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Assessing In-Service Needs of Basic School Natural Science Teachers in New Juaben Municipality, Ghana

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Abstract This study investigated in-service needs of basic school Natural Science teachers in the New Juaben Municipality in the Eastern Region of Ghana. The study was to ascertain the in-service needs of 234 Natural Science teachers across gender. A questionnaire was used to collect data on the teachers' feedback on eight dimensions of science teachers' needs: generic pedagogical knowledge and skills, knowledge and skills in science subjects, managing and delivering science instruction, diagnosing and evaluating students, planning science instruction, administering science instructional facilities and equipment, integration of multimedia technology and the use of English language in science instruction. Data were descriptively analyzed, followed by chi square analysis. Results of the descriptive analysis demonstrate that the topmost in-service needs of Natural Science teachers were the acquisition of knowledge and skills in science subjects, generic pedagogical knowledge and skills and planning of science instruction. The chi square analysis did not yield significant association between gender and science teachers' needs in all dimensions except knowledge and skills in science subjects. It was recommended among others that in-service organisers need to assess the in-service needs of participants before providing INSET services.

Keywords*: in-service training, in-service Training needs, natural science, basic school*

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1. Introduction

Natural science was introduced into the basic science curriculum as part of the 2007 school reforms in Ghana. Currently, the crop of teachers who teach at the basic schools in Ghana is a mixed bag. Majority of these teachers possess Cert 'A' Post Secondary certificates with a few acquiring Cert 'A' 4-year. The others are holders of Diploma in Basic Education mostly from the colleges of education and graduates from the universities. Some of the schools also have pupil-teachers with senior high school, technical or vocational school certificates. Different types and levels of in-service may be needed for the different category of teachers. These variations in needs require a comprehensive assessment so as to identify specific needs of each identified groups.

In Ghana, basic school teachers who teach science consist of a high proportion of non- professional teachers who have little or no knowledge in science as well as generalist teachers with no subject specialty (UNESCO, 2011). Even though these teachers might have used various kinds of coping strategies and safety net in their teaching (Idris, 2002), they still need in-service training courses to teach science meaningfully and effectively. This is particularly so because Natural Science as an innovation in the school curriculum places a demand on the teachers. They are expected to learn new content and new teaching approaches to be able to teach effectively. To be successful in meeting the requirements of any curriculum innovation, teachers must not only know what types of changes are needed, but they must also have the tools and skills to implement the changes which can be achieved through in-service training (Fessler & Christensen, 1992). In-service training is a big opportunity for teacher development and for successful implementation of curriculum innovations (Uysel, 2012). Natural science is a curriculum innovation in the Ghanaian science curriculum and so if teachers' needs are identified and addressed it will lead to its effective implementation. It is for these reasons that a need assessment leading to in-service training programmes cannot be overlooked. According to Che Omar (2014), need analysis will identify teachers that need training and what training they will need.

The main aim of this study was to ascertain the in-service needs of basic school Natural Science teachers in the New Juaben Municipality. The study also sought to identify existing associations if any, in the Natural Science teachers' needs across gender. The study was guided by the following research questions:

1. What are the in-service needs of basic school Natural Science teachers?
2. What differences exist between the in-service needs of male and female teachers who teach Natural Science?

2. Literature Review

In developing countries especially on the continent of Africa, existing teaching force is under qualified (Kelani, 2009). One-third of existing teachers in sub-Saharan Africa are untrained with teaching practices focused on memorization, and poor materials and facilities (Leach, 2005). However, recent research has indicated that locally based training, properly resourced and supported, can be a highly effective form of professional development (Zhao & Franck, 2003).

According to Joerger (2002), access to appropriate and timely in-service education activities is critical to the initial success, effectiveness, continued development, and retention of teachers. Teachers who are prepared in progressive traditional teacher education programmes and continue their education through ongoing in-service education and other professional development activities help ensure elevated levels of personal satisfaction, student achievement scores and success (Darling-Hammond, 1999). Such in-service programmes also provide teachers with the ability for new thinking (Butt, 2014). Besides that in-service training also 'provide teachers with ample opportunities to learn new concepts, methods and approaches' (Che Omar, 2014, p. 2).

