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Influence of School Location and Achievement Level on Integrated Science Students' Perception of Their Classroom Environment

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Abstract

Meaningful learning in science and technology classrooms at the various levels of education is an imperative of the Vision 20-2020 in Nigeria. Classroom environment has been factored in students' learning outcome equation. It is necessary to investigate students' perceptions of their psychosocial classroom environments as a predictor variable of meaningful learning especially with reference to school location and students' characteristics. The influence of school location and achievement level on integrated science students' perceptions of their classroom environment was investigated in this study with 640 integrated science students. The short form of Individualized classroom Environment Questionnaire was administered on these students. The results showed that school location did not significantly influence the students' perception of their classroom environment [$F_{(1,639)} = 0.50$, $p > 0.05$]. But the results indicated that achievement level significantly influenced their perceptions [$F_{(1,639)} = 24.87$, $p < 0.05$]. The implications of the study are discussed in this article.

Keywords: Integrated Science; Classroom Environments, Students' Perceptions; Junior Secondary School; Psychosocial Relations.

1. Introduction

One of the objectives of Universal Basic Education component of the 9-3-4 System of Education in Nigeria is reducing drastically the incidence of drop-out from the formal school system through improved relevance, quality and efficiency (Federal Republic of Nigeria, 2004). An averred intention of the ministry is to bring about qualitative education at all levels of education to facilitate national development. This intention is supported by Majasan (1998) who says that any society that functions with qualitative education in its citizens must make waves in an enlightened environment and can push forward the boundaries of human progress. Many items are factored in qualitative education equation. According to Okandeji (2012), these include; educational policies and their implementation, funding, admission policies, educational administration and supervision, human resources, provision for facilities, equipment and materials, curriculum content and the relevance, staff welfare and workload, conduct of examinations, and teaching strategies and psychosocial relations in the classrooms and laboratories etc.

Psychosocial relations in the classroom have been given considerable attention in the quest for improving educational achievement at the various levels. This is in the aftermath of the elucidation by Walberg (1970) that learning outcomes are a function of curriculum, the characteristics of the student and the psychosocial environment for learning. The relationship among these variables is shown in the figure below.

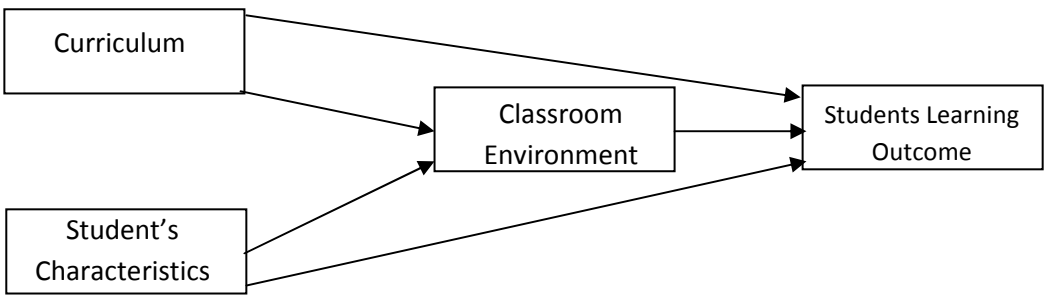

Figure 1. A Model of Factors of Students Learning (Walberg, 1970)

Several strands of research evidence converge to indicate that there is strong positive association between students' perceptions of their psychosocial environment and their learning outcomes (O' Reilly, 1975; Fraser & O'Brien, 1985; McRobbie & Fraser, 1993; Fraser, 1994; Fraser & McRobbie, 1995; Igwebuike, 2000; Koul & Fisher 2002; den Brok, Brekelmans & Wubbels, 2004; Okonkwo, 2010). For instance, O'Reilly (1975) concluded, among others, that although pupils' personal and social characteristics are important correlates of

achievement, classroom environment is a more important factor, and psychosocial factors and academic achievement are significantly related. Igwebuike's (2000) study showed significant main effect of nature of learning environment on affective achievement of integrated science students. Okonkwo (2010), whose study is relatively more recent than any of two studies highlighted above, established that secondary school chemistry students with positive perception of their classroom environment achieved significantly better than their counterparts with negative perception.

