

# Field Dependence-Field Independence Cognitive Style, Gender, Career Choice and Academic Achievement of Secondary School Students in Emohua Local Government Area of Rivers State

Dr. Bruno Uchenna Onyekuru

Department of Educational Psychology, Guidance and Counselling, Faculty of Education, University of Port Harcourt

## Abstract

This is a descriptive study that investigated the relationships among field dependence-field independence cognitive style and gender, career choice and academic achievement of secondary school students in Emohua Local Government Area of Rivers State, Nigeria. From the initial sample of 320 senior secondary school one (SS1) students drawn from the population of SS1 students in the local government area using cluster and simple random sampling techniques, a final sample of 158 SS1 students participated in the study. Three research questions were answered and four null hypotheses tested at 0.05 level of significance. The instrument for data collection was Group Embedded Figures Test (GEFT). Research question one was answered using percentage while mean was used to answer research questions two and three. Hypotheses one and four were tested using chi-square and hypotheses two and three were tested using student's t-test statistical tool. It was found that; A higher proportion of the male respondents were field independent while a higher proportion of the female respondents were field dependent; There was a significant relationship between field dependence-field independence cognitive style and gender; Field independent students had a higher mean achievement in sciences than the field dependent students while field dependent students had a higher mean achievement in arts than the field independent students; There was a significant relationship between field dependence-field independence cognitive style and career choice of the students. Based on these findings, appropriate recommendations were made.

**Keywords:** Field dependence-field independence, cognitive style, gender, career choice, GEFT, ambiverts, science and arts.

## Introduction

Achuonye and Ajoku (2003) defined education as the leading out of the in-born powers and potentialities of the individuals in the society and the acquisition of skills, aptitudes and competences necessary for self-realization and coping with life's problems.

Education aims at producing individuals who are morally, physically, mentally and socially balanced. An educated man is not only expected to acquire knowledge, but he is to demonstrate those worthwhile qualities characteristic of educated men. He demonstrates his knowledge by what he can do.

In recognition of the importance of education, governments of all nations including Nigeria strive hard to provide qualitative education to the citizens as qualitative education guarantees sustainable technological, economic, cultural and socio-political development of a nation. It can then be rightly said that the future of a nation is in jeopardy without a strong educational base. Scarcity of skilled manpower which is the consequence of poor educational plan can mar the economic and technological growth of a nation as her industrial or economic wheel may not spin at its full potential. Conscious of the immense benefits derivable from a sound educational base, Nigeria allocates a great deal of resources to the education sector annually. A look at the statistics of budgetary allocations in Nigeria shows that the country allocated ₦33.6 billion to education in 2009 (Nwosu, 2008) and ₦249.08 billion in 2010 (NairaBrain, 2009). Hence, Nigeria allocates substantial resources to education sector amounting to billions of naira each year. The resources are expected to be used to improve on the existing infrastructures or develop new ones in our educational institutions. They are also meant for payment of teachers' salary, procurement of instructional materials, etc. All these are geared towards improving the quality of education in our country, Nigeria. However, despite the huge annual budgetary allocations to the educational sector, not much on ground justifies the huge financial investment. The investment has not translated to improved students' academic achievement to an appreciable level.

In recent times, students' academic achievement in Nigeria is witnessing a downward slide. Poor performance of students can be noticed at all levels of our educational institutions. Nigerians are apprehensive of the rising rate of failures in external examinations. Statistics made available by the examination bodies such as West African Examinations Council (WAEC) and the National Examinations Council (NECO) indicates a high failure rate in recent times. In Lagos State, only thirteen percent of the total number of candidates that sat for the 2009 West African Senior School Certificate Examination (WASSCE) passed with the requisite five credits and above (Ozordi, 2010). The head of national office, West African Examination Council, Dr. Iyi Uwadiae, while

commenting on the performance of candidates, had this to say about 2009 May/June WASSCE results:

Only 356,981 candidates representing 25.99% of those who wrote May/June 2009 West African Senior School Certificate Examination (WASSCE) can gain admission into the Universities without combining o' level results. They were the only candidates that made five credits and above including English Language and Mathematics in the examination which was written by 1,373,009 candidates nationwide (Nigeria Universities Update, 2009, p.1).

Comparing the results with those of the previous year, where only 23.50% of the candidates achieved the same feat, Uwadiae went further to say:

The performance is slightly better this year. However, if subjected to statistical analysis, it is possible there will be no significant difference. We have nothing at hand to jubilate about. If we are talking about 50% of the candidates making credit passes in five subjects including English Language and Mathematics, then I would have put it in my speech and announced that the candidates did well (Nigeria Universities Update, 2009, p.2).

Uwadiae said that the poor performance, which has been the case for some years now, shows that the factors causing poor results are still there and that the interventions being put in place in schools have not manifested in terms of improved academic performance of the students. He noted that their research has shown that minimal learning is taking place in schools as teaching is largely ineffective.