Claycomb and Petty (1983) are of the view that in-service education needs of teachers change over time. They further asserted that the in-service education needs of beginning teachers are, often different from those of experienced teachers. Training is therefore necessary to reorientate teachers to new goals and values, to prepare them to cope with curriculum change (Dutt, 2014) and to provide them with the knowledge and skills to teach new learning areas (Garton & Chung, 1997). Again, changing in-service education needs has also been attributed to the phase or stage of teacher development, differences in the backgrounds of teachers, pre-service preparation, teaching site and experiences of beginning teachers (Steffy, Wolfe, Pasch & Enz, 2000), changing attitudes about teaching (Moir, 1990), levels of pedagogical knowledge (Veenman, 1984), technical knowledge (Garton & Chung, 1997) and the domains of adult functioning (Bee & Bjorklund, 2000).

Also, teachers often experienced difficulty with various aspects of classroom management or discipline (Mundt & Connors, 1999, Joerger & Boettcher, 2000), student motivation (Garton & Chung, 1997; Mundt & Connors, 1999), as well as classroom and lesson organization and development (Camp, & Heath-Camp, 1994; Kazemi, & Ashrafi, 2014). Additional studies reveal that teachers have difficulty locating adequate teaching materials (Camp & Heath-Camp, 1994; Joerger & Boettcher, 2000). They also have difficulty understanding complex school or community systems and policies (Mundt & Connors, 1999). In his analysis of 83 studies from around the world, Veenman (1984) found that relationships with parents of students, insufficient time for preparation due to heavy teaching loads, relationships with colleagues and effective use of alternate teaching methods were high ranking problematic experiences of teachers. Other research findings reveal teachers have difficulty in changing and designing curricula to meet local needs (Edwards, & Briers, 2000; Mundt, 1991).

Teachers, regardless of certification method, have a continuing desire and need for in-service training to ensure that their skills are current and their subject content knowledge is up to date. Historically, education authorities have as part of their mission, function to identify and deliver relevant in-service workshops to teachers. However, the authorities often have had difficulties in identifying appropriate topics to include (Birkenholz & Harbstreit, 1987) due to lack of credible demographic data and academic and professional qualification of the teachers (Rakumako & Laugksch, 2010). This problem may be compounded by the influx of uncertified teachers who often possess more different backgrounds and experiences than traditionally certified teachers. Therefore, accurate data should be gathered and used in planning a successful in-service program. A needs assessment is one means of determining areas in which teachers desire help (Rossett, 1987). Identification of these perceived needs could have implications for in-service programs provided for teachers. This can best be achieved through needs assessment of the participating teachers. According to Camuzcu and Duruhan (2011), detailing these in-service training needs of teachers using scientific tools and methods leads to objective results. This is because the outcome of the needs analysis will lead to effective planning of in-service activities that address the expressed needs of the teachers.

3. Methodology

The research design employed in this study was a descriptive survey design using a questionnaire as the prime instrument. The survey design is chosen so that generalizations can be made from the samples representing the population (Creswell, 2005). Neuman (2000) argues that such an approach can be justified in terms of the nature of information gathered. This study garnered information on the Natural Science teachers' needs based on gender. The nature of such data justifies the suitability of the survey design employed.

3.1. Sample

All the basic school teachers who taught Natural Science in the 78 public primary schools in the New Juaben Municipality were purposively sampled for the study. The study therefore, involved 234 Natural Science teachers comprising 71 from the rural circuits and 163 from the urban circuits. Purposive sampling was employed since it deals with conscious selection of people of a particular set of attributes that have an effect on the problem or issue of interest and ensures comprehensive representativeness (Stringer, 1996; O' Lery, 1990).

3.2. Instrument

Questionnaire was the only instrument used in collecting data for the study. The instrument, the Science Teacher Inventory of Needs (STIN), developed by Zerub and Rubba (1983) was adapted for the study. The original instrument comprised 72 items categorised into eight dimensions. The instrument was modified to reflect the perceived instructional needs of primary school teachers who teach Natural Science in Ghanaian basic schools and it comprised 61 items.

The STIN instrument consisted of two sections, A and B. Section A sought information on the demographic

factors and academic background of the respondents while section B comprised 61 items pertaining to in-service needs of the science teachers. These needs were categorized as (i) management of science instruction (ii) diagnosing and evaluating students (iii) generic pedagogical knowledge and skills (iv) knowledge and skills in science subjects (v) administering science instructional facilities and equipment (vi) planning activities in science instruction (vii) integration of multimedia technology in science education and (viii) using English language in science teaching. Each item consisted of a stem follow by a five-point Likert type options ranging from (1) strongly required to (5) strongly not required.