Fraser (1998) reviewed empirical probes of educational productivity model made by carrying out extensive research synthesis that involved the correlations of learning with the factors in the model and concluded that classroom and school environment was found to be a strong predictor of both achievement and attitudes even when a comprehensive set of factors was held constant. His conclusion underscores the gaze, which has also been emphasized by Igwebuike (2011), on nature of classroom environment for understanding and learning outcomes among students.

The Nigeria Vision 20-2020, according to the Presidency (2008), is a perspective, an economic business plan intended to make Nigeria a fully developed economy by the year 2020. In specific terms, Vision 20-2020 stipulates that Nigeria will be one of the twenty strongest economies in the world by the year 2020. One of the thematic areas to be worked upon for the attainment of the vision is rural development. This theme is included largely because more than 70 per cent of the population of Nigeria are rural dwellers. Qualitative education in science, mathematics and technology is an imperative of this Vision 20-2020. But there is penumbra of uncertainty about the quality of education in the rural areas of Nigeria. In other wards, is education in rural areas qualitative enough to facilitate rural development, as a component of Vision 20-2020 in Nigeria? It is speculated that quality of education in the rural areas of Nigeria is low. This speculation is informed, in part, by the fact that many qualified teachers reject posting to the rural areas because of lack of development of infrastructures and social amenities.

1.2 Statement of the Problem

Fraser (1998) strongly suggests the use of classroom environment instruments as a source of process criterion in evaluation of education provisions/innovations. He highlights an evaluation of an urban systemic reform initiative in the USA which used Classroom Learning Environment Scale (CLES) which showed that there was a disappointing lack of success in achieving the desired result. Similarly, students perceptions of their classroom environment can be used for assessing, in part, the quality of learning in those classrooms.

This is supported by Goh and Fraser (1998), and Margianti, Fraser and Aldridge (2002) who concluded that students perceptions of their classroom environments can be regarded as a determinant of students' learning outcomes. These studies were carried out in Singapore and Indonesia respectively, in different levels of education and subjects. Studies conceptualized in this manner are yet to be embarked upon in Nigeria using integrated science students (grades 7 – 9).

Achievement level has been found to influence perceptions of classroom environment. Okonkwo (2010) found that high achievers among secondary school chemistry students had more positive perceptions of their classroom environment than the low achievers. A similar study (Okoh, 2011) also found that high achievers in secondary school biology had more positive perception of their classroom environment than the low achievers. But the literature is mute about the influence of crossing achievement level with school location (urban or rural).

Considering the place of science and technology in national development and its implication for the Vision 20-2020 in Nigeria, it is imperative to determine the perception of classroom environment integrated science students in the rural areas. There is the need to compare their perceptions with those of their counterparts in the urban areas and cross such perceptions with achievement level. In other words, will integrated science students' perceptions of their psychosocial classroom environment differ according to location (urban/rural) of the school and achievement (high/low) of the school? Will there be significant interaction of school location by achievement level on integrated science students perception of classroom environment?

1.3 Purpose of the Study

The purpose of this study was to determine if there would be any difference in perception of classroom environment between secondary school integrated science students in urban areas and their counterparts in the rural areas and between high and low achievers. It also sought whether there would be interactive influence of school location (urban/rural) by achievement level on the perception of classroom environment by secondary school integrated science students.

1.4 Hypotheses

H_o1 There is no significant difference in perception of psychosocial classroom environment between junior secondary school integrated science students in urban areas and their counterparts in rural areas.

H_o2 There is no significant difference in perception of psychosocial classroom environment between high achievers in secondary school integrated science and their counterparts who are low achievers.

H_o3 There is no significant interactive influence of school location by achievement level on the perception of psychosocial classroom environment by secondary school integrated science students.

