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Influence of field dependent-independent cognitive style on students' academic achievement in English language in junior secondary schools in rivers state

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Abstract
The study investigated the influence of field dependent and field independent cognitive styles on JSS3 students' academic achievement in English Language in Rivers State. Nigeria. The study adopted the causal-comparative research design with a Sample size of 396 students. An adopted instrument titled Group Embedded Figure Test (GEFT) and a self-designed English language Achievement Test (ELAT) were used for data collection. Test re-test coefficient of 0.74 and Kuder-Richardson coefficient of 0.85 were established for GEFT and ELAT respectively. Five research questions and five null hypotheses guided the study. Mean and standard deviation were used to answer the research questions while independent samples t-test was used to test the null hypotheses at 0.05 level of significance. The study revealed that students who are field independent in their cognitive style outperformed their field dependent counterparts in English Language. It was also found that male students who are field independent (FI) and field dependent (FD) outperformed their female counterparts in English Language test. It was recommended among others that teachers and school authorities should identify students' cognitive styles; separate them into different classes in order to enhance appropriate teaching methods which can consequently enhance their academic achievement.

Keywords: field independent, field dependent, gender (male and female), academic achievement, English, language

Introduction

Academic achievement is an important part of the overall educational goal of an individual or a society. Focusing on developing each child's strength and ability placed the need for improved academic achievement into a larger perspective regarding the goal of education. The success and failure of every educational institution are generally measured by how good or bad the students performed academically. In recent times, this phenomenon has attracted the attention of researchers especially from the field of psychology and education and has become a major concern to teachers, parents, school administrators and the larger community. Attempts have been made by researchers to unravel the complexities surrounding this construct.

Academic achievement has been defined severally as "a successful completion, through the effort of the acquisition of academic content and skills (Nzesei, 2015) [15]. It is the extent to which a student, teacher or institution has achieved their educational goals. It is generally regarded as the display of knowledge attained or skills developed or performed in school subject (Busari.2000) [4]. Similarly, Ogundokun and Adeyemo (2010) [16]. identified test scores or marks assigned by teachers as indicators of academic achievement. These grades assigned by schools could either be high or low, which means academic achievement could either be high or low. Several factors have been identified in explaining academic achievement: demographic status (Ray, 2010) [21]. intelligence (Deary, Strand, Smith, & Fernandez, 2007) [7]. behavioural characteristics (Lane, Barton-Arwood, Nelson, & Wehby, 2008) [20]. and psychological factors such as attributes (Erdogan, Bayram, & Deniz, 2008) [8]., self-esteem (Reasoner, 2005) [22]. self-efficacy (Olatunde, 2009) [18]., and self-concept (Holliday, 2009) [13].

The major goal of the school is to work towards improved attainment of academic excellence by students. The school may have other peripheral objectives; emphasis is always placed on the achievement of academic excellence. The findings of Harb and El-Shaarawi (2006) [11]. showed that one of the most important factors that have a positive effect on students' performance is students' competence in English. If the students have strong communication skills and have a strong grip on English, it increases the performance of students.

Samuel (2012) [24]. opined that numerous studies have been done to identify those factors which affect students' academic performance. The author stressed the fact that students' academic performance also depends on a number of socio-economic factors like family income, mother and father's education, teacher-student ratio, the presence of trained teachers in the school, sex of the students, and distance of schools from home.

Studies by Aruna and Asha (2006) [2]. Deary, Strand, Smith and Fernandes, (2007) [7]. and Gurubasappa, (2009) [10]. have found that intelligence is a significant contributor to achievement. Research on students' academic achievement has generally taken the form of findings on human and environmental variables which correlate positively with achievement and which can be used as predictors of achievement. Among the variables identified are individual differences (Pitcher, 2002, Riding & Douglas (1993) [19, 23].

Different researchers emphasized different dimensions of individual differences which correlate with higher achievement and which hold out some hope for positive action for educational practice and intervention. Cognitive styles have emerged as a new dimension within individual differences through cognitive psychology studies in the field of information processing. It is of particular importance as it determines the way information processing is done when

solving problems or making decisions or interpretation of stimuli and response. Therefore, psychologists are interested in studying cognitive style as an important dimension of individual differences. Cognitive style is the basis of discrimination between individuals during their interaction with the elements of the situation, and it is also an important approach to understanding a personal way of thinking (Sternberg & Williams, 2002) [25].