3.2.1. Validity

Face validity of the instrument was established by lectures and colleagues. They reviewed the items with respect to wording, clarity and ease of response. Secondly, the instrument was field tested with forty primary school teachers in the in the East Akim Municipality. The construct validity of the instrument was established by employing the confirmatory factor analysis.

3.2.2. Reliability

Internal consistency (Cronbach Alpha) approach was employed to establish the reliability of the needs instrument. The alpha values spanned between 0.572 and 0.857.

3.3. Data Collection Procedure

Permission was obtained from the district director and unit managers to carry out the study in the schools under their jurisdiction. Letters from the latter were presented to the heads of the basic schools who in turn informed the teachers concerned about the intension to involve them in the study. The researcher on his first visit to the schools explained to the teachers sampled what they were expected to do. A date was then agreed upon for the questionnaire administration. On the agreed dates the researcher administered the questionnaires personally taking time to explain the intention of the study and the demands of the items in the questionnaire.

The respondents were assured that any data collected from them would be held in confidence. They were informed that identifying information of the participants written on the questionnaires would not be used in the text and data will be stored in a secure, private place. All the 234 questionnaires administered were successfully retrieved giving a retrieval rate of 100%.

3.4. Data Analysis

The data collected from questionnaires were descriptively analysed using Statistical Package for Social Sciences (SPSS version 16.0). Descriptive statistics was used to organise the data into frequency counts and converted to percentages to answer question 1. For research questions 2, chi square statistics was used to establish association existing between the science teachers' needs and gender using alpha < 0.05 level of significance. Ranking of percentage frequencies was used to determine the most required needs of natural science teachers and by gender.

4. Results

The demographic characteristics of the participants are reported in Table 1.

Table 1. Demographic characteristics of natural science teachers

Variable		Category/N			
		Male	**Percent**	**Female**	**Percent**
Gender		45	**19.2**	189	**80.8**
Age	< 21	1	**2.2**	12	**6.4**
	21-30	9	**20.0**	52	**27.5**
	31-40	12	**26.7**	48	**25.4**
	41-50	9	**20.0**	49	**25.9**
	> 50	14	**31.1**	28	**14.8**
	Total	45	**100**	189	**100**
Subject area of Specialisation	Science	18	**40.0**	27	**14.3**
	General Arts	10	**22.2**	64	**33.9**
	Vocational	2	**4.4**	44	**23.3**
	Technical	7	**15.6**	5	**2.6**
	Business	8	**17.8**	49	**25.9**
Total		**45**	**100**	**189**	**100**
Professional Qualification	Certificate A	6	**13.3**	43	**22.8**
	Diploma	20	**44.4**	73	**38.6**
	B. Ed.	14	**31.1**	63	**33.3**
	None	5	**11.1**	10	**5.3**
	Total	**45**	**99.9**	**189**	**100**
Teaching Experience	<1 year	5	**11.1**	23	**12.2**
	1-3 years	12	**26.7**	26	**13.7**
	4-6 years	10	**22.2**	27	**14.3**
	7-10 years	8	**17.8**	31	**16.4**
	>11 years	10	**22.2**	82	**43.4**
	Total	**45**	**100**	**189**	**100**

The female participants (80.8 %) were more than their male counterparts (19.2 %). The ages of the participants ranged between less than 21 to 50 years with 61 % of them within the 21 to 30 years range. All the participants were professional teachers of various categories. However, only 19.2 % were professional science teachers. This reflects the position of basic school teachers in science. Science teachers are always in the minority in Ghanaian basic schools Ministry of Education, 2013). Further details on the participants are provided in Table 1. The rest of the findings of the study are presented along the pattern of the research questions.

Research question 1

What are the in-service needs of basic school Natural Science teachers?

This question sought to identify the in-service needs of basic school teachers who participated in the study. In the analysis, needs that were 'strongly required' and 'required' were categorized as 'required' while those that were 'strongly not required' and 'not required' were categorized as 'not required'. The teachers' responses were organized into frequency counts and then converted into percentages and presented in Table 2. The teachers considered all the dimensions as important needs required for effective teaching and learning of Natural Science in the basic school. Level of needs not required, ranged between 8.6% and15.4%, those moderately required range between 6.4% and10.0% while those required range between 75.2% and 93.6%. The observation is that higher percentages were obtained under the 'required' category.