The students' poor academic performance in the country has not gone unnoticed by the leader of the Muslim Congress. Suggesting a way to curtail this ugly trend, he advised the authorities saddled with the responsibilities of administering the education sector in Nigeria to improve the teachers' proficiency through regular seminars and workshops (AbdurRaheem, 2010). A release signed by the leader, stated that some of the teachers were no longer in tune with modern methods of teaching, adding that recycled lesson notes for many years were repeatedly being used by most teachers in the country. Concluding, he added that:

Majority of the teachers have no knowledge of information communication technology, computer appreciation, and also many use teacher-centred and not student-centred approach (AbdurRaheem, 2010 p. 12).

For effective teaching and learning to take place, it is high time teachers started looking beyond the traditional methods of teaching. One way this can be done is to humanize the classroom by adopting student-friendly/student-centered approaches. The teachers should help the students by taking cognizance of the cognitive styles of the students with a view to matching their cognitive styles with the teaching styles. The teachers should understudy the cognitive styles of the students and adapt their teaching strategies to align with the students' cognitive styles. Tailoring teaching in line with the students' cognitive styles is capable of bringing about the much needed improved performance of the students. In other words, when teaching style is matched with the learners' cognitive operations, teaching and learning becomes productive and rewarding (Ndudi and Mkpa, 2003).

Pithers (2002) defined cognitive style as the relatively stable strategies, preferences and attitudes that determine an individual's typical modes of perceiving, remembering and problem solving. Messick (1998) defined cognitive style as the process which is self-generated, transient, situationally-determined conscious activity that a learner uses to regulate, receive and transmit information and ultimately behaviour. It refers to an individual's way or method of processing information. Different people/students have different preferred methods of transforming, encoding, storing, retrieving and using information. One's preferred method of processing information gives rise to one's uniqueness as information processor. Hence, this justifies the existence of individual differences in cognitive operations. A theory of cognitive style that has been widely researched is the dependence-field-independence cognitive style (Pithers, 2002).

Some of the studies conducted on field dependence-field independence cognitive style include investigation of the interaction between field-dependent/independent learning style and learners' linguality in third language acquisition (Maghsudi, 2007), the influence of the nature of field dependence/field independence construct on academic achievements as well as on the thinking style construct (Lucas-Standard, 2003), undergraduate students' academic achievement, field dependent/independent cognitive styles and attitude towards computers (Altun and Cakan 2006), cognitive style (field-dependent/independent) and sex as mediators of biology retention-test performance of students exposed to two instructional modes in Benin City, Nigeria by Adeyemi (1992), effect of cognitive styles (field-dependence/independence) and instructional strategies on students' achievement in social studies (Ndudi and Mkpa, 2003) and the influence of gender and cognitive style (field-dependent/independent) on senior secondary two (SS11) students' achievement in physics essay test (Okwo and Otubah, 2007)

However research is scanty on how field dependence/field independence cognitive style relates with

other variables such as gender, career choice and the students' academic achievement especially those involving secondary school students in Emohua Local Government Area in a single study. This study is unique as it investigated the relationships among field dependence/field independence cognitive style, gender, career choice and the academic achievement of secondary school students.

Two major factors that may relate with field dependence-field independence cognitive style are gender and career choice. A study conducted by Antonietti and Gioletta (1995) found that males were more analogical problem solvers than the females. Hence, males tended towards field independence while the females tended towards field dependence. Witkin and Goodenough (1981) indicated that cultural stereotypes tended to lead males to be field independent and females, field dependent. Witkin and Goodenough (1981) also found that "liberated" females tended to be more field independent than those who preferred the traditional female roles.

Some qualities of field dependent and field independent individuals may predispose them to certain types of career choice (Kelleher, 1997). On this issue, Hansen (1995) stated that field dependent people were better at learning materials with high human contents than the field independent ones. A study conducted by Altun and Cakan (2006) yielded the result that field dependent individuals were better at recalling social information such as conversation and relationships. Pithers (2002) reported that field dependent individuals were more strongly influenced by the immediate social context and more inclined to attend to and learn about social aspects of their environments and that field dependent individuals show greater incidental learning for social materials than do field independent individuals. According to Witkin and Goodenough (1981), field dependent learners are more socially oriented than field independent ones. They pay more attention to social cues, they like to be with others and they seek learning and vocational experiences that put them in contact with people. Field dependent children perform less well on formal operation tasks than do field independent children.

### **Statement of the problem**

For the time being, secondary school students especially those in Emohua Local Government Area have been receiving their lessons in the usual traditional method. In this method, a group of students are usually placed together in a classroom. The teachers take turn to teach them using mostly talk-chalk method or lecture method irrespective of students' unique talents and differing cognitive styles; that is whether they are field independent or field dependent. In such situations, students are obliged to adjust their cognitive styles to whatever teaching approaches adopted by the teachers. No attempts are made by instructors to identify the cognitive styles of the students so as to integrate such styles with their teaching strategies. This disregard of students' cognitive styles and inability of teachers to integrate them within their instructional strategies may be counter productive.

