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Competency Gaps among Geography Teachers in the Teaching of Geography Mapwork in Secondary Schools in Kogi State

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Abstract
This study was aimed to identify the competency gaps among geography teachers in teaching mapwork in Kogi State secondary schools. The study was carried out in Idah, Dekina and Ankpa Education Zones of Kogi State and it involved 120 geography teachers in all the 196 secondary schools in the zones. The study was guided by six research questions and two hypotheses. Data was collected through questionnaire that was administered to 120 geography teachers in the study area. In order to answer the research questions, weighted mean and competency needed index (CNI) was employed in analyzing the data for the competency cluster questionnaire items. The formulated null hypotheses for the study were tested using the T-test statistics. The findings of the study revealed that: (1) there are competencies needed by geography teachers in teaching of mapwork in secondary schools. (2) Some geography teachers do not possess some of the competencies needed in teaching of mapwork in secondary schools. (3) There are competency gaps among geography teachers that need to be filled for teaching of mapwork in secondary school

Introduction.

The development of any environment and society is undertaken by persons with correct and appropriate knowledge, skills and attitudes as well as commitment to high values. At the secondary school level in Nigeria, many subjects are taught with the aim of providing students with basic skills and knowledge for self reliance in the society or to prepare them for further studies. Geography is one of the secondary school subjects taught at the secondary school level in Nigeria (FRN; 2004).

Harm (1999) opines that education that does not include geography will have a lot of social cost among which include: deprivation of young students of early awareness of spatial relationships; denial of students their early exposure to maps and their uses; and it engenders a geographic illiteracy that will last till adult hood among others. Functional geography education refers to the application of geographic knowledge and related skills to problem solving efforts in the environment. The acquisition of professional qualification and related skills in Geography equips an individual for self employment and related business opportunities. This is the purpose of geography education as stated in the National Policy on Education which includes among other things the acquisition of appropriate skills and development of mental, physical and social abilities and competencies required by an individual to contribute to the development of the society (FRN; 2004).

In consideration of the importance of geography, Nigerian Educational Research and Development Council (NERDC) produced a new geography curriculum to ensure continuity and flow of themes, topics, experience from senior secondary school one to senior secondary school three levels (NERDC,2007), before which the Junior Secondary School Social Studies is expected to have laid the necessary foundation. At the senior secondary school education level, the geography curriculum comprises of Physical, Human, Regional and map reading components. Among the different components of geography, mapwork stands out very significantly.

According to Sarah, 2001; maps are not the whole of geography, but there can be no geography without them; Hartshorne (1939) states that the use of maps in geographic works is so important that it seems fair to suggest that if the problem cannot be studied fundamentally by maps, then it is questionable whether or not it is within the field of geography. Haggett (1989) expressed the same sentiment even more directly and succinctly that geography is art of map able. Ofomata (2006) opines that maps aid the achievement of objectives of geography – as the map is the distinctive tool of the geographer. All these are pointers to the fact that well known geographers often define geography around maps and map use.

Maps are therefore very important in senior secondary school Geography. Knowledge, Skills and competencies acquired in map associated teaching/learning facilitate effective teaching and learning of other aspects of senior secondary school geography. It is equally with maps that spatial relation and spatial forms can best been seen and analysed. It also facilitates the understanding of Global Positioning Satellite (GPS) and Global Information System (GIS) based systems which are the modern navigational technologies that appear in our everyday life (Wigglesworth, 2003). These technologies are key research and communication tools for geographers. They have significantly increased interest in geography as the growing importance of maps is rising among geographers, psychologists and cognitive scientists in spatial thinking; the kind of thinking that under pins map reading and interpretation (Sarah, 2001).

Unfortunately, mapwork has posed a great threat to effective geography education in secondary schools

and weakened the morale and enthusiasm of students of Geography, thus leading to high rate of poor performance of Geography in Senior Secondary School Certificate Examinations for years now.

Assessment of students' knowledge, indicate that students are not competent map users. For instance, analysis of the National Assessment of Educational Progress (NAEP; 2001) geography exam reveal that at every level, test items that required students to use and interpret maps were most challenging as the most difficult items required map interpretation, construction or use. Also, WAEC chief examiners reports (2004, 2005, 2009 and 2010) show that questions on map reading aspect of geography were poorly attended by the candidates. According to the reports, the candidates lacked knowledge of drawing of cross profile and interpretation of maps; most candidates could neither draw an annotated cross profile nor determine inter-visibility between relief and transportation network or give reasons for the sparse population of the mapped areas.