From Table 2, the most required need was knowledge and skills in science subjects (93.6%). This was followed by generic pedagogical knowledge and skills dimension (84.1%).

Table 2. Ranking of Respondents' level of in-service needs for each dimension

Ranking	Dimensions	Level of needs		
		Not Required % (freq)	Moderately Required %(freq)	Required %(freq)
1	Knowledge and skills in Science subjects	4.3(10)	2.1(5)	93.6(219)
2	Generic pedagogical knowledge and skills	8.6(20)	7.3(17)	84.1(197)
3	Planning of science instruction	10.3(24)	6.4(15)	83.3(195)
4	Integration of multimedia technology	9.0(21)	10.0(23)	81.0(190)
5	Administering science instructional facilities and equipment	12.0(28)	9.0(20)	79.0(186)
6	Managing and delivering science instruction	14.0(32)	9.0(21)	77.0(181)
7	Diagnosing and evaluating students for science instruction	15.4(36)	9.4(22)	75.2(176)
8	Use of English language in science teaching and learning	15.4(36)	9.4(22)	75.2(176)

The third most required need or dimension was planning of science instruction (83.3%) which was followed by integration of multimedia technology dimension (81.0%). The least needs required by the Natural Science teachers were diagnosing and evaluating students for science instruction (75.2%) and the use of English language in science teaching and learning (75.2%).

The indication from Table 2 is that the Natural Science teachers are conscious of their deficiencies with regards to the knowledge and skills required for teaching Natural Science hence, their desire for assistance in the various skills required for teaching science.

Research question 2

What differences exist between the in-service needs of male and female teachers who teach Natural Science?

The question sought to determine whether in-service needs of rural Natural Science teachers were different from those of urban teachers. The responses of the sample were categorized into 'required', 'moderately required' and 'not required'. The frequency counts of teachers' responses for each category of responses were converted to percentages followed by subsequent Chi Square measure of association. The results of the analysis are presented in Table 3.

Table 3. Respondents' level of in-service needs for each dimension according to gender

Dimension	Variable	Not Required %(freq)	Moderately Required %(freq)	Required %(freq)	x^2	P
Managing and delivering science instruction	Male	13.0(6)	9.0(4)	78.0(35)	2.957	.587
	Female	13.0(25)	9.0(17)	78.0(147)		
Diagnosing and evaluating students	Male	18.0(8)	11.0(5)	71.0(32)	4.477	.459
	Female	15.0(29)	10.0(18)	75.0(142)		
Generic pedagogical knowledge and skills	Male	9.0(4)	9.0(4)	82.0(37)	4.024	.471
	Female	8.0(16)	7.0(13)	85.0(160)		
Knowledge and skills in Science subjects	Male	9.0(4)	0.0(0)	91.0(41)	16.141	.003**
	Female	15.6(7)	6.6(3)	77.8(35)		
Administering science instructional facilities and equipment	Male	11.1(5)	6.7(3)	82.2(37)	3.997	.460
	Female	10.1(19)	6.3(12)	83.6(158)		
Planning of science instruction	Male	11.1(5)	8.9(4)	80.0(36)	3.873	.550
	Female	8.0(16)	11.0(20)	81.0(153)		
Integration of multimedia technology	Male	11.1(5)	8.9(4)	80.0(36)	4.217	.488
	Female	8.0(16)	11.0(20)	81.0(153)		
Use of English language in science teaching and learning	Male	22.0(10)	11.0(5)	67.0(30)	8.117	.304
	Female	13.7(26)	9.6(18)	76.7(145)		

* significant at $p < .05$.

From Table 3, level of needs not required, range between 8.0% and 22.0 %, those moderately required range between 0.0% and11.0 % while those required range between 14.1% and 95.1%. Table 3 also revealed that most female teachers demonstrated a higher requirement for six out of the remaining seven dimensions of needs. Similar level of needs was demonstrated in only one between male and female Natural Science teachers. The results indicated no associations between gender and Natural Science teachers' needs in all dimensions except knowledge and skills in science subjects.