2. Research Design and Method

2.1 Design

A descriptive survey research design was used for this study. The population of the study consisted of junior secondary II (grade 8) integrated science students in Warri Township of Delta State of Nigeria, and rural areas around it. Warri is located in the Niger-Delta region which is oil mineral producing. Because of expansion of oil-mineral exploration, the population of the city has increased tremendously. Education in the city is also developing commensurately.

2.2 Sample

Twelve secondary schools were selected, 6 from Warri Township, and the remaining 6 from the rural areas. Stratified random sampling technique was used in this selection with location (urban/rural), nature of school (single/co-educational) as strata. From these schools, a sample of 640 students was randomly constituted. The subjects were categorized into high and low achievers by making a median split on the list that arranged the students in the order of cognitive achievement on teacher-made integrated science test. The test had considerable psychometric integrity because it was prepared by a group of specialist teachers in the subject area supervised by the Ministry of Education in the area. The distribution of the subjects into the independent variables is shown in Table 3.

2.3 Research Instrument

The instrument used for data collection in this study is the actual form of Individualized Classroom Environment Inventory (ICEQ). It was initially developed and validated by Rentoul and Fraser (1979) who were guided by: the literature on individualized open and inquiry-based education; extensive interviewing of teachers and secondary school students; and reactions to draft versions sought from selected experts, teachers and junior high school students. The original form of it contained 50 items. This was considered too long and cumbersome for junior secondary II (grade 8) students. Its use for this level of students could result to fatigue which could confound the result of the study. A short form of ICEQ containing 25 items, as developed by Fraser and Fisher (1982) was used. Like the long form, the short form has 5 scales which are Personalisation, Participation, Independence, Investigation and Differentiation. Each of these has 5 items. The actual form of ICEQ was used because the response solicited was for students' perception of their actual classroom environments and not the classroom environment they preferred. Each of the items has response options of Almost Never, Seldom, Sometimes, Often, and Very Often. These options were scored 1,2,3,4,5, respectively for positively stated items. The scoring was reversed for 9 of the items that were negatively stated. A description of the scales and a sample of the scales is provided in Table 1 below.

Table 1: Description of scales in ICEQ

Scale name	Description	Sample item
Personalization	Extent to which practices are personalized with respect to students.	The teacher talks with each student.
Participation	Extent to which students participate in the class.	Students' ideas and suggestions are used in class discussion.
Independence	Extent to which individual students carry out investigations.	Students choose their partners for group work.
Investigation	Extent to which individual students carry out investigations.	Students carry out investigations to test ideas.
Differentiation	Extent which individualization of instruction.	Different students do different work.

2.4 Reliability and Validity of the Research Instrument

Data establishing psychometric integrity of the ICEQ in part, and as provided by earlier studies using Australian (Fraser & Fisher, 1982), British (Thorpe, Burden & Fraser, 1994) and Nigerian samples (Igwebuike & Ilegar, 1992) can be seen in Table 2.

Table 2: Reliability Coefficients for the Scales in ICEQ

Scale	Reliability		
	Australian	British	Nigerian
Personalisation	0.83	0.84	0.71
Participation	0.73	0.85	0.69
Independence	0.70	0.75	0.76
Investigation	0.69	0.68	0.78
Differentiation	0.85	0.67	0.67

Considering the fact that the studies mentioned here have lost currency, a composite reliability coefficient for this instrument was determined during the pilot study using 63 grade 8 students that were not part of the sample. A Cronbach alpha value of 0.742 was obtained. Composite reliability coefficient was determined because the dependent variable (criterion) was determined by a summation of the scores from the 5 scales in the instrument. Content validity of the instrument was ascertained by the procedures adopted by Rentoul and Fraser (1979) and which have been mentioned earlier.

