Teaching Competencies Needed By Agricultural Science Teachers for Effective Task Performance in Senior Secondary Schools in Taraba State For Sustainable National Development

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Abstract
This study was carried out to determine the teaching competencies needed by agricultural science teachers for effective task performance in Taraba State for sustainable National development. Two research questions and two null hypotheses postulated at 0.05 level of significance guided the study. Survey research design was used for the study. A population of 440 comprising 276 agricultural science teachers and 164 principals were used for the study from three education Zones, Gembu, Bali and Takum .Cluster, Stratified, purposive and simple random sampling techniques were used and 208 sample size was obtained using Taro Yamane's formula for finite population out of which 130 agricultural science teachers and 78 principals were selected randomly from the selected senior secondary schools. A questionnaire was used to collect data for the study. The questionnaire was validated by 3 experts. The instrument was pre-tested and Cronbach alpha statistic used to determine the internal consistency of the instrument which yielded 0.89 reliability coefficient. The data collected was analyzed using mean to address research questions, while Z-test was used to test null hypotheses. Based on the analysis, it was discovered that two core teaching areas that the agricultural science teachers need competencies to excel are computational and pedagogical competencies. Furthermore, the Z-test of independent mean revealed there was no significant difference in the mean ratings of the agricultural science teachers and principals for hypotheses (1-2). From the findings of the study it is recommended that the school administrators should set up school farms. Agricultural science teachers in senior secondary schools in Taraba state should apply varying strategies in teaching the subject and the use of computers to compute students' results.

Key Words: Agricultural Science, Competencies, Task Performance. Teaching,

Introduction

The general purpose of teaching is to promote learning. Teaching entails the application of skills and performing the activities that enables students to develop and ultimately exhibit the expected learning outcomes. Teachers' competency is an important factor that affects learning (Collias, Pajak, &Ridgen, 2009). Their decision can facilitate or impede learning. According to Goe (2007) empirical study showed that some teachers are more effective in contributing to the learning outcomes than others. Tsang and Rowland (2003) contended that for a teacher to be effective he or she must have mastery of the substantive and syntactic structures of subject matter which enables him to impart subject contents in a way that makes meaning to the students. This idea is supported by Adeosun, Oni, Onuoha and Yakasai (2009) who opined that an effective teacher has a strong knowledge base of the subject matter content and also has repertoire of pedagogical strategies that he or she employs for delivery of his lesson. Effective teachers make use of their knowledge and skills to achieves the teaching goals imposed on them. From the forgoing there is the dire need to explore the professional competencies needed by agricultural science teachers for effective task performance in senior secondary schools in Taraba State. The role of the teacher is to facilitate wholesome learning in school system, therefore the major task performed by teachers is teaching oriented.

Professional competency has been given several meanings; profession is an area of vocation for which a person can become an expert. Competency in the view of Gove in Alawa, Abanyam and Okeme (2010) is a quality or state of being functionally adequate of having knowledge, skill or strength. Olaitan (2003) stated that competency is knowledge ,skill and attitude one can develop in every aspect of life long occupation. It is the ability of an individual to do a job properly. Olaitan (2003) further commented

that by this it means that a teacher must possess the required competencies gained through years of training in order to impart the knowledge, skill and attitude to the learners.

It is established that there lies a strong relationship between teacher competence and effective teaching competence. This bears the mark of perception, values and belief that the individual carries when he enters teacher training programme. Kautto-Koivula (1993) reported that there has been increase argument about whether professional competency is best defined, and measure as a one dimensional concept or a multi-dimensional concept involving many distinct components. In profession where work is relatively homogeneous, there will be little confusion between statements of general and specific competence because one can be reliably inferred from the other. It is important to note that individual professional experience and personal characteristics are parts of professional competency and should not be undermined. The relationship and importance of different competence factors are very much dependent on the job and further professional requirements. Kirschner and Thijssen (2005) contended that professional competence is a cluster of person related qualities suitable to deal with in a setting manner. Their submission included three professional competence characteristics where a reasonable level of agreement exists, hence they purported that:-

a. Competency is person related, people possess different competencies in varying degree.
b. Competency is criteria related, different criteria must be defined and used to assess the acquisition of competency and
c. Competency is context related because it can manifest itself in different ways, beside, competency can be seen as the ability to perform satisfactorily the prescript job of an individual teacher in the school.