Comparison between male and female respondents showed that for both genders, the percentage of responses received on a required need is similar (78.0%) under managing and delivering science instruction dimension. Chi-square analysis revealed that there is no significant association identified in managing and delivering science instruction dimension and gender ($x^2 = 2.957$; $p>.05$). This means that the percentage of female teachers indicating this dimension did not differ significantly from their male counterparts. Table 3 also reveals that75.0% of female Natural Science teachers require assistance in diagnosing and evaluating their students, while 71.0% of their male counterparts expressed the same need. In contrast, 18.0% of male teachers and 15.0% of their female colleagues felt they had already acquired the necessary skills in diagnosing and evaluating students. Chi-square analysis showed that there is no significant association between gender ($x^2 = 4.477$; $p>.05$) and science teachers' in-service needs with reference to diagnosing and evaluating

students. This denotes the fact that female teachers needs in assessing their students did not differ significantly from male teachers.

In the acquisition of generic pedagogical knowledge and skills dimension, Table 3 indicated that female teachers (85.0%) compared to 71.0% of their male counterparts expressed higher requirement for this need. However, minority of the teachers (female = 13.0%; male = 18.0%) felt that such a need is not required. Chi-square analysis established that no significant association exists between the acquisition of generic pedagogical knowledge and skills dimension and gender. This indicates the fact that the needs of female teachers in the acquisition of generic pedagogical knowledge and skills did not differ significantly from their male counterpart.

A high percentage of male teachers (91.0%) required assistance in acquiring knowledge and skills in science subjects compared to 77.8% of their female counterparts. A chi-square analysis carried out established an association between gender and science teachers in-service needs ($x^2 = 16.141$; $p<.05$). This means that a high percentage of female teachers indicating their requirement for assistance in acquiring knowledge and skills in science subjects differ significantly from the male teachers.

With reference to administering science instructional facilities and equipment dimension, Table 3 revealed that there is no significant association between gender and science teachers' in-service needs ($x^2 = 3.997$; $p>.05$). Majority of the science teachers portrayed that they require support in administering science instructional facilities and equipment. Specifically, female teachers demonstrated a higher percentage (83.6%) compared to their male colleagues (82.2%) in expressing their requirements for such support.

In planning science instruction dimension, no association exist between gender and science teachers' needs ($x^2 = 3.875$; $p>.05$). It was found in Table 3 that 81.0% of female teachers compared to 80.0% of male teachers, required assistance with regard to planning of science instruction. Further analysis of the findings revealed that 8.0% of female teachers felt that such a competency is not needed as opposed to male teachers who displayed a higher percentage of 11.1%.

In the integration of multimedia technology dimension, no association exist between gender ($x^2 = 4.217$; $p>.05$) and perceived science teachers needs. Both female and male teachers felt that they require such skills (female = 81.0%; male = 80.0%). For both genders, only a low percentage felt that such a skill is moderately needed (female = 11.0%; male = 8.9%) or irrelevant and hence, unimportant (female = 8.0%; male = 11.1%). From Table 3, there was no significant association identified in the use of English language in science teaching and learning dimension and gender. 76.7% of female teachers required help in mastering English language compared to their male counterparts (67.0%). As much as 22.0% of male teachers and 13.7% of female teachers however, indicated that this was not required.

It could be deduced from Table 3 that that no significant associations exist between gender and science teachers' needs in all dimensions except knowledge and skills in Science subjects. This is evidenced when results for the other seven dimensions show that the in-service needs of male Natural Science teachers are similar to the in-service needs of their female counterparts. It also implies that knowledge and skills in Science subjects affects male and female teachers' perception of the importance of planning effective science instruction.

5. Discussion

This study sought to identify the in-service needs of basic school teachers who teach Natural Science in the New Juaben Municipality. The study also sought to identify existing associations, if any, in the science teachers' in-service needs across gender.

Data was collected from 234 primary school teachers using a questionnaire. The questionnaire sought feedback on the eight dimensions of science teachers' needs: generic pedagogical knowledge and skills, knowledge and skills in Science subjects, managing and delivering science instruction, diagnosing and evaluating students, planning science instruction, administering science instructional facilities and equipment, integration of multimedia technology and the use of English language in science instruction. Descriptive statistics was used to organize the data into frequency counts and percentages while chi square statistics was used to establish any association between the independent variables and the dimensions.

This section discusses into details the results of the study with regard to the research questions set to guide the study.

5.1 In-service Needs of Basic School Natural Science Teachers

Findings with regard to research question one revealed that the topmost priority needs of Natural Science teachers are the acquisition of knowledge and skills in science subjects, generic pedagogical knowledge and skills, and planning of science instruction. Additionally the respondents indicated that they required assistance in the integration of multimedia technology in science teaching. The least needs required by the Natural Science teachers however, were diagnosing and evaluating students for science instruction and the use of English language in science teaching and learning.