In recent times when secondary school students in Rivers State in particular and Nigeria in general are faced with dwindling academic fortune, emphasis should be shifted to student-centered approaches in a bid to improve on their performance. The teachers should identify the cognitive styles (field independence or field dependence) of the students and integrate them in their instructional strategies. This is capable of making the teaching effective and result-oriented. In this work, efforts were geared towards investigating the relationships among cognitive styles (field dependence/field independence), gender, career choice, and academic achievement of secondary school students in Emohua Local Government Area of Rivers State, Nigeria.

### **Purpose of the study**

This study investigated the relationships among cognitive styles (field dependence/field independence), gender, career choice, and academic achievement of secondary school students in Emohua Local Government Area of Rivers State. The specific objectives of this study include;

1. To determine the proportions of male and female secondary school students that are field dependent, field independent and ambiverts (neither field dependent nor field independent) in Emohua Local Government Area of Rivers State.
2. To determine the relationship between the field dependence-field independence cognitive style and gender of secondary school students in Emohua Local Government Area of Rivers State.
3. To compare the mean academic achievements of field dependent and field independent students in sciences.
4. To compare the mean academic achievements of field dependent students and field independent students in arts.
5. To determine the relationship between the field dependence-field independence cognitive style and career choice of secondary school students in Emohua Local Government Area of Rivers State.

### **Research questions**

The following research questions were answered in this study:

**RQ<sub>1</sub>:** What are the proportions of male and female secondary school students that are field dependent, field independent and ambiverts in Emohua Local Government Area of Rivers State?

**RQ<sub>2</sub>:** What are the mean academic achievements of field dependent and field independent students in sciences?

**RQ<sub>3</sub>:** What are the mean academic achievements of field dependent students and field independent students in arts?

### **Hypotheses**

The following null hypotheses were formulated to guide the study. They were tested at 0.05 level of significance.

**H<sub>01</sub>:** There is no significant relationship between field dependence-field independence cognitive style and gender of the students.

**H<sub>02</sub>:** There is no significant difference in mean achievements between the field dependent students and field independent students in science.

**H<sub>03</sub>:** There is no significant difference in mean achievements between the field dependent students and field independent students in arts.

**H<sub>04</sub>:** There is no significant relationship between field dependence-field independence cognitive style and career choice of the students.

### **Brief review of literature**

#### **The concept of field dependent-field independent cognitive style**

Theories of cognitive style (Lucas-Stannard, 2003) or dimensions of cognitive style (Blanton, 2004) are prescriptions, beliefs or postulates which help to explain or predict cognitive styles and their occurrence in individuals. Some cognitive style theories as listed by Lucas-Stannard, (2003) include reflective/impulsive cognitive style, holistic/serialistic cognitive style, holist/analytic cognitive style, sensory preference modality, deep-level/surface-level processing cognitive style, concrete, abstract, sequential and random cognitive style, Kolb's learning style model, levelers vs sharpeners cognitive style. Of all these, field dependence-field independence (FDI) cognitive style dimension has received more attention than any other cognitive style and is by far the most researched cognitive style of the existing cognitive style dimensions (Liu & Ginther, 1999). Field dependence-field independence cognitive style theory was first proposed by Herman Witkin (Witkin, 1976). His pioneering work in this dimension dated back to early fifties and sixties (Lucas-Standard, 2003; Liu & Ginther, 1999). According to Witkin (1976), field dependence-field independence cognitive style is value-neutral and is characterized as the ability to distinguish key elements from a distracting or confusing background. Field dependence/field independence cognitive style cognitive style is a concept which refers to the capability of an individual to recognize or trace out a figure embedded in a complex background (Blanton, 2004). Those who can trace the figures to a large extent are regarded as field independent individuals while those who cannot trace out the figures to an appreciable extent are regarded as field dependent individuals (Blanton, 2004).

Summerville (1999) referred to cognitive style dimension of field dependence/field independence as a global versus articulated style that reflects the degree to which an individual's processing of information is affected by the contextual field. Field independent learners have been referred to as "analytical, competitive, individualistic, task-oriented, internally referential, intrinsically motivated, hypothesis testing and detail-oriented" (Hall, 2000), whereas field dependent learners have been referred to as "group-oriented, global, sensitive to social interactions and criticisms, extrinsically motivated, externally referential, non-verbal and passive learners who prefer external information structures" (Hall, 2000, p.6).

Witkin and Goodenough (1981) stressed that field dependence/field independence cognitive style dimension should be viewed as a "bipolar" cognitive style because individuals at the two ends of the continuum have different personality characteristics and traits. Individuals with different FDI cognitive style equally have different personality characteristics. Field independent individuals have a greater aptitude for cognitive restructuring. They are usually autonomous, impersonal and manipulative (Waber, 1997). Other characteristics of field independent individuals as noted by Waber (1997) include self-reliance and lack of awareness for social stimulus values. They are usually inner-directed, self-motivated and individualistic. They do not require extrinsic motivation and they rate low on interpersonal qualities. On this subject, Rayner and Riding (1997) added that field independent learners set goals for themselves, rely on intrinsic reinforcement, and are likely to devise their own strategies for learning. Field-dependent individuals, on the other hand, have a better Knack for interpersonal relationships. They have the tendency to relate well with others and are often described as warm, accommodating, affective or empathic (Waber, 1997). As observed by Waber (1997), field-dependent people are socially dependent, gregarious and eager to make a good impression, others-directed as opposed to self-directed, conforming and sensitive to social surroundings. As a result of these qualities, field dependent learners prefer group study, structured activities and have stated goals. By interacting with teachers and peers, field-dependent learners receive the cherished positive or negative extrinsic reinforcement which serve to influence their reactions to their learning experiences (Rayner & Riding, 1997).