The reports also explained that the consistent poor mapwork exhibition by candidates has resulted to their poor grades in geography. The reports attributed these poor grades of the candidates among other things to incompetency and non-qualification of geography teachers. WAEC; (2004) observes that social studies graduates, geologists and OND/HND graduates in Town and Regional Planning are engaged to teach geography in secondary schools. This, to researcher's point of view could cause competency gaps among geography mapwork teachers.

According to Nnawugwu (2010), there are several areas of skills in mapwork. These include: basic skills: (which involve labeling and annotation of diagrams, maps, graphs, sketches etc), drawing sketches from photographs and in the field, use and interpretation of aerial / oblique and satellite photographs of rural / or urban landscapes; cartographic (map) skill: (skills in recognizing and describing distributions and patterns of both human and physical features) Also the drawing, labeling, understanding and interpretation of sketch maps are required. Others include ordinance survey map reading skills; graphical skills (skills to construct line, bar, scatter graphs, and pie diagrams, completion of a variety of graphs and maps including choropleth, isoline and proportional symbols). Interpretation of a variety of graphs including those located on maps and topological diagrams.

In translating these skills requirement into the context of the classroom, teachers of geography should demonstrate their competencies in knowledge and skills while teaching mapwork. Olaitan, Alaribe and Nwobu (2009) note that when a teacher of a subject is unable to demonstrate competencies while implementing the subject curriculum, to a level that is acceptable, then the teacher lacks competence and requires improvement in that regard. The geography teacher who lacks competence in the teaching of mapwork has a gap to be filled for effective teaching and learning of mapwork in geography. The gap is the difference between the task the teacher is expected to perform and the level to which the teacher could perform the task in teaching mapwork, which otherwise is the competency gap. Could the competency gaps among geography teachers be identified in the teaching of mapwork in secondary schools?

Purpose of the Study

The general purpose of the study is to determine the competency gaps among geography teachers in the teaching of mapwork in secondary schools in Kogi State. Specifically, the study intends to:

1. Identify the competencies needed by geography teachers in the teaching of geography mapwork in secondary schools.
2. determine the competencies possessed by geography teachers in the teaching of geography mapwork in secondary schools.
3. find out the competency gaps that geography teachers need to fill in the teaching of geography mapwork in secondary schools.

Research Questions

The following research questions guided the study:

1. What are the competencies needed by teachers in the teaching of geography mapwork in secondary schools?
2. What are the competencies possessed by geography teachers in the teaching of mapwork in secondary schools?
3. What are the competency gaps among geography teachers that need to be filled in the teaching of mapwork in secondary schools?

Design of the Study

The design of the study is an evaluative design. Evaluative design according to Ali, A. (2006) uses sample of an investigation to explain what is in existence or non- existent on the present status of phenomena being investigated. The design is suitable for the study because the competencies needed and possessed by geography teachers are investigated to show competency gaps to be filled for effective teaching of geography

mapwork in secondary schools.

Area of the Study

The study was carried out in three Education Zones of Kogi State (Idah, Dekina and Ankpa Education Zones). In Idah Education Zone, there are four local government areas (Idah, Ibaji, Igalamela/Odolu and Ofu Local Government Areas). In Dekina Education Zone, there are two Local Government Areas (Dekina and Bassa Local Government Areas). And in Ankpa Education Zone there three Local Government Areas (Ankpa, Omala and Olamaboro Local Government Areas). The zones comprise of predominantly civil servants, majority of which are primary and secondary school teachers. The choice of the area of study is due to the recorded consistent poor performances of students in geography mapwork in the WASC/NECO Exanimations in the secondary schools in the zones.

Population of the Study

The target population of the study is all the senior secondary school geography teachers in Idah, Dekina and Ankpa Education Zones of Kogi State. Available records show that there are 205 geography teachers in the Zones (Ministry of Education, Idah, Dekina and Ankpa Zonal Offices, 2012). The estimated population of students offering geography at the senior secondary school level is 3,590 students in the 195 secondary schools in the zones. The choice of geography teachers as the population of the study is the fact that they will provide the responses to the questionnaire in the area of competences possessed or not possessed by them.

Sample and Sampling Technique

The representative sample of 120 geography teachers was randomly selected from the secondary schools in the study area. A stratified random sampling was used to select respondents from all the secondary schools in the study area.