The study revealed that the Natural Science teachers are cognisant of their deficiencies with regards to the knowledge and skills required for teaching Natural Science hence, their desire for assistance through in-service training. According to Laugksch, Rakumako, Manyelo and Mabye (2005), the role of teachers' pedagogical knowledge and skills in their subject area is acknowledged to be a key factor among the many factors that influence achievement in the Natural Sciences. One major objective of in-service education and training (INSET) programmes is improving the quality of elementary science teaching and learning which has become a serious national concern to many countries (Kusalin, 2007; Abu Bakar, & Tarmizi, 1995; Harlen, 1998; Ogan, 2002).The high requirement for knowledge and skills in teaching science subjects indicated by the teachers may be attributed to the fact that majority (80.8%) of the Natural Science teachers have a non-science background. In-service training will therefore be required

to increase their confidence as regards the syllabus content, to introduce them to innovative teaching methods and to provide material support and a forum for sharing ideas and experiences (Luchini, 2010).

Additionally, the respondents indicated that they required assistance in the integration of multimedia technology in science teaching as one of the topmost required skills. The findings agree with previous studies (Beasly, 2000; Layfield & Dobbins, 2002; Osman et al., 2006). According to Layfield and Dobins (2002) the top five competencies in need by South Carolina experienced agriculture teachers included the use of computers and other multimedia equipment in teaching. Osman et al. (2006) also found out that one of Malaysian teachers' prominent needs was integrating multimedia technology in science lesson. Another study conducted by Beasley (2000) also disclosed that teachers' greatest need for in-service training in the Philippines was upgrading teachers' competencies in hands-on operation of modern technologies such as computers. These findings however, contradict the study carried out by Abu Bakar and Tarmizi (1995). Their study indicated the use of the internet and computers as the least needed in-service courses by respondents in the State of Delware.

The indication of integrating multimedia technology in science instruction as one of the topmost needs of the Natural Science teachers may be attributed to teachers' cognisance of the importance of ICT in every facet of human activities. In this context, the teachers' main concern is how they could use multimedia technology towards a more exciting yet significant science lessons. The Government‘s policy on Information and Communications Technology (ICT) in instruction demands a comprehensive ICT training for all teachers with the hope that teachers would be confident computer users who would be able to apply ICT to their content areas (Ministry of Education and Sports, 2006).

The current provision of ICT training in our educational institutions, especially the pre-tertiary institutions, has been fragmented, unregulated and not coordinated (Ministry of Education and Sports, 2006). Most of the colleges of education responsible for training majority of the basic school teachers have inadequate computers and a few computer science teachers. Although there is a unified course content being used by schools for ICT training, those of the colleges of education are not adequate (Anamuah-Mensah, Mereku & Ampiah, 2008). A continued programme of in-service training can provide teachers with the support they may need in technology usage (Wright, Rice & Hildreth, 2001). The lack of computers in the colleges of education does not allow pre-service teachers to engage in certain cognitive activities such as carrying out scientific procedures, studying natural phenomenon through simulation, looking up information, analyzing data and solving real life problems (Anamuah-Mensah et al, 2008). Although most Natural Science teachers have gone through courses in ICT during their training, many of them still felt incompetent and hence need much support in this aspect. Recently, the government reiterated its commitment to extend computers to all schools in the country in the news media. The government also emphasized its commitment to promote equitable ICT in the school system so that all pupils will equally benefit from ICT regardless of their geographical location. The successful implementation of such a policy would be a great achievement in the educational system. However, existing inequality, poor infrastructure and the nation's present economic situation is likely to pose a challenge to implementing equitable ICT in the school system (Mfum-Mensah, 2010). The current supply of computers to basic schools by the Ministry of Youth and Sports offers Natural Science teachers the opportunity to utilize computer software and applications in teaching basic scientific concepts in science.

The study indicated that one main concern of the Natural Science teachers is proper planning of science instruction. This finding supports the findings of previous researchers (Birkenholz & Harbstreit, 1987; Garton & Chung, 1996, 1997; Mundt, 1991; Mundt & Connors, 1999; Osman et al, 2006) who established that, planning is a challenge many new teachers experience. The main concern about planning may be rooted in the teachers' tendency to encourage their pupils to learn science. The teachers are aware of the existence of a wide spectrum of children's abilities which requires teachers to make their lessons interesting and attractive especially for children with low ability levels (Osman et al, 2006). Another plausible reason for the concern in planning instruction may be associated with large class size brought about by the government policy of increasing access to education for all school going children. The inception of the capitation grant to all schools as well as the school feeding programme has brought in its wake an increase in school enrolment with subsequent increase in class size which demands proper planning of instruction for effective teaching and learning.