Other than the existence of differences in the personality characteristics of field-dependent / field-independent individuals, there is also existence of differences in the methods through which these two groups of people process information. Field-independent individuals tend to do better in analytical activities. They can solve complex problems, recall information, isolate facts from fantasies, separate relevant from irrelevant information, perceive an item as discrete from its background, impose structure when it is lacking from content,

can generally encode information quickly and accurately, and do well on standardized test (Richardson & Turner, 2000). A study conducted by Bahar and Hansell (2000) on Biology students revealed that field-independent subjects had a higher working memory capacity than those who were field dependent. The analytic ability of the field-independent subjects tends to confer on them the penchant for science, and mathematics options. Analytic thinkers are more reflective, more independent of others, more concerned with mastery, more cautious, and less easily distractible in the class room (Vernon, 1972).

Field-dependent individuals, on the other hand, tend to be global in the analysis of learning situations and have difficulty breaking information into isolated parts. They do not perceive an item as discrete from its background, nor do they impose structure when it is lacking in content. As a result of these characteristics, field-dependent learners usually prefer more direct instruction in situations that require restructuring (Kahtz & Kling, 1999). They seem to be incidental learners in social contexts and have difficulty using intuition. A study by Tinajero and Paramo (1998) indicated that field-dependent subjects did not do as well as the field-independent persons on standardized multiple-choice tests across five disciplines. Field dependent people are usually impulsive and tend to be affected by approving or disapproving comments and they have dividing performance in anxiety provoking situations (Anderson, 1988). In learning tasks, field-dependent learners need learning activities that are explicitly placed within a social context and they need interaction with peers who serve as skill models, reinforcers of learning and counsellors in times of crisis.

### **Field dependence-field independence cognitive style and gender**

A variable often mentioned as one of the influential factors in the existence of field dependence-field independence cognitive style in human beings is gender. However, the existence of field dependence-field independence cognitive style in relation to gender has its own controversy (Witkin & Goodenough, 1981). On this issue, Maghsudi (2007) reported that there was mixed evidence of the relationship between gender and field dependence-independence cognitive style. Maghsudi (2007) noted that studies of some children had not found any difference at all; however, in studies of adults, when differences between sexes were found, males always achieved scores that were indicative of greater field independence. Witkin et al. (1977) found slight but persistent differences among the sexes, the females tended to be more field dependent than the males. A study conducted by Witkin, Oltman, Raskin and Karp (1971) revealed that there was a significant difference between the males and females with males on the average, being more field independent.

However, Maghsudi (2007) reported that there were rarely differences between males and females in the occurrence of field dependence-independence cognitive style, but where differences occurred, men were more field independent than the women, though, the effect of gender on field dependence-independence was so small that this factor was practically insignificant. Studies conducted by Kelleher (1997) using a sample of business students, revealed that there was no significant difference between the opposite sexes in terms of field dependence-field independence.

### **Field dependence-field independence cognitive style and career choice**

There are a good number of studies that apparently indicated a connection between field dependence-field independence cognitive style and career choice. Some qualities of field dependent and field independent individuals predispose them to certain types of career choice (Kelleher, 1997). Field dependents people are more strongly interested in people, have greater sensitivity to others with higher-developed social and interpersonal skills, prefer situations that require direct communication with others (Waber, 1997). Hence, they are global, "others-directed", people-oriented and poor problem solvers who have learning and behavioural problems in school (Rayner and Riding, 1996; Tinajero and Paramo, 1998), but who can acquire information by the use of structured activities such as note-taking and outline making (Rickards et al., 1997). These characteristics help to explain the reasons why field dependent people appear to show strong penchant for career choice in humanities, law, behavioural science and education (Rickards et al., 1997).

In a study titled, "cognitive styles and teacher education: field dependence and areas of specialization among teacher education majors", by Frank (1986), using a sample size of 427 female teacher education majors, who enrolled in different areas of specialization, and GEFT as one of the instruments for data collection, the result revealed that teacher education majors who specialized in the areas of natural sciences, mathematics, and business were significantly ( $p < 0.05$ ) more field independent than majors in the areas of humanities, family and child development, home economics, special education, and speech pathology. A study conducted on "field dependence-independence as related to college curricula," by Derussey and Futch (1971) revealed that students of liberal arts were more field dependent than those involved in mathematics, physics and chemistry as well as graduates of design and architecture.