Instrument for Data Collection

The researcher developed instrument which was used in data collection. It is titled "Competency Gaps among Geography Teachers in Map Reading (CGGTMR)" The instrument was developed by identifying the skills required in map reading and then constructing items that can indicate the teachers possession or non-possession of competencies in teaching the skills identified in literature. The teachers were required to indicate their competency/non-competency levels in imparting the stated mapwork skills on a 4-point likert type scale of Very Highly Possessed, Possessed, Not Possessed and Not Very Slightly Possessed with the corresponding value of 4, 3, 2 and 1 respectively. Also, the needed response category has a rating scale of Very Highly Needed (4 points), Needed (3 points), Not Needed (2 points) and Not Very Slightly Needed (1 point).

Validation of the Instrument

The developed instrument was validated by three science education specialists in the Departments of Science Education and Social Science Education, University of Nigeria, Nsukka. Two of them are specialists in measurement and evaluation and one in geography education. The research topic, purpose of the study and research questions and the constructed instrument were given to them for scrutiny. They were required to examine the instrument in terms of level of language of expression, ambiguity, duplication of statement relevance of items to research purpose and research questions and the adequacy of the items among others. The comments and suggestions of the validates were used in producing the final copy of the instrument for data collection.

Reliability of the Instrument

The reliability of the instrument was determined using Cronbach's Coefficient alpha reliability method. Twenty copies of the instrument were administered on twenty geography teachers in Okene Education Zone of Kogi State which is outside the study area. Their scores on needed and possessed competencies were obtained. The differences in the needed and possessed competencies which were the competency gaps among the geography teachers were noted. The scores were split in to two equal half. The split half scores of the instrument were correlated to find the coefficient of internal consistency and a reliability coefficient of 0.98 was obtained.

Method of Data Collection

The instrument was administered directly by the researcher and three research assistants to geography teachers in the area of study. The teachers from each school in the area of study were required to complete the questionnaire on the spot, and it was collected back from them by either the researcher or his research assistants. This ensured a high rate of return of the copies of the questionnaire.

Method of Data Analysis

Weighted Average and competence needed index (CNI) were employed in analyzing the data from the competency cluster questionnaire items in order to answer the research questions. The competencies needed were determined as follows:

The mean (Xn) of the needed category was determined for each item.

The mean (Xp) of the possessed category was determined for each item.

The competency gaps (CG) among the geography mapwork teachers were also determined by finding the difference between Xn and Xp. That is, CG=Xn-Xp.

Where the value of CG is positive (+ve), it means competency improvement is needed because the level at which the teachers are performing in teaching the item is lower than what is needed. Where CG is negative (-ve), it means competency improvement is not needed because, the teachers possess teaching competencies more than what is required; but where CG is zero (0), it means competency improvement is also not needed because the level at which the teachers are teaching geography mapwork is equal to the level that is needed.

In making decisions on the needed and possessed competencies by the geography teachers, where the mean response value falls between 1-1.49, it is interpreted as Not Very Slightly Needed or Not Very Slightly Possessed; where the mean response falls between 1.50-2.49, it is interpreted as Not Needed or Not Possessed. Also, where the mean response falls between 2.50- 3.49, it is interpreted as Needed or Possessed and where the mean value falls between 3.50-4.00, it is interpreted as Very Highly Needed or Very Highly Possessed as the case may be.

Results

This chapter was presented according to the research questions and the hypotheses that guided the study.

Research Question One: What are the competencies needed by geography teachers in the teaching of mapwork in secondary schools?