In addition, the results indicated the use of English language in science teaching and learning as one of the least needs required by the Natural Science teachers. This contradicts the findings of the study carried out by Osman et al, (2006). According to Osman et al (2006) the use of English language in teaching science was considered as priority need by Malaysian science teachers. Considering the use of English language as not a priority need by Natural Science teachers is not surprising since the National Literacy Acceleration Programme (NALAP) stipulates that 80% of instruction in the lower primary should be in the local language of the child (Hartwell, 2010). The use of Ghanaian language in teaching science at the lower primary could be the reason why the use of English language was one of the least required needs. According to Bamgbose (1991), when pupils begin school in a language they know well (i.e. the language they speak at home often referred to as mother tongue), they can understand what is being taught and can learn to read and write; and once these skills had been developed, they can learn the official or the national language used at the higher levels of education of the area. Furthermore, the scientific concepts expected to be taught at this level are not complex.

5.2. Differences in the In-service Needs of Male and Female Natural Science Teachers

Findings with regards to research question two showed that no significant associations existed between gender and science teachers' needs in all dimensions except

knowledge and skills in science subjects. In a study conducted by Osman et al (2006) it was reported that teachers' gender was associated with their perception towards upgrading their knowledge and skills in science subjects, as well as generic pedagogical knowledge and skills required for effective science instruction.

The study further revealed that apart from Managing and delivering science instruction, where both genders expressed equal requirements for assistance, female Natural Science teachers expressed greater needs in all the other dimensions compared to their male counterpart. This finding agrees with that of Osman et al (2006). In their study, it was realized that Malaysian female teachers required more attention in equipping themselves with the skills in all dimensions identified. This situation has a serious implication for Natural Science teaching since majority of the Natural Science teachers (80.8%) are females (see Table 1) with only 14.3 % professional science teachers. Also, 43.3 % of the females were in their eighth year of teaching when natural science was introduced in basic schools in 2007. These facts about them further strengthen their need for in-service training in all the dimensions.

6. Conclusion

Based on the findings of the study, the following conclusions were made: The study established the fact that Natural Science teachers in the New Juaben Municipality have various needs that require immediate attention by those involved in designing and implementing in-service education and training (INSET). Except for the acquisition of knowledge and skills in science subjects, no associations existed between gender and Natural Science teachers' needs in all dimensions. Female Natural Science teachers in New Juaben Municipality demonstrated higher demand for assistance under the entire dimensions of needs.

7. Recommendations

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

1. INSET organizers need to assess the in-service needs of participants in the New Juaben Municipality before providing INSET services. The specific in-service needs with the highest ranking should be given priority when planning and developing INSET programmes for Natural Science teachers in the municipality. The current situation where in-service activities are usually structured on the basis of the observations of INSET providers and the requests of educational administrators, without consulting teachers to identify their priority in-service needs ought to be discarded. When teachers are not consulted about their work environments, and planners assume that they know what is best for teachers, teacher morale suffers, in-service programmes are poorly attended, and achievement is scarcely influenced (Baird & Rowsey, 1989).
2. The fact that female Natural Science teachers in the New Juaben municipality expressed greater needs in majority of the dimensions compared to their male counterpart suggest that there is a need for an effective in-service training programme based on gender. A gender based INSET directed towards meeting the needs of the teachers concerned are therefore recommended for Natural Science teachers in the Municipality. As highlighted by Baird and Rowsey (1989), teachers have been complaining that much time spent in INSET activities is wasted when such programmes were not applicable to their classroom needs. Without accurate data on teacher's needs, planning will definitely be difficult and results are likely to be disappointing not to the teachers, but also to those who deliver the in-service programmes.
3. The fact that Natural Science teachers in the New Juaben municipality who do not have science as their area of specialization require more assistance than their science counterparts calls for a pragmatic effort to organize in-service training with the view of bridging the gap between science and non-science teachers in the municipality. The current situation where majority (80.0%) of Natural Science teachers in the municipality are non-science teachers emphasise the need to carryout needs assessment study among Natural Science teachers so as to put interventional measures to address their needs.

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