2.5 Procedure for Data Collection and Analysis

ICEQ was administered on the subjects by the researchers and their assistants. The subjects were informed that their responses would be treated confidentially. They were told to follow instructions given on the instrument and to note that they were making responses about their actual classroom environment and not the one they preferred. The questionnaires were collected back from the subjects on the spot with the assistance of the class teachers.

Individual student was used as the unit of analysis of data and not classroom or school. Group means of scores of the subjects according to the variables on the instrument were determined as well as the standard deviation measures. To test the hypotheses posited in this study, a 2 x 2 fixed ANOVA model for orthogonal design was carried out. Observations were made at the 0.05 level of significance.

3. Results

The means and standard deviation measures obtained in this study are shown in Table 3.

Table 3: Means and Standard Deviation according to group.

		Location	
		Urban	Rural
Achievement Level	H.A	n = 160 $\bar{x}$ = 74.30 SD = 11.23	n = 160 $\bar{x}$ = 75.75 $\bar{x}_3$ = 75.03 SD = 11.78
	L.A	n = 160 $\bar{x}$ = 78.75 SD =10.04	n = 160 $\bar{x}$ = 78.25 $\bar{x}_4$ = 78.50 SD = 12.21
		$\bar{x}_1$ = 76.53 N_1 = 320	$\bar{x}_2$ = 77.00 N_2 = 320

$\bar{x}$ = mean; SD = standard deviation;

N = number of subjects; N = column total of subjects

$\bar{x}_1$ = mean for subjects in urban areas

$\bar{x}_2$ = mean for subjects in rural areas

$\bar{x}_3$ = mean for high achievers

$\bar{x}_4$ = mean for low achievers

HA = high achievers

LA = low achievers

Table 4: ANOVA Summary of Perception of Classroom Environment

Summary of Variance	df	SS	Ms	F
Location (L)	1	38.97	38.97	0.50
Achievement level (A)	1	1946.03	1946.03	24.87*
L x A	1	156.10	156.10	1.99
Within-group	636	49758.27	78.24	
Total	639	50899.37		

* Significant at the 0.05 (and 0.01) level of significance.

Table 4 indicates that there was no significant influence of location(urban or rural) ($F_{(1, 639)} = 0.50$, $p > 0.05$) on integrated science students' perception of their classroom environment. Hypothesis 1 which states that there is no significant difference in perception of psychosocial classroom environment between junior integrated science students in the urban areas and their counterparts in the rural areas was not rejected. This means that location of schools did not influence the junior secondary school integrated science students perception of their psychosocial classroom environments.

The table further indicates that there was significant difference in perception of classroom environment between junior secondary school high achievers in integrated science and the low achievers ($F_{(1, 639)} = 24.87$, $p < 0.05$). The hypothesis of no significant difference in perception of psychosocial classroom environment between high achievers was rejected. The low achievers with a group mean perception of 78.50 had more positive perception of their classroom environment than the high achievers with 75.03.

There was no significant interaction of school location by achievement level on the junior secondary school integrated science students perception of their psychosocial classroom environment ($F_{(1, 639)} = 1.99$, $p > 0.05$). By implication, the hypothesis of no significant interactive influence of school location and achievement level on junior secondary school integrated science students perception of their classroom environment was not rejected. There was, therefore, no need to probe the nature (ordinal or disordinal) of interaction.

4. Discussion and Conclusion

4.1 Discussion

The overarching question addressed in this study was whether junior secondary school integrated science students in the urban areas had a better perception of their classroom environments than their counterparts in the rural areas. Perception of learning environment, as suggested by Fraser (1998), was subtly used as a criterion variable to assess if there is qualitative education in the rural areas where over 70 percent of the population of Nigeria live. Data obtained in the study do not provide any supportive evidence of differential perception of psychosocial classroom environment between the integrated science students in urban and rural areas. This agrees with the finding of Manoharan and Sundaram (2003) which indicated that there was no significant difference in classroom climate as perceived by high school students in different locations and school types. But a study carried out by Trickett (1978) indicated differences in perception of classroom environment between students in five types of public schools (rural, urban, suburban, vocational and alternative). This finding contradicts that of the present study. The finding of another study by Khalil and Saar (2009) provides another contradiction.