Witkin et al. (1977), working on the "role of the field-dependent and field-independent cognitive styles in academic evolution: A longitudinal study", followed the career progress of a group of 1,548 students from college entry into graduate/professional school. The Group Embedded Figures Test was administered at college

entry. One thousand four hundred and twenty two (1,422) study-subjects were followed through their careers, and eight hundred and thirty-one (831) study-subjects were identified as having applied to graduate or professional school and five hundred and fifty (550) having enrolled. In their preliminary choices at college entry, final college majors and graduate/professional school specialties, relatively field-independent students favoured impersonal domains requiring cognitive restructuring skills (e.g. sciences) and relatively field-dependent students favoured interpersonal domains which did not emphasize such skills (e.g. elementary education). Study subjects whose college-entry choices were incongruent with their cognitive styles tended to shift to more compatible domains by college graduation or graduate school. Study-subjects with congruent choices tended to remain with their choice. Some tendency was found for students to do better in domains compatible with their cognitive styles. Keogh and Donlon (1972) indicated that while in the lower grades where students were compelled to fulfill the curricula guides of the school system and had almost no choice in subject selection, field dependent students have more learning and behavioral problems in school than the field independent students. Furthermore, Donlon (1972) reported that among college students who were determined to be field dependent or field independent, no significant difference was found in grade point average, but there was a significant difference in the types of courses the students selected to take. The field independent students took more science and mathematics courses while field-dependent students chose more courses from social sciences and humanities.

### **Field dependent-field independent cognitive style and students' academic achievement**

A study conducted by O'Brien and Wilkinson (1992) on "cognitive styles and performance on the National Council of State Boards of Nursing Licensure Examination", using a sample of 400 high-school students, and GEFT as one of the instruments for data collection, revealed that both field independent boys and girls performed better than field dependent ones on all subjects. They concluded that field dependence/field independence cognitive style was related to overall academic achievement. The result of the research on "student cognitive styles in postsecondary technology programme" by Hansen (1995), using a sample of ninety five (95) university and college students, and GEFT and Guilford-Zimmerman Aptitude Survey as instruments for collecting data, showed that field independent subjects achieved significantly higher mean grades than their field dependent counterparts.

Maghsudi (2007) investigated the interaction between field-dependent/independent learning style and learners' linguality in third language acquisition. The data were subjected to t-test analysis and the result revealed that there was a significant difference between field dependent and field independent students in their English Achievement Test scores ( $t=3.577$ ;  $P < 0.001$ ) in favour of the field independent subjects. Secondly, the data were also subjected to ANOVA test and the result showed that there was no significant interaction between students' learning styles, gender and their English Achievement Test Scores.

In a correlational study titled, "Undergraduate students' academic achievement, field dependent/independent cognitive styles and attitude towards computers," Altun and Cakan (2006) investigated the cognitive styles, achievement scores and attitude towards computer among university students. The sample of the study consisted of 130 undergraduate students ranging from freshmen to senior levels at a teacher training programme at Abant Izzet Baysal in Turkey. They found that;

1. Less than half (47.70%) of the participants were field dependent, 36.90% were field independent while 15.40% of them were in the middle group, meaning that they did not have certain tendency to either pole of the style.
2. There was no significant correlation between participants' academic achievement and their cognitive styles ( $r = 0.14$ ;  $P > 0.15$ ).

Adeyemi (1992) worked on the "cognitive style and sex as mediators of biology retention-test performance of students exposed to two instructional modes in Benin City, Nigeria". The results of the experimental study showed that field independent students performed significantly better than the field dependent students and that experimental group significantly retained materials learned during the course of treatment at the retention stage better than the control group.

Ndudi and Mkpa (2003) researched on the "Effect of cognitive styles and instructional strategies on students' achievement in social studies" and found that

1. For expository method of teaching, field dependent subjects ( $\bar{X} = 59.63$ ) significantly performed better than the field independent subjects ( $\bar{X} = 18.36$ ), and for discovery method of teaching, field dependent subjects ( $\bar{X} = 70.50$ ) performed significantly better than the field independent subjects ( $\bar{X} = 19.50$ ). Overall, a significant difference in achievement was found between the field dependent and field independent subjects in favour of field dependent subjects as measured by SSSAT at post treatment test ( $F_{1, 174} = 11.49$ ;  $P < 0.05$ ).

Okwo and Otubah (2007) found that field independent SS11 students performed significantly better than their field dependent counterparts in physics essay test with cognitive style explaining 5.21% of the variance in essay scores of the students.

### Methods

From the thirty four (34) registered secondary schools in Emohua Local Government Area (From the Department of Statistics, Rivers State Ministry of Education, 2010) eight clusters were obtained. Two schools were drawn from each cluster using simple random sampling technique giving a total of sixteen schools. Twenty SS1 students were drawn from each school also using simple random sampling technique. Hence, a total of three hundred and twenty (320) SS1 students took part in the initial study. The choice of SS1 students was made based on the fact that they had not selected arts or science subjects they would register for WASSCE. Hence, their motivational levels for all the subjects were even.

A research assistant from each of the participating schools helped in instrument administration, scoring of the instruments when they had been responded to and compiling the data so generated. The instrument used in this study for data collection was the Group Embedded Figures Test (GEFT). Group Embedded Figures Test (GEFT) is a validated and standardized instrument published by Witkin, Oltman, Raskin and Karp (1971). Its correlation coefficient measured over a three year period using Pearson product moment correlation technique was 0.89.

