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# INTELLECTUAL STYLES OF MALE AND FEMALE SENIOR SECONDARY SCHOOL BIOLOGY STUDENTS – IMPLICATION FOR CREATIVITY

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## ABSTRACT
*This study titled, the intellectual Style of Male and Female Senior Secondary School Biology Students- Implication for Creativity was a descriptive survey. Using a standard instrument, the Group Embedded Figure Test (GEFT), the intellectual style of senior secondary school biology students in Giwa Educational zone of Kaduna state was determined. Purposive sample technique was used to draw a sample of 211 students. The data was analysed using descriptive and Chi square statistics. The result revealed 95.3% as Field Dependent while 5.7% are Field Independent. Also there was a significant relationship between Field Dependent – Field Independent intellectual styles and gender. It was concluded that the disposition of our science students towards thinking is quite worrisome. Some recommendations were given.*
***Keywords**: Intellectual style, cognitive style, creativity, biology student*

## INTRODUCTION
Due to globalization and technological change, educational systems around the World have to be attentive to the changing priorities and learning needs of students (Evans & Waring, 2011).Acknowledging the diversity of our students in terms of culture, ethnicity, family background and cognitive style is essential at this stage of Nigeria's educational development. According to cool (2009), evidences abound in the literature pointing to the fact that, style has an impact on processes such as decision making, problem solving, perception and learning. Style refers to the relatively stable states with respect to learning and thinking that people have a proclivity to enter into and which are more or less adaptive under different sets of circumstances (Sadler –Smith, 2012).There are a lot of style labels in the literature. However, in a recent review Zhang, Sternberg and Rayner (2012) observed that all style dimensions were unified under the umbrella term intellectual style. According to Zhang &Sternberg (2005), intellectual style refers to one's preferred way of processing information and of dealing with tasks. The authors opined that, "to varying degrees, intellectual style is cognitive, affective, physiological, psychological and sociological". However, Field –Dependence/ Independence (FDI) cognitive style construct are the most widely researched intellectual style Construct (Witkin 1977, in Cao, 2006). This study is poised to study the Field Dependence/Independence

intellectual style profile of senior secondary school science student in Giwa Educational zone, Kaduna state, Nigeria.

## Theoretical Framework

Field –Dependence/ Independence alternatively known as psychological differentiation and perceptual style (Witkin, Dyke, Faterson, Goodnough & Karp, 1962), FDI refers to the extent to which people are dependent upon versus independent of the organisation of the surrounding perceptual field. Field independent (FI) individuals are thought to be better at cognitive restructuring because of their propensity for being free from external referents. Field –dependent (FD) individuals are considered as being more socially oriented because of their higher levels of sensitivity to external referents (Zhang and Sternberg, 2012). FI depict individuals that can easily recognized a figure embedded in a field whereas FD describes individual that cannot easily recognized such a figure. Blanton (2004) shed more light on the characteristics of FI and FD individuals. In literature, several studies exist on Witkin Field –Dependence/ Independence cognitive construct. For instance earliest study (i.e., Witkin, 1962, Wober, 1966, MacArthur, 1970, Gruenfeld and MacEachron (1975) showed empirically that students in the united states tends toward field independency, while many African students fell within the more field dependent range across several measures of FDI. that the level of field independency were systematically associated with the levels of economic development of respective countries. However, empirical finding of recent disagree with the earliest finding (Zhang and Sternberg, 2012). Many empirical research finding showed the performance of the FI to be above the FD students (i.e. Onyekuru, 2015, Musya, 2015 and Danili and Reid, 2004).

In fact, Tinajero and Paramo's (1998) concluded that field-independent students perform better than field-dependent students, across different discipline. Other studies tend to find out the effectiveness of different instructional strategies on the performance of FI and FD. In some of these studies, the researchers tend to use a particular instructional strategy to help the FD perform equally well as their counterpart, FI student (i.e Altun and Cakan (2006), computer instruction, Cao (2006),cueing strategy, in a multimedia environment, Hsu &Dwyer(2004), providing different level of adjunct questions in a hypermedia, Dwyer &Moore(2001). In this study, intellectual style (Field dependency/independency) of senior secondary school biology students in Giwa educational zone, Kaduna, northwest Nigeria was explored.

## OBJECTIVES OF THE STUDY

The objective of this study include,

- To determine the intellectual style profile of senior secondary school science using the GEFT instrument.
- To determine the relationship between the FDI intellectual style and Gender.

## RESEARCH QUESTIONS

The following research question guided the study

- What is the intellectual style (Field dependency/independency) profile of the students as measured by the GEFT instrument?

## RESEARCH HYPOTHESIS

- There is no significant relationship between field dependence- field independence intellectual style and gender of the student

## METHODOLOGY

The research design is a survey. The population of the study is all senior secondary II school biology students in Giwa Educational Zone of Kaduna state, north western Nigeria. Four schools were purposively sampled because of their infrastructural advantage. Purposively three schools were used and a sample of 211 students was drawn .The sample comprised of 110 males and 101 females. A standard instrument, the Group embedded Figure Test (GEFT) (Witkin, Oltman, Raskin and Karp, 1971) was used. The GEFT has a reported reliability coefficient of 0.82 and 0.79 for male and female respectively (Luk, 1998 and Edward, 2008). The GEFT was used to establish the students' cognitive style. The GEFT has three sections which consist of twenty five items. First section consists of 7 items while second and third sections consist of 9 items each. The subject is asked to locate a previously seen simple figure within a larger complex figure which has been designed to obscure or embed the sought – after simple figure. Scoring was done as the number of simple forms correctly traced in the second and third section combined. The total score is 18. The items in the first section are not included in the total score. Those who scored above 12 out of 18 were labeled as FI, and those with a score of 11 and less than 11 were branded as FD cognitive stylists (Kathib and Hosseinpur, 2011).Data generated were analysed using simple descriptive like percentage. The hypothesis however, was tested using Chi square statistical tool at 0.05 level of significance.

