t-tab	Decision
Bachelor Degree	32	3.15.99	1.78				
Masters' Degree	20	2.89	1,70	50	0.695	2.009	retained

Table 6: t-test analysis on teachers' perception of professional development based on working experience

s	N	Mean	SD	df	t-cal	t-tab	Decision
0-10 years	32	3.15	1.77				
11 years and above	20	2.86	1,66	50	0.78	2.009	retained

experience teachers. HO1: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on gender in Public Senior Secondary School in Ikwerre local government area of Rivers State. Table 4 shows, t-cal < t-tab since the calculated t-value (0.243) is less than the t-value (2.009), the null hypothesis that, there is no significant difference between mean score of chemistry teachers' perception of professional development strategies based on teachers' gender is retained. HO2: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on gender in Public Senior Secondary School in Ikwerre local government area of Rivers State. Table 5 shows, t-cal < t-tab since the calculated t-value (0.695) is less than the t-value (2.009), the null hypothesis that, there is no significant difference between mean score of chemistry teachers' perception of professional development strategies based on teachers' qualification is retained. HO3: There is no significant difference in the mean score of chemistry teachers' perception of professional development strategies based on working experience in Public Senior Secondary School in Ikwerre local government area of Rivers State. Table 6 shows, t-cal < t-tab since the calculated t-value (0.78) is less than the t-value (2.009), the null hypothesis

that, there is no significant difference between mean score of chemistry teachers' perception of professional development strategies based on teachers' working experience is retained.

DISCUSSION

Table 1: on the responses of the perception of male and female chemistry teachers on professional development strategies (in-service training, seminar and workshop) shows grand mean score of male chemistry teachers as 2.99 and female as 2.91 indicates slight disparity. However, the null hypothesis 1 reveals that this slight difference between the genders is not significant, implying that both male and female chemistry teachers agreed that professional development strategies (in-service training, seminar and workshop) can enhance teachers' productivity on the job. This study is in agreement with the view of Asiyai (2016), who observed that teachers who participated in in-service training perceived the program positively impacted their teaching job.

Table 2: on the responses of the perception of bachelor degree and masters' degree chemistry teachers on professional development strategies (in-service training, seminar and workshop) shows grand mean score of bachelor degree chemistry teachers as 3.15 and masters' degree as 2.89 again there is slight disparity in the mean. But t-cal < t-tab (0.695 < 2.009) so the null hypothesis of no significance was retained revealing that this slight difference between the qualifications is not significant, implying that both bachelor degree and master's degree chemistry teachers agreed that professional development strategies (in-service training, seminar and workshop) can enhance teachers' productivity on the job. This study is in agreement with the view of Adawi (2017), who observed positive impact of professional development strategies in enriching classroom learning and students' responsibility for their own learning which can be achieved through training for teachers and students.

Furthermore, table 3and 6 showed that chemistry teachers who have 0 -10 years working experience response on perception on professional development strategies (in-service training, seminar and workshop) as mean of 3.15 and those of 11 years and above mean as 2.82. t-cal < t-tab (0.78<2.009), there is no significant difference in the responses of chemistry teachers on working experience. Hence, professional development strategies are likely to enhance chemistry teachers in their teaching job. The study of Ollor (2021) found out that attendance to workshop and conferences are very significant and crucial in enhancing quality instructional delivery by teachers in secondary school. Due to the fact that over the years, teachers have through professional development strategies developed in their teaching methods, knowledge and skills.

Conclusion

Professional development strategies are crucial in the enhancement of professions including the profession of teaching. The chemistry teachers can through attendance and participation in in-service training, seminars, and workshop improve in their teaching for the students to benefit being that they can through these program improve their teaching methods, increase in subject matters and acquire greater skills to perform their duties with utmost confidence.

Recommendations

1.Chemistry teachers should form the habit of attending professional development program.
2. Schools should organize even within the schools and among the teachers program to train the trainer.
3.Teachers should be motivated by well-meaning individuals and groups through their financial support to enable them regularly attend professional development programs.
4.Provision for in-service training should be given to teachers who themselves should make best use of them.
5.Bodies such as science teacher's organization and industries should build up innovative programs to update teachers with new and innovative development and technologies.

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