Each individual has a preferred way of organizing what he/she sees, remembers and thinks about. Consistent individual differences in these ways of organizing and processing information and experience have come to be called cognitive styles. These styles represent consistencies in the manner or form of cognition, as distinct from the content or level of skill displayed in the cognitive performance. They are conceptualized as stable attitudes, preference or habitual strategies determining a person's typical modes of perceiving, remembering, thinking and problem-solving. Research shows that an individual's cognitive style affects perception and information processing during learning and thinking (Heinich, Molenda, Russel & Svmaldino, 1999) [12]. Cognitive style is also associated with certain personality characteristics that may have important instructional and learning implications (Sternberg & Grigorenko, 1997) [26].

Cognitive style is the control processor style which is a self-generated, transient, situational determined conscious activity that a learner uses to organize and to regulate, receive and transmit information and ultimate behaviour. Studies in cognitive styles have shown that individuals do not approach learning tasks in the same manner (Anukwe, 2015; Bassey, Umoren, & Udida, 2011) [1, 3]. Field independent and field dependent (FI/FD) cognitive styles have received more attention from scholars in education and psychology than any other cognitive styles. These two styles are frequently paired for discussion because they represent an individual's information processing mode along with a bipolar plane at either end of a continuum. From a psychological differentiation perspective, Witkin *et al* (1977: 35) describe these two domains in the following manner:

The person with a more field independent way of perceiving tends to experience his surroundings analytically, with objects experienced as discrete from their background. The person with a more field dependent way of perceiving tends to experience his surroundings in a relatively global fashion, passively conforming to the influence of the prevailing field or context." Based on 30 years of field dependence-independence research, Witkin, Moore, Goodenough and Cox (1977) felt that their cognitive style approach could be profitably applied to issues relevant to education. In reviewing this research, they recognized that it was only in the beginning stages but felt that there was sufficient body of empirical evidence to suggest that field dependence/independence had educational implications on how students learn, how teachers teach, how students and teachers interact and how students make vocational decisions.

Some of the results of related studies showed that field independent learners are generally more superior to their field dependent counterparts in academic achievement (Okwor & Tartiyus, 2006, Davis (1991) [17, 6]. summarized the result of studies investigating field dependence-field independence cognitive styles and academic achievement and reported that they all showed a consistent pattern that the field independent students performed significantly better than field dependent students in virtually all curriculum areas. Many studies have shown that sex differences exist between cognitive styles and achievement. In fact, Witkin's field-dependent cognitive style theory predicted that females are more likely to have a social or field-dependent cognitive style, whereas males are more analytical or field independent cognitive styled. These differences include personality and information processing characteristics that may have cognitive origins. These predictions were established in the study of other researchers like Fritz (1992) [9].

Statement of the problem

English Language is a compulsory subject offered by students in secondary schools in Rivers State. In spite of the important place occupied by English Language in the educational system in Nigeria, students in secondary schools continually achieve poorly both at the junior and senior secondary school certificate examinations. This may account for the reason researchers have been working hard to unravel the complexities surrounding it. Several factors like intelligence, socio-economic variables, gender, environmental factors, personality traits etc have been identified. Cognitive styles have also been identified and linked to students' academic achievement. However, in spite of the seeming exhaustiveness of literature on the determinant of academic achievement of students, there seem to be more areas of interest to be investigated, especially in the area of students' cognitive styles. Thus, it is hoped that the result of this study will enable curriculum planners to design a curriculum that allows students to develop the skills that will lead to expertise in problem-solving, create an environment that will nurture and improve the information processing capabilities of students, and develop learners' potentials to the fullest.

Aim of the study

The aim of this study was to investigate the influence of field dependent and field independent cognitive styles on students' academic achievement in English language in junior secondary schools in Rivers state, Nigeria.

Research questions

The following research questions were raised to guide this study.

1. What is the difference between the English Language achievement scores of students who are field dependent and those that are field independent?
2. What is the difference between the English Language achievement scores of field dependent male students and field independent male students?
3. What is the difference between the English Language achievement scores of field dependent female students and field independent female students?
4. What is the difference between the English Language achievement scores of male and female students that are field-dependent cognitive style?
5. What is the difference between the English Language achievement scores of male and female students that are field independent cognitive style?

Hypotheses

The following null hypotheses were tested at 0.05 alpha.

1. There is no significant difference between the English Language achievement scores of students who are field dependent and those that are field independent learners.
2. There is no significant difference between the English Language achievement scores of male students who are field dependent and male students that field independent learners.
3. There is no significant difference between the English Language achievement scores of female students who are field dependent and female students that are field independent learners.
4. There is no significant difference between the English Language achievement scores of male and female students who are field dependent learners.
5. There is no significant difference between the English Language achievement scores of male and female students who are field independent learners.