Table 1: mean analysis of competencies needed by the geography teachers

Items	Competency Skills in Geography Mapwork	N	Mean	Std. Dev.
item1	Conversion from one type of scale to another.	3	4.00	.000
item2	Measuring distance on map.	3	4.00	.000
item3	Correct calculation of actual distance on a map.	3	4.00	.000
item4	Making a statement scale.	3	3.00	.000
item5	Writing Representative Fractions to be converted to Statement Scale.	3	3.00	.000
item6	Conversion of Representative Fractions to Statement Scale.	3	3.00	.000
item7	Conversion of Statements scale to Representative Fractions.	3	3.00	.000
item8	Conversion from Linear Scale to Representative Fraction.	3	3.33	.577
item9	Conversion from Statement scale or Representative Fraction to Linear Scale.	3	3.00	.000
item10	Skills in using thread for measurements on maps.	3	3.67	.577
item11	The skills in use of pair of dividers to measure distance on maps.	3	3.67	.577
item12	Calculation of actual distance on land from measured distance on map.	3	3.67	.577
item13	Determination of actual distance from a Linear Scale.	3	3.00	.000
item14	Reduction of map by any given scale factor.	3	4.00	.000
item15	Enlargement of a map by any given scale factor.	3	3.67	.577
item16	Insertion of features in an enlarged map.	3	3.67	.577
item17	Insertion of features in a reduced map.	3	4.00	.000
item18	Measurement of bearing of one point from another.	3	3.67	.577
item19	Calculations of gradients between any two points on a map.	3	4.00	.000
item20	Determination of the area of a map.	3	3.67	.577
item21	Determination of inter visibility between any two points on the map.	3	4.00	.000
item22	Drawing the cross profile of any relief features on a map.	3	4.00	.000
item23	Accurate calculation of the vertical exaggeration of any given relief profile.	3	4.00	.000
item24	Accurate identification of conventional signs used on contour maps.	3	3.67	.577
item25	Identification of conventional symbols on contour maps.	3	3.00	.000
item26	Skills in identifying relief features on contour maps.	3	3.67	.577
item27	Skills in differentiating contour lines of one land form from another.	3	3.67	.577
item28	Identification of line symbols on topographical maps.	3	3.00	.000
item29	Identification of pictorial symbols on topographical maps.	3	3.00	.000
item30	Identification of point symbols on topographical maps.	3	3.33	.577
item31	Identification of literal symbols on topographical maps.	3	3.00	.000
item32	Description of drainage characteristics on topographical maps.	3	4.00	.000
item33	Skills in description of relief of a section map.	3	3.00	.000
item34	Identifying nature of slops in mapped area.	3	3.67	.577
item35	Skills in description of communication routes.	3	3.33	.577
item36	Correct description of various land forms on a given topographical map.	3	4.00	.000
item37	Description of settlements on topographical maps.	3	4.00	.000
item38	Labeling and annotation of diagrams.	3	4.00	.000
item39	Accurate interpretation of aerial maps.	3	3.33	.577
item40	Skills in construction of line and bar graphs.	3	3.33	.577

Table 1 shows that all the items of the instrument are the competencies needed by geography teachers in the teaching of mapwork in secondary schools. This was arrived at by considering the mean values for each of the items. The analysis implies that all the items have mean values more than 2.50 benchmark mean and thus are the competencies needed by the geography teachers in teaching of geography mapwork.

Research Question Two: What are the competencies possessed by geography teachers in the teaching of mapwork in secondary schools?

Table 2: mean analysis of competencies possessed by the geography teachers

Items	Competency Skills in Geography Mapwork	N	Mean	Std. Dev.
item1	Conversion from one type of scale to another.	120	3.18	.756
item2	Measuring distance on map.	120	3.16	.810
item3	Correct calculation of actual distance on a map.	120	3.08	.795
item4	Making a statement scale.	120	2.93	.764
item5	Writing Representative Fractions to be converted to Statement Scale.	120	2.93	.753
item6	Conversion of Representative Fractions to Statement Scale.	120	2.93	.790
item7	Conversion of Statements scale to Representative Fractions.	120	2.89	.786
item8	Conversion from Linear Scale to Representative Fraction.	120	2.83	.737
item9	Conversion from Statement scale or Representative Fraction to Linear Scale.	120	2.92	.751
item10	Skills in using thread for measurements on maps.	120	2.86	.714
item11	The skills in use of pair of dividers to measure distance on maps.	120	2.90	.738
item12	Calculation of actual distance on land from measured distance on map.	120	2.88	.724
item13	Determination of actual distance from a Linear Scale.	120	2.93	.742
item14	Reduction of map by any given scale factor.	120	2.95	.787
item15	Enlargement of a map by any given scale factor.	120	2.88	.769
item16	Insertion of features in an enlarged map.	120	2.91	.733
item17	Insertion of features in a reduced map.	120	2.88	.735
item18	Measurement of bearing of one point from another.	120	2.80	.805
item19	Calculations of gradients between any two points on a map.	120	2.48	.898
item20	Determination of the area of a map.	120	2.30	.922
item21	Determination of inter visibility between any two points on the map.	120	2.28	.925
item22	Drawing the cross profile of any relief features on a map.	120	2.38	.918
item23	Accurate calculation of the vertical exaggeration of any given relief profile.	120	2.45	.887
item24	Accurate identification of conventional signs used on contour maps.	120	2.67	.900
item25	Identification of conventional symbols on contour maps.	120	2.82	.837
item26	Skills in identifying relief features on contour maps.	120	2.93	.790
item27	Skills in differentiating contour lines of one land form from another.	120	2.91	.789
item28	Identification of line symbols on topographical maps.	120	2.95	.776
item29	Identification of pictorial symbols on topographical maps.	120	2.88	.688
item30	Identification of point symbols on topographical maps.	120	2.88	.668
item31	Identification of literal symbols on topographical maps.	120	2.87	.733
item32	Description of drainage characteristics on topographical maps.	120	2.90	.771
item33	Skills in description of relief of a section map.	120	2.91	.778
item34	Identifying nature of slops in mapped area.	120	2.87	.744
item35	Skills in description of communication routes.	120	2.86	.770
item36	Correct description of various land forms on a given topographical map.	120	2.82	.722
item37	Description of settlements on topographical maps.	120	2.85	.694
item38	Labeling and annotation of diagrams.	120	2.86	.652
item39	Accurate interpretation of aerial maps.	120	2.82	.694
item40	Skills in construction of line and bar graphs.	120	3.25	.583
	Conversion from one type of scale to another.			
	Measuring distance on map.			