### Method of data collection

Copies of Group Embedded Figures Test (GEFT) were administered to the three hundred and twenty (320) SS1 students in Emohua Local Government. When the instrument had been responded to, their responses were scored and used to classify the students into field dependent, field independent subjects or ambiverts (neither field dependent nor field independent). The first seven figures in GEFT were for practice session. The nine figures in the second and third sections of the Group Embedded Figures Test (GEFT) respectively were awarded one mark each for the correct answers. So, the minimum mark obtainable by a student in this instrument was zero while the maximum mark obtainable was 18. However, Witkin, Oltman, Raskin and Karp (1971) did not specify clear cut-off points for determining field dependent and field independent individuals according to their performance in GEFT. Maghsudi (2007) used Mean  $\pm$  Standard deviation as boundary points. That is, those whose scores are;

$\leq$  Mean minus standard deviation..... Field dependent

$\geq$  Mean plus standard deviation..... Field independent

The rest are ambiverts.

In this study, the procedure adopted by Maghsudi (2007) for determining field dependent and field independent students was applied. Hence, those students whose scores were less than or equal to the mean minus standard deviation were adjudged as field dependent while those whose scores were greater than or equal to the mean plus standard deviation were adjudged as field independent. The rest were adjudged as ambiverts (neither field dependent nor field independent). 162 students who were found to be ambiverts were excluded from further study. Then the average score of each student's results in two key science subjects (Physics and Chemistry) and two key art subjects (English Literature and Christian Religious Studies) obtained from the result booklets of the schools for the term preceding the study was calculated and used as students' result data.

### Results

**RQ<sub>1</sub>:** What are the proportions of male and female secondary school students that are field dependent, field independent and ambiverts in Emohua Local Government Area of Rivers State?

**Table 1: Percentage distribution of the students**

Students		N	%
Field independent	Male	45	14.06
	Female	23	7.19
Field dependent	Male	22	6.88
	Female	68	21.25
Ambivert	Male	94	29.38
	Female	68	21.25
<b>Total</b>		320	100.01

Table 1 shows that 45 male students representing 14.06% of the respondents were field independent, while 23 female students representing 7.19% of the respondents were field independent. Twenty two (22) male students representing 6.88% of the respondents were field dependent, while 68 female students representing 21.25% of the respondents were field dependent. Ninety four (94) male students representing 29.38% of the

respondents were ambiverts. Sixty eight (68) female students representing 21.25% of the respondents were ambiverts.

**H<sub>01</sub>:** There is no significant relationship between field dependence-field independence cognitive style and gender of the students.

**Table 2: Chi-square result of the relationship between FD-FI cognitive style and gender**

Students	Gender	N	DF	A	X <sup>2</sup> <sub>-cal</sub>	X <sup>2</sup> <sub>-crit</sub>	Decision
Field independent	Male	46	1	0.05	27.90	3.84	Significant
	Female	22					
Field dependent	Male	23					
	Female	67					

Table 2 shows that the calculated chi-square is 27.90 while the critical chi-square at one degree of freedom and alpha level of 0.05 is 3.84. As the calculated chi-square is greater than the critical chi-square, the null hypothesis is therefore rejected. This implies that there was a significant relationship between field dependence-field independence cognitive style and gender of the students.

**RQ<sub>2</sub>:** What are the mean academic achievements of field dependent and field independent students in science?

**H<sub>02</sub>:** There is no significant difference in mean achievements between the field dependent students and field independent students in science.

**Table 3: t-test science result of field dependent and field independent students**

Students	N	$\bar{x}$	SD	DF	A	t <sub>-cal</sub>	t <sub>-crit</sub>	Decision
FD	90	51.78	9.35	156	0.05	8.02	1.96	Significant
FI	68	63.97	9.57					

Table 3 shows that the mean achievements of field dependent students and field independent students in science are 51.78 and 63.97 respectively while their standard deviations are 9.35 and 9.57 respectively. The calculated t-test is 8.02 and the critical t-test at 156 degrees of freedom and alpha level of 0.05 is 1.96. As the calculated t-value is greater than the critical t-value, the null hypothesis was rejected, implying that there was a significant difference in mean achievements between the field dependent students and field independent students in science.

**RQ<sub>3</sub>:** What are the mean academic achievements of field dependent students and field independent students in arts?

**H<sub>03</sub>:** There is no significant difference in mean achievements between the field dependent students and field independent students in arts.

**Table 4: t-test arts result of field dependent and field independent students**

Students	N	$\bar{x}$	SD	DF	A	t <sub>-cal</sub>	t <sub>-crit</sub>	Decision
FD	90	60.36	9.34	156	0.05	5.83	1.96	Significant
FI	68	51.46	9.62					

Table 4 shows that the mean achievement of field dependent students in arts is 60.36 with a standard deviation of 9.34 while that of field independent students is 51.46 with a standard deviation of 9.62. The calculated t-value is 5.83 and the critical t-value at 156 degrees of freedom and 0.05 alpha level. This implies that the calculated t-value is greater than the critical t-value. Hence, the null hypothesis was rejected. This implies that there was a significant difference in mean achievements between the field dependent students and field independent students in arts.