Methodology

The design for this study is ex-post facto research design. The population for this study consisted of all 35,889 students (boys and girls) of all the 249 public co-educational junior secondary schools in Rivers state. The sample for this study was 396 junior secondary school students (JSS3), comprising of 152 males and 244 females. The Group Embedded Figures Test and English language Achievement test were used for data collection. The Group Embedded Figures Test is a standardized psychological test developed by Witkin, *et al* (1971). used to categorize learners as field dependent or field independent.

The test comprised of three sections. The first section is made up of seven questions and was used as a practice. The second and third sections have nine questions respectively and serve as the test. The test required students to trace the lines of a simple form embedded within the complex form. Their responses are scored as 1 when students correctly locate the figure and as 0 when they failed. The test score was the total number of figures correctly traced or located. Thus, the cut off mark for GEFT is 9. Students who scored below 9 are field dependent while those with scores above are field independent.

The English Language Achievement Test (ELAT) is an objective test comprising 60 items constructed by the researcher. It is a 60 item objective test instrument which covers the government junior secondary school curriculum in Rivers State. Each item has 4 options lettered A-D. The test was based on the units of study in JSS3 English language curriculum used for the study. The minimum score obtainable by a student was 0 and the maximum score was 60. The data were analyzed using descriptive statistics to obtain the mean scores and standard deviation. Analysis of Variance (ANOVA) was used to in testing the null hypotheses at 0.05 significant level.

Results

Results of statistical analyses of data are presented in tables.

Table 1: Mean, standard deviation and independent samples t-test of field dependent and field dependent students in English Language

Categories	N	$\bar{x}$	Sd	Df	t-cal.	t-crit.	Remarks
field independent cognitive learning style students	130	36.94	9.47				Statistically significant
field-dependent cognitive learning style students	266	31.40	10.66	394	5.036	1.96	

P>0.05

The result from above table revealed that JSS3 students who are field independent in their cognitive styles have mean and standard deviation scores of 36.95 and 9.47 while students who are field dependent in their cognitive styles have mean and standard deviation scores of 31.40 and 10.66 respectively. The mean difference between students who are field independent and field dependent is 5.55. It implies that students who are field independent in their cognitive styles have high achievement scores in English language than students who are field dependent. Therefore, the students who are field independent differ from those that are field dependent on cognitive styles with respect to English Language achievement scores in favour of field independent.

With a degree of freedom of 394, the calculated z-test value of 5.036 is greater than the critical table value of 1.96. Therefore, the null hypothesis is rejected. By implication, there is a significant difference between the English Language achievement scores of students who are field dependent and those that are field independent learners.

Table 2: Mean, standard deviation and independent samples t-test of male field dependent and field independent students in English Language

Categories	N	$\bar{x}$	Sd	Df	t-cal.	t-crit.	Remarks
male field independent	84	35.4881	9.34157	196	4.386	1.96	Statistically significant
male field dependent	114	29.2018	10.40437				

p>0.05

Table 2 revealed that male students who are field independent in their cognitive styles had mean and standard deviation scores of 35.49 and 9.34 while field dependent male students had mean and standard deviation scores of 29.20 and 10.40 respectively. The mean difference between male students who are field independent and field dependent was 6.29. It implies that male students who are field independent had a higher achievement score in English language test than those who field dependent. With a degree of freedom of 196, the calculated z-test value of 4.37 is greater than the critical table value of 1.96. Therefore, the null hypothesis is rejected. By implication, there is a significant difference between the English Language achievement scores of male students who are field dependent and those who field independent learners.

Table 3: Mean, standard deviation and independent samples t-test of female field dependent and field independent students in English Language

Categories	N	$\bar{x}$	Sd	Df	t-cal.	t-crit.	Remarks
Female field independent students	46	39.61	9.22	196	3.79	1.96	Significant
female field dependent students who are	152	33.05	10.586				

P<0.05

The result in Table 3 showed that female field independent students had a mean and standard deviation scores of 39.61 and 9.22 while field dependent female students had mean and standard deviation scores of 33.05 and 10.59 respectively. The mean difference between female students who are field independent and female students who are field dependent was 6.56. It implies that female students who are field independent in their cognitive styles have high achievement score in English language than female students who are field dependent. Therefore, the female students who are field independent differ from those that are field dependent in their cognitive style in English Language achievement scores in favour of female students who are field independent. With a degree of freedom of 196, the calculated z-test value of 3.79 is greater than the critical table value of 1.96. Therefore, the null hypothesis is rejected. By implication, there is a significant difference between the English Language achievement scores of female students who are field dependent and those that are field independent learners.