Computational competency entails the ability to process, communicate and interpret numerical information. Numeracy is the ability to process, communicate and interpret numerical information in a variety of context (keys, Harms and Fernandez 1996). Ball and Bass (2004) observed that without adequate computational skills, teachers will find the task of analyzing, interpreting and presenting students achievement data a more challenging one. Computational skills acquired through sound mathematical knowledge serves as an important pre-requisite knowledge for many field of study (Mewborn, 2001).

Obi (2008) stated that knowledge of pedagogical content is very important as it motivates and stimulates students in various fields of study .It transforms subject matter knowledge in teaching. To most scholars, subject matter knowledge is an indisputable foundation for development of pedagogical content knowledge (Rohaan, Taconis & Jochem, 2010) .According to Bransford (2005) pedagogical content knowledge allows a teacher to understand the aspect of the subject matter that can be grasped easily or may prove more challenging for the learners. The teacher must possess different level of pedagogical competencies as teachers are expected not only to impart knowledge but also to foster adjustment of students, understand students basic cognitive and social problems, match curricular offering to level of mental development, translate curricular specifications into relevance and provide smooth transition from home to school and from one level of education to another (Creemer, 1994).

Task performance is simply a term expressing how one carries out a given piece of work and the duration taken to carry out such a work. According to Olaitan (2003) for a task performance to be effective, an individual must have acquired the required knowledge, skill, attitude and judgement at a specified proficiency level in any given job. Actions which can be scaled and measured are considered to constitute task performance. Furthermore, the outcome aspect refers to the consequences or results of the individual behaviour. Task performance as a result of gap in teachers competence, curriculum instruction, learning facilities, resources, funding and weak institutional management (Ayeni, 2012). It is imperative for teachers to continually update their knowledge and skills for optimal performance on the job.

Purpose of the Study

The general purpose of the study is to determine the teaching competencies needed by Agricultural Science teachers for effective performance in senior secondary schools in Taraba State. The specific objectives are to determine:

(i) Computational competencies needed by Agricultural Science teacher for effective task performance in senior secondary schools in Taraba State.
(ii) Pedagogical competencies needed by Agricultural Science teacher for effective task performance in senior secondary schools in Taraba State

Research Questions

(i) What are the mean teaching computational competencies needed by Agricultural Science teachers and that which they possessed?
(ii) What are the mean teaching pedagogical competencies needed by Agricultural Science teachers and that which they possessed?

Null Hypotheses The following hypotheses were tested at 0.05level of significance.

Ho1: There is no significant difference in the mean response of Agricultural Science teachers and Principals on computational competencies needed and possessed by Agricultural Science Teachers.

Ho2: There is no significant difference in the mean response of Agricultural Science teachers and Principals on pedagogical competencies needed and possessed by Agricultural Science Teachers.