**H<sub>04</sub>:** There is no significant relationship between field dependence-field independence cognitive style and career choice of the students.

**Table 5: Chi-square result of the relationship between FD-FI cognitive style and students career choice**

Students	Career choice	N	DF	A	X <sup>2</sup> <sub>-cal</sub>	X <sup>2</sup> <sub>-crit</sub>	Decision
Field independent	Arts	16	1	0.05	36.76	3.84	Significant
	Science	52					
Field dependent	Arts	65					
	Science	25					

Table 5 shows that the calculated chi-square is 36.76 and the critical chi-square at one degree of freedom and alpha level of 0.05 is 3.84. Since the calculated chi-square is greater than the critical chi-square, the null hypothesis was rejected. This implies that there was a significant relationship between field dependence-field independence cognitive style and career choice of the students.

### Discussion of findings

It was found that a higher proportion of the male respondents were field independent while a higher proportion

of the female respondents were field dependent and there was a significant relationship between field dependence-field independence cognitive style and gender. The present finding is consistent with that of Antonietti and Gioletta (1995) who found that males tended towards field independence while the females tended towards field dependence. A higher proportion of the male students were field independent while a higher proportion of the female students were field dependent because cultural stereotypes tend to make males to be field independent and females, field dependent.

It was found that the field independent students had a higher mean achievement in science than the field dependent students and the difference in mean was significant. This present finding is similar to those of Okwo and Otubah (2007) and Adeyemi (1992) who found that field independent students performed significantly better than field dependent students in physics and biology respectively. Field independent students performed significantly better than field dependent students because field independent students are better problem solvers than the field dependent students and problem-solving ability is a crucial factor in teaching and learning of science.

It was found that the field dependent students had a significantly higher mean achievement in arts than the field independent students. This finding supported that of Ndudi and Mkpa (2003) who found that overall, a significant difference in achievement was found between the field dependent and field independent subjects in favour of field dependent subjects as measured by SSSAT at post treatment test in Social Studies. It was possible for field dependent students to score significantly higher than their field independent counterparts in arts because field dependent people have higher-developed social and interpersonal skills and prefer situations that require direct communication with others.

Finally, it was found that there was a significant relationship between field dependence-field independence cognitive style and career choice of the students. This finding is in line with the finding of Frank (1986) who found that this cognitive style is related to the choice of area of specialization in a manner consistent with field dependence theory. The present finding can be explained from the fact that field dependence disposition of people confers in them the interpersonal skills needed for excellence in the area of behavioural sciences and education as the field dependent people possess interpersonal skills.

## Conclusion

1. A higher proportion of the male respondents were field independent while a higher proportion of the female respondents were field dependent.
2. There was a significant relationship between field dependence-field independence cognitive style and gender.
3. Field independent students had a higher mean achievement in sciences than the field dependent students while field dependent students had a higher mean achievement in arts than the field independent students.
4. There was a significant relationship between field dependence-field independence cognitive style and career choice of the students.

## Recommendations

Based on the findings in this study, the teachers in secondary schools in Emohua Local Government Area should make effort to study the cognitive style of the students with the view to tailoring their teaching methods in line with the students' cognitive style. Career counsellors should take advantage of knowledge of students' cognitive styles to guide them on the types of careers they are likely to succeed.

## REFERENCES

- AbdurRaheem, A. L. (2010). Falling standard of education in Nigeria. *Nigerian Tribune*, May, 14, 2010.
- Achuonye, K. A., & Ajoku, L. I. (2003). *Foundations of curriculum development and implementation*. Port Harcourt: Pearl Publishers.
- Adeyemi, M. A. (1992). Cognitive style and sex as mediators of biology retention-test performance of students exposed to two instructional modes in Benin City, Nigeria. *International Journal of Educational Development*, 12 (1) 3-12
- Altun, A., & Cakan, M. (2006). Undergraduate students' academic achievement, field dependent/independent cognitive styles and attitude towards computers. *Educational Technology and Society*, 9 (1) 289-297.
- Anderson, J. (1988). Cognitive styles and multicultural populations. *Journal of Teacher Education*, 39 (1), 2-9
- Antonietti, K.M., & Gioletta, M. (1995). Individual differences in analogical problem solving. *Personality and Individual Differences*, 18 (5) 97-113
- Bahar, M., & Hansell, M. (2000). The relationship between some psychological factors and their effects on the performance of grid questions and word association test. *Educational Psychology*, 20, 349-361
- Blanton, E. L. (2004). The influence of students' cognitive style on a standardized reading test administered in three different formats. Retrieved August 7, 2010, from [http://etd.fcla.edu/C/F/CFE0000055/Blanton\\_Elizabeth\\_L\\_2004\\_EdD.pdf](http://etd.fcla.edu/C/F/CFE0000055/Blanton_Elizabeth_L_2004_EdD.pdf)
- Derussey, E. & Futch, E. (1971). Field dependence- independence as related to college curricula. *Perceptual and Motor Skills*, 33, 235-240
- Frank, B. M. (1986). Cognitive styles and teacher education: Field dependence and areas of specialization among teacher