Table 4: Independent samples t-test between male and female field dependent students in English Language

Categories	N	$\bar{x}$	Sd	Df	t-cal.	t-crit.	Remarks
Male field dependent	114	29.20	10.40				Statistically significant
Female field dependent	152	33.05	10.59	264	2.96	1.96	

p>0.05

Table 4 revealed that field dependent male students had mean and standard deviation scores of 29.20 and 10.41 while field dependent female students had mean and standard deviation scores of 33.05 and 10.59 respectively. The mean difference between field dependent male and female students is 3.85. It implies that female field dependent students score higher in English language than male field dependent students. With a degree of freedom of 196, the calculated t-test value of 2.96 is greater than the critical table value of 1.96. Therefore, the null hypothesis is rejected. By implication, there is a significant difference between the English Language achievement scores of male and female students who are field dependent learners.

Table 5: Mean, standard deviation and independent samples t-test of male and female field dependent students in English Language

Categories	N	$\bar{x}$	Sd	Df	t-cal.	t-crit.	Remarks
Male field independent	84	35.49	9.37	128	2.416	1.96	Statistically significant
Female field independent	46	39.61	9.22				

p>0.05

Table 5 showed that male field independent students had mean and standard deviation scores of 35.49 and 9.34 while female field independent students had mean and standard deviation scores of 39.61 and 9.22 respectively. The mean difference between female and male field independent students is 4.00. It implies that female students who are field independent in their cognitive learning styles have high achievement score in English language than male students who are field independent. With a degree of freedom of 196, the calculated z-test value of 2.42 is greater than the critical table value of 1.96. Therefore, the null hypothesis is rejected. By implication, there is a significant difference between the English Language achievement scores of male and female students who are field independent learners

Discussions of Findings

The result and findings in Table 1 revealed that the students who are field independent achieved better than those that are field dependent with respect to English Language achievement. This finding indicated that the information processing style of students who are field independent have a rewarding influence on academic achievement in English language. This finding is in agreement with the earlier study by Musya (2015). who found that students who are field independent achieved better than students who are field dependent in many areas. This finding may be traceable to the fact that field independent students are problem solvers; hence they have the ability to approach a problem in diverse ways. So they are more intrinsically motivated than the field dependent.

Tables 2 and 3 showed that more male and female students were found to be field independent in their cognitive styles than their male and female counterparts who are field dependent. It implies that male and female students who are field independent in their cognitive styles have high achievement score in English language test than male and female students who are field dependent. This may not be far from the fact that, according to Daniel (2009) [5]. field independent students tend to be more efficient at retrieving items from memory. This finding is also consistent with the study of Musya (2015). who found that more male students were field independent than field-dependent cognitive style.

Table 4 revealed that male students who are field dependent in their cognitive styles have mean and standard deviation scores of 29.20 and 10.41 while female students who are field dependent in their cognitive learning styles have mean and standard deviation scores of 33.05 and 10.59 respectively. The mean difference between female students who are field dependent and male students who are field dependent is 3.85.

It was also evident in Table 5 that female students who are field independent in their cognitive styles have mean and standard deviation scores of 35.49 and 9.34 while female students who are field independent in their cognitive learning styles have mean and standard deviation scores of 39.61 and 9.22 respectively. It implies that female students who are field independent in their cognitive learning styles have high achievement score in English language score than male students who are field independent. The null hypothesis of no significant difference was also rejected with a t-cal value of 2.42 greater than the critical table value of 1.96. The implication is that there is a significant difference between the English Language achievement scores of male and female students who are field independent learners. The result of this study generally revealed that gender is a significant factor in the achievement of field dependent and field independent learners.

Conclusion

Based on the findings from this study, it was concluded that cognitive styles can enhance students' academic achievement in English Language, especially of students that are field dependent and independent but mostly in favour of students who are field independent in secondary schools in Rivers State.

Recommendations

Based on the conclusion of this study, the following recommendations were made, that:

1 Teachers should identify patterns of cognitive styles available in their classes and utilize relevant teaching methods in order to improve students' achievement in English Language.

2 The school authorities should place male and female students of the same cognitive style in one class and be taught using the same method since their information processing patterns are similar.

3 Curriculum designers and classroom teachers should put into consideration students with different cognitive styles when designing contents to be included in the curriculum.

4 English Language teachers should encourage and give every student, sex notwithstanding equal opportunities to actively participate in classroom activities in order to improve their cognitive style.

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