Methodology

A survey design was adopted for this study. The design is deemed appropriate for the study since it seeks to sample opinions of people within a defined population. The population of the study was 396 agricultural science teachers and 260 principals of senior secondary schools across the five education zones in Taraba state. The education zones include Gembu, Bali, Takum, Wukari and Donga.The population was clustered and stratified; purposive and simple random sampling techniques were adopted. The population was stratified into two (2) strata: agricultural science teachers and principals of senior secondary schools. Purposive sampling technique was used in selecting three educational zones to include Gembu, Bali and Takum, with a finite population of 440, out of which 276 were agricultural science teachers and 164 were principals. The sample size of 208 was obtained using Taro Yamane's formula for finite population as given by Uzoagulu (1998). 130 agricultural science teachers and 78 principals were used for data collection by simple random sampling technique, A structured questionnaire tagged professional competency needs questionnaire (PCNQ) was used to collect data the instrument was subjected to face and content validations by three experts in the faculty of education, Taraba state university Jalingo. To determine the internal consistency of the instrument, cronbach alpha was used. A trial test was carried out on 8 agricultural science teachers and 2 principals in government secondary school Dubeli and capital secondary school Yola. The Cronbach alpha was used to determine stability coefficient of the instrument, where 0.89 was obtained. To determine competencies needed and those possessed by Agricultural science teachers the data was analyzed using mean. Improvement Need Index (INI to answer research questions. Where (INI) is negative and zero it means not needed. This is because the level of performance is greater than the needs or equal to the needs. Where (INI) is positive (0.1-4.0) it means the level of performance is less than the needs therefore competency is needed. The null hypotheses (1-2) was tested by use of z-test of independent sample. The decision to accept or reject the null hypotheses was based on comparing the z-calculated and the critical value. If the z-calculated is greater than the critical t, the null hypotheses was rejected otherwise accepted.

Results

Research Question 1: What are the mean professional computational competencies needed by agricultural science teachers and that which they possessed?

The data collected on the computational competencies needed by agricultural science teachers for an effective teaching in learning are presented in Table 1

Table 1: Mean Ratings of Agricultural Science Teachers and Principals on Computational Competencies needed by the Teachers (N = 208, n_1 = 130, n_2 = 78)

S/No	Item Statement	Xn_1	Xp_1	Xn_1- Xp_1 (PG_1)	Xn_2	Xp_2	Xn_2- Xp_2 (PG_2)	Remark
1	Ability to organize data	3.09	1.68	1.41	3.03	1.44	1.59	CN
2	Ability to analyze students data	3.68	2.54	1.10	3.74	2.32	1.42	CN
3	Ability to interpret numeral	3.06	1.69	1.37	3.12	1.40	1.72	CN
4	Ability to use statistical tools	3.69	2.73	0.96	3.00	1.38	1.62	CN
5	Good records keeping	3.34	1.40	0.54	3.96	1.55	2.41	CN
6	Ability to represent students results using shapes	3.47	2.53	0.94	3.00	1.36	1.64	CN
7	Deep understanding of arithmetic	3.57	2.54	1.03	3.12	1.41	1.71	CN
8	Knowledge of measures of central tendencies	3.17	2.55	0.62	3.06	1.37	1.69	CN
9	Knowledge of scores dispersion	3.17	1.60	1.57	3.11	0.59	1.52	CN
10	Knowledge of standardized scores	3.49	1.76	1.73	3.89	1.62	2.27	CN

The mean responses of both the principals and the agricultural science teachers shows that all the 10 items were accepted as needed professional competencies in computation needed by agricultural science teachers for effective performance. The means shows that the agricultural science teachers rated items 2,4 and 7 as most highly needed skills with means of 3.63,3.69 and 3.57. while the principals rated items 2,5 and 10 as most highly needed skills with 3.74,3.96 and 3.89 means respectively

Research Question 2: What are the mean professional pedagogical competencies needed by agricultural science teachers and that which they possessed?

Table 2: Mean Ratings of Teachers and Principals on professional Pedagogical Competencies needed by Agricultural Science Teachers (N = 208, n1 = 130, n2 = 78)

S/No	Item Statement	Xn_1	Xp_1	Xn_1- Xp_1 (PG_1)	Xn_2	Xp_2	Xn_2- Xp_2 (PG_2)	Remark
1	Understanding of learners	3.81	1.70	2.11	3.59	1.70	1.89	CN
2	Understanding learning difficulties	3.83	1.69	2.14	3.00	1.42	1.58	CN
3	Utilization of wide range of teaching strategies	3.03	1.59	1.44	3.12	1.43	1.69	CN
4	Ability to plan curriculum	3.78	1.73	2.05	3.06	1.44	1.62	CN
5	Ability to plan instruction	3.94	1.62	2.32	3.99	1.53	2.46	CN
6	Ability to develop appropriate assessment technique	3.54	1.68	1.86	3.69	1.48	2.21	CN
7	Good classroom management	3.90	1.67	2.23	3.06	1.39	1.67	CN
8	Ability to manage time	3.86	1.66	2.20	3.89	1.58	2.34	CN
9	Ability to motivate and persuade others to learn	3.16	1.72	2.24	3.00	1.48	1.52	CN
10	Encourage class participation	3.82	1.57	2.25	3.69	1.51	2.18	CN
11	Use appropriate instructional materials							CN