- education majors: *The Journal of Educational Research*, 80 (1)19-22
- Hall, J. K. (2000). *Field dependence-independence and computer- based instruction in geography*. Doctorial Dissertation, Virginia State University.
- Hansen, J. W. (1995). Students' cognitive styles in postsecondary technology programme. *Journal of Technology Education*, 6 (2) 14-23.
- Kahtz, A. W., & Kling, G. (1999). Field dependent and field independent conceptualization of various instructional methods: A qualitative analysis. *Educational Psychology*, 19, 413-428
- Kelleher, W. E. (1997). The group embedded figures test: Field dependence/ independence and undergraduate commerce major. *College Student Journal*, 31, 45-51
- Keogh, B., & Donlon, C. (1972). Field independence, impulsivity, and learning disability. *Journal of Learning Disabilities*, 5 (7)16-21
- Liu, Y., & Ginther, D. (1999). Cognitive styles and distance education. *Journal of Distance Learning Administration*, 2 (3) 78-92
- Lucas-Stannard, P. (2003). Cognitive styles: A review of the major theories and their application to information seeking in virtual environment. Retrieved March 10, 2010, from <http://www.personal.kent.edu/~plucasst/cognitive%20styles.pdf>
- Maghsudi, M. (2007). The interaction between field dependent/field independent learning styles and learners' linguality in third Language acquisition. *South Asian Language Review*, 17 (1)100- 112.
- Messick, A. P. (1998). Cognitive preference and academic achievement to tenth grade physics students. *Indian Educational Review*, 22 (6), 29-37
- NairaBrain. (2009). Nigeria 2010 budget breakdown. Retrieved May 19, 2010, from <http://nairabrain.com/2009/11/25/nigeria-2010-budget-breakdown>.
- Nigeria Universities Updates (2009). WAEC will not make alteration on certificates. Retrieved May 14, 2010, from <http://nigeriauniversitiesupdates.com/?cat=126>
- Ndudi, M. J., & Mkpka, M. A. (2003). Effects of cognitive styles and instructional strategies on students' achievement in social studies. *The Educational Psychologist*, 1(1), 172-193
- Nwosu, C. (2008). Budget 2009: Nigeria proposes N2.87tn. Retrieved May 19, 2010, from <http://www.haaba.com/news/2008/12/03/272-216382/Budget2009-nigeria-proposes-n2.87tn>
- O'Brien, T., & Wilkinson, N. (1992). Cognitive styles and performance on the National Council of State Boards of Nursing Licensure Examination. *College Student Journal*, 26 (8). 156-161
- Okwo, F. A., & Otubah, S. (2007). Influence of gender and cognitive style on students' achievement in physics essay test. *Journal of the Science Teachers Association of Nigeria*, 42 (1) 85-88
- Ozordi, C. (2010). The falling grades. Retrieved May 14, 2010, from <http://234next.com/csp/cms/sites/next/home/5544951-146>
- Pithers, R. T. (2002). Cognitive learning styles: A review of field dependent-independent approach. *Journal of Vocational Education and Training*, 13 (4), 267-279
- Rayner, S., & Riding, R. J. (1997). Towards a categorization of cognitive styles and learning styles. *Educational Psychology*, 17, 5-27
- Rickardson, J., & Turner, T. (2000). Field dependence revisited: Intelligence. *Educational Psychology*, 20, 255-270
- Summerville, J. (1999). Role of awareness of cognitive style in hypermedia. *International Journal of Educational Technology*. Retrieved August 20, from [http://www.outreachuiuc.edu/ijet/v1n1\\_summerville/](http://www.outreachuiuc.edu/ijet/v1n1_summerville/).
- Tinajero, C., & Paramo, M. (1998). Field dependence-independence cognitive style and academic achievement: A review of research and theory. *European Journal of Psychology of Education*, 13, 227-235
- Vernon, P. (1972). The distinctiveness of field independence. *Journal of Personality*, 40, 366-391
- Waber, D. (1997). Biological substrates of field dependence: Implications of the sex difference. *Psychological Bulletin*, 84, 76-87
- Witkin, H. A. (1976). *The perception of upright*. In S. Messick (Ed.) *Individuality in learning: Implications of cognitive styles and creativity for human development*. San Francisco: Jossey Bass Publishers
- Witkin, H. A., & Goodenough, D. R. (1981). *Cognitive styles: Essence and origin*. New York: International University Press.
- Witkin, H. A., Goodenough, D. R., & Karp, S. A. (1977). Stability of cognitive style from childhood to young adulthood. *Journal of Personality and Social Psychology*, 7, 291-300.
- Witkin, H. A., Oltman, P. K., Raskin, E., & Karp, S. A. (1971). *A manual of the Group Embedded Figures Test*. Palo Alto, California: Consulting Psychologists Press.

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