The finding of this study is different from what was expected. It was conjectured that students in urban areas would have a more positive perception of their classroom environment than their counterparts in the rural areas. This conjecture was premised on the fact that the urban environment is more permissive than the rural setting. The instrument for data collection in this study – ICEQ provides for "personalisation" of instruction. For instance, one of the items under personalisation is, "the teacher talks with each student". It provides for other scales like

Participation, Independence, Investigation and Differentiation. These scales compositely describe a classroom climate that tends to be more permissive and more akin to situation in urban areas than in rural areas which are more authoritarian or dictatorial.

A plausible explanation for this unexpected result is that students commute from urban to rural areas and vice-versa. In effect, the students often described as those in the rural areas may be residing in the urban areas and may only be schooling in rural areas. The same explanation can be given for the teachers in the rural areas who organize their classroom environment on the basis of the urban experience.

An implication of this result for practice is that location of school (rural or urban) is not a factor for determining quality of instruction on the basis of personalization of instruction, participation by the students during instruction and investigations among others, which are parameters of effective integrated science instruction. Individualization of instruction in integrated science classrooms should be pursued irrespective of the location of the school. This will facilitate provision of quality basic science education programme for development of science and technology which is a substratum for attainment of the Vision 20-2020.

Another question of interest in the study is whether or not there is a difference in perception of classroom environment between junior secondary school integrated science students who are high achievers and their counterparts who are low achievers. Data reported in Tables 3 and 4 indicated that low achievers had a significantly more positive perception of their classroom environment than the high achievers. This means that junior secondary school integrated science students in different achievement levels perceive the same classrooms differently. This finding contrast with that of earlier studies (Akale & Nwankwonta, 1996; Koul & Fisher, 2002; Margianti, Fraser & Aldridge, 2002; den Brok, Brekelmans & Wubbels, 2004; Okoh, 2011) which found that high achievers had more positive perception of their classroom environment than low achievers. The contrast is further strengthened by Chionh and Fraser (1998) who asserted that students learn better when they perceive their classroom environment positively.

This anomaly can be explained speculatively by an idea that high achievers are likely to be more critical about the nature of classroom environment than the low achievers. In this study, it was possible that the high achievers were not stimulated to threshold of excitability by the level of participation, independence, investigation and differentiation offered by interaction patterns in their classrooms. Since this explanation is speculative, it may not provide a reasonably tenable answer. The phenomenon is therefore still intriguing. Further studies on this may help to unravel it.

Nonetheless, an implication of the finding is that attempts to improve integrated science classroom environment from students' perception should recognize this dichotomy and optimize interaction that reflect participation, independence, investigation, and differentiation.

Also of interest in this study was whether there would be interactive influence of school location and achievement level on integrated science students' perception of their classroom environment. Data obtained indicated absence of interactive influence of the two variables. This means that the influence of school location on integrated science students' perception of their psychosocial classroom environment did not depend on achievement level. In the same manner, the influence of achievement level on their perception of classroom environment did not depend on school location.

4.2 Conclusion

In this study, we examined the influence of school location (rural or urban) and achievement level (high or low) on secondary school integrated science students' perception of their psychosocial classroom environment. From the data obtained it was concluded that school location did not significantly influence the students' perception of their classroom environment. This means, since perception of psychosocial classroom environment by the students was used as a criterion variable for assessment of qualitative integrated science education in the two locations, that integrated science classrooms in urban areas are not superior to those in the rural areas. It was also concluded from the data that secondary school integrated science students that are low achievers had more positive perception of their classroom environment.

4.3 Suggestion for Further Studies

Further studies in this direction of enquiry and with larger sample and wider coverage are eagerly awaited to unravel the anomaly observed in this study and to extend the generalizability of the conclusions. By implication, cautious interpretation of the findings of this study is advocated.

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