12	Select appropriate practical tools	3.94	1.55	2.33	3.13	1.42	1.71	CN
13	Ask and allow student to ask questions	3.78	1.70	2.08	3.59	1.68	1.91	CN
14	Make good use of chalkboard	3.88	1.56	2.32	3.02	1.46	1.56	CN
15	Move around the class	3.10	1.89	1.21	3.45	1.59	1.86	CN
16	Psychomotor skills	3.99	1.59	2.40	3.12	1.46	1.66	CN

The data collected on pedagogical competencies needed by agricultural science teachers for an effective delivery in teaching and learning are presented in Table 2

The mean responses of both the principals and the agricultural science teachers shows that all the 16 items are accepted as needed professional competencies in pedagogy needed by agricultural science teachers for an effective task performance. The means shows that agricultural science teachers rated items 1,2,4,5,8,10,12,13,14 and 16 as most highly needed competencies with means of 3.81,3,83,3,78,3,94,3.86,3.82,3.94,3.87,3.88 and 3.99.while the principals on the other hand rated items 1,5,6,8,10,12,13,14 and 16 as the most highly needed competencies with 3.59,3.99,3.69,3.89,3.69 and 3.59 means respectively.

Null Hypothesis 1: There is no significant difference between the mean responses of teachers and principals on computational competencies needed and possessed by agricultural science teachers. To test hypothesis one the grand means and standard deviation were calculated to obtain Z value as indicated on Table 3.

Table 3: Z test of Mean Ratings of Agricultural Science Teachers and Principals on Computational Competencies needed by Agricultural Science Teachers**.**

Respondents	$\overline{X}$	SD	N	SE	Z-cal	Z-critical	Remark
Agricultural science teachers	3.37	1.62	130				
				0.219	0.319	1.96	NS
Principals	3.30	1.50	78				

Table 3: Showed that the Z calculated 0.319 is less than Z-critical at 1.96, therefore the null hypothesis three is upheld on the basis of no significant difference between the mean responses of the respondents any observed difference may be due to sampling error thus not significant.

Null Hypothesis 2: There is no significant difference between the mean responses of agricultural science teachers and principals on pedagogical competencies needed and possessed by agricultural science teachers. To test the hypothesis four, grand means and standard deviations were calculated to obtained the Z value as shown in Table 4.

Table 4: Z-test of Mean Ratings of Teachers and Principals on Pedagogical Competencies needed by Agricultural Science Teachers

Respondents	$\overline{X}$	SD	N	SE	Z-cal	Z-critical	remark
Agricultural science teachers	3.25	1.52	130				
				0.214	0.467	1.96	NS
Principals	3.15	1.48	78				

Table 4 showed that the Z calculated 0.467 is less than the critical Z at 1.96 level of significance, this gave the bases for accepting the null hypothesis. Any observed difference may be due to sampling error.

Findings of the Study

Based on the results obtained from the analysis of the data,

i. The study revealed that computational competencies are required by agricultural science teachers and above all the most highly needed found are; Use of statistical tools, Data analysis, Interpretation and adequate record keeping to ensure feedback on students learning outcomes.

ii. The finding also revealed that psychomotor skills, good classroom management, good use of chalkboard stand out among the most needed pedagogical competencies needed by Agricultural science teachers among others.

Discussion of Findings

The finding revealed the need for professional competencies on computational competencies, the decision making of the teacher hinges on available data on students' academic achievement or otherwise. The ability of the teacher to analyze, organize, interpret and record adequately students learning outcomes is of paramount importance. Knowledge of standardized scores and adequate record keeping form the most highly needed professional competencies needed in computational skills by the teachers of agricultural science. The finding is in agreement with Gentuck (2012) who disclosed that teachers computational competencies predicts the quality lesson design, students assessment, students results, data organization and overall classroom climate.