The analysis of data in Table 2 shows that out of the 40 items of the instrument, items 19, 20, 21, 22 and 23 are the competencies not possessed by the geography teachers in teaching of mapwork in secondary schools.

This is for the fact that those items have mean values less than the 2.50 bench mark mean. All other items of the instrument are the competencies possessed by the geography teachers since they have mean values above 2.50.

Research Question Three: What are the competency gaps among geography teachers that need to be filled in the teaching of mapwork in secondary schools?

Table 3: mean analysis of the competency gaps among geography teachers

Competencies	N	Mean	Std. Deviation
Needed Competencies	40	3.5500	.1090
Possessed Competencies	35	2.8261	.6691
Mean difference		0.7239	

Table 3 indicates that the mean of the competencies needed by the geography teachers is 3.5500 with a standard deviation of 0.1090, while the mean of the competencies possessed by the geography teachers is 2.8261 with a standard deviation of 0.6691. This by implication shows that the competency gap among the geography teachers that need to be filled for effective teaching of mapwork in secondary schools is 0.7239.

Discussion of the Findings

The result of this study reveals that on a general note, there are competencies needed in teaching mapwork. The analysis of the data to the first research question shows that all the identified mapwork competencies are needed in teaching of mapwork in secondary schools. This is in support of Nnawugwu (2010) who opined that there are several skills needed by geography teachers to possess for effective teaching of mapwork; and that geography teachers should demonstrate their competencies in knowledge and skills while teaching the needed mapwork skills.

The analysis of data to the second research question in table 2 shows that geography teachers do not possess competency item numbers 19, 20, 21, 22 and 23 respectively needed in teaching mapwork. This is in support of WAEC chief examiners reports (2004, 2005, and 2009) that attributed the poor performance of the candidates to non qualification and incompetency of the geography teachers to teach the candidates the basic mapwork skills. No education can rise about the quality of its teachers (Federal Ministry of Education, 2004) is apt in this respect as teachers can not impact what they do not possess.

The analysis of data to research question in table 3 shows that competency gaps exist among geography teachers in teaching mapwork. This is because of the differences between the competencies needed in teaching mapwork and the competencies possessed by teachers of geography in teaching mapwork. This finding lend support to Olaitan, Alaribe and Nwobu (2009) who opine that a teacher of a subject who is unable to demonstrate competencies while implementing the subject curriculum, to a level that is acceptable, that teacher lacks competence and requires improvement in that regard. Thus, the geography teachers who lack competencies in teaching mapwork have gaps to be filled for effective teaching and learning of mapwork.

Conclusion

This study has identified the competencies needed and possessed by geography mapwork teachers. It has also identified the competency gaps among geography teachers in the teaching of mapwork in secondary schools. It is expected that adequately planned and implemented training and re-training programmes that is based on the findings of this study will equip geography teachers adequately to teach mapwork effectively in secondary schools. As a result students' achievement both in internal and external examination in geography mapwork will improve.

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