Researchers and practitioners are becoming increasingly aware that they characteristics of the 21st century classroom and the demand on both student and teachers has undergone significant changes, teachers should be competent in choosing assessment methods appropriate for instructional delivery because feedback on student learning out comes aid in the decision making of the teacher. He or she must be competent in administering, scoring and interpreting student learning outcomes which could aid in planning teaching, developing curriculum, school improvement and educational decision about individual student, the society at large and educational goals. This work is in consonant with Ayeni, (2012) who recommended improvement on instructional resource input, appropriate assessment of student learning outcomes as a major source of data for planning teaching programs in tandem with educational goals. From the ratings of both the principals and agricultural science teachers shows that the 10 items are accepted as needed competencies. Following the data presented and analyzed it can be concluded that the 6 outstanding skills are highly needed by the agricultural science teachers for effective task performance in senior secondary schools in Taraba state

Furthermore, the finding revealed a widespread need for professional competencies on pedagogical competencies. The use of wide range of teaching strategies is uncontestable because different topics require change of approach. The strategies should be modified to suit the learning condition at hand. This change of methodology is believed to sustained students interest all through. The use of questioning method in teaching is to ascertain if learning objective are met. In addition students are rewarded to reinforce good performance also recognition giving to individual students enable the teacher to carry all students along. Of all the professional competencies in methodology, classroom management, effective management of time and selection appropriate practical tools to suit teaching and learning process stand-out to be the most highly needed skills in pedagogy. This finding is in line with Obi (2008) who espoused the use of varieties of teaching strategies to teach agricultural science at the secondary school level.

The use of specialized teaching pedagogy to instruct students effectively has been applauded by many researchers. For instance, teachers use questioning techniques to sensitize and ascertain if learning objectives are met. In the same vein the use of demonstration methods of teaching is to aid students understanding by developing their manipulative skills in practical agriculture, this stems from the belief that the competence in teaching arises from the teachers capacity to reach out students with individual ability to learn. This is in agreement with the work of Obundike and Omeye (2014) who revealed that demonstration method is the best method for teaching practical agriculture at the secondary school level. Following the two ratings of the agricultural science teachers and principals shows that all the 16 items are accepted as needed competencies in pedagogy but 11 items stand-out to be the most highly needed. Therefore the data presented and analyzed so far shows that 11 items were found to be outstanding and highly needed for an effective delivery of the agricultural science teachers in senior secondary schools in Taraba state.

The Z-test of independent mean revealed no significant difference between the mean ratings of agricultural science teachers and principals for hypotheses (1-4). Thus the null hypotheses were accepted and conclusion drawn as to any observed difference is not statistically distinct and may be due to sampling error. This acceptance of the null hypotheses further concretized the level of agreement of the respondents on the need foremost of the professional competencies for effective teaching.

Conclusion

There is need for computational competencies. The entire decision making of the school system hinges on the available information obtained from students academic performance therefore, teachers must display the ability to harness the data obtained from student learning outcomes. Furthermore, is the pedagogical competencies that put the teacher at the centre stage, the strategies used in teaching can either facilitates or impede learning progress. Teachers are expected to adopt, adjust suitably in the application of strategies or methods they employ to ensure that the goals set for them and the one they set for themselves are realized. In addition agricultural science teachers are expected to create a level platform for all categories of students to learn according to their own capability. Lastly is the acceptance of the null hypotheses based on the Z-test of difference carried out, this further depicts the high level of agreement by agricultural science teachers and their principals on the competencies needed by agricultural science teachers to perform optimally on the teaching job.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. School administrators should invest in agriculture by establishing school farms where teachers will put their practical knowledge to use while students learn skills and attitudes in agriculture for future use
2. The State Government should provide enabling environment for teachers to acquire modern skills for computation of student's results through the use of computers for an accurate information

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