## RESULTS AND DISCUSSION

What the Intellectual Style profile of the students is as measured with the GEFT instrument?

Simple percentage was computed and the result is presented in figure 1 below

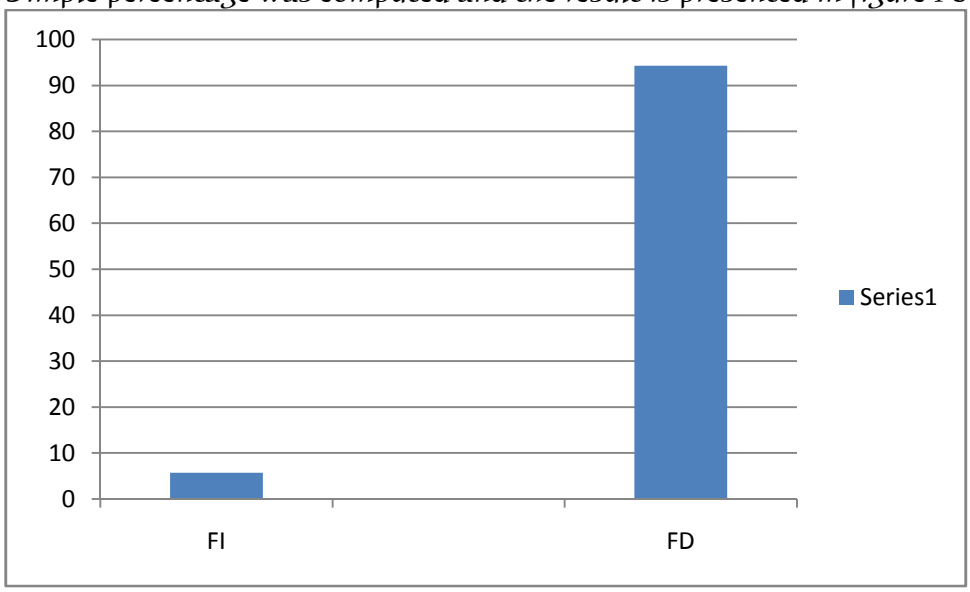


**Figure 1:** The Intellectual style profile of the students

The result showed the percentage of the FD to be 94.3% while the percentage of the FI to be 5.7%. This result could be attributed to the fact that, majority of our students don't like task that demands much thinking and reflection. This result agrees with, Ibrahim (2008) and Mokhtarian (2003), who found that most students were Field dependent and are at the concrete level of cognitive thinking. This result points to the fact that, thinking to most of our science students is not a desirable venture. It does concur with Anderman & Sinatra( 2008) assertion that Some students are dispositionally low in need for cognition, that is, they are not comfortable with opportunities to engage in the effortful thinking required to solve complex problems. The chi square analysis of the data result is presented in table 2.

## HYPOTHESIS

There is no significant relationship between Field dependency/Independency and gender. Chi square analysis was computed at 0.05 significant levels and the result presented in table 1 below.

| Gender | Intellectual style FD | FI | $X^2$-Cal | $X^2$-Critical |
|---|---|---|---|---|
| Male | 100 | 10 | 13.27 | 3.841 |
| Female | 99 | 2 | | |

**Table 2**: Chi square Analysis of intellectual style and Gender

Table 1 showedan$X^2$ calculated value (13.27) greater than $X^2$critical value (3.841). This indicates that, there is a significant relationship between field dependence-field independence intellectual style and gender .The result is in congruent with the result of Onyekuru(2015), who reported values of 27.90 and 3.84 for calculated and critical value respectively. According to Atonietti and Gioletta (1995) males tended towards field independence while the females tended towards field dependence. This could be as a result of cultural stereotypes that tend to make males to befield independent and females, field dependent. Although, differential psychologist and educationist seem to agree that, style (intellectual style) differs with intelligence or cognitive ability. The implication of this study however, is worrisome. Considering the characteristics outlined by Blanton (2004) and the demands and challenges of the 21st century, it seems reasonable to deduce that our science students usually do not appreciate the opportunities to engage in the effortful thinking required to solve complex problems.
Ability to think independently, to separate relevant from irrelevant, to concentrate on task amidst distractions, reflectiveness as stated earlier are all qualities that can promote creative and innovative thinking. A creative person is someone with the ability to solve a problem in a situation where the context of the problem and interpretation is unclear. This description seems to support the FI as having an added advantage towards creativity. However, the FD might not be altogether disadvantaged. Mentoring, role models and other social inclination that support creativity –might favour FD students. However, going by the traits of a creative person listed by Blank (2005) that is, curiosity, confidence, independent and non-conformity are traits that will support FI as being more creative. However it calls for a more effective instructional differentiation in the science classroom
Base on the findings of this study, it can be concluded that the disposition of science students toward thinking is quite worrisome.

## RECOMMENDATIONS

- Teachers should expose students to metacognitive skills or strategies that can cause a shift in students style preference
- Employing instructional strategies like cooperative learning, inquiry learning teaching, where the teacher assumes the role of a facilitator can help the field dependent student to think independently

- Conduct an empirical study using different creative instrument(i.e., Torrance instrument of creativity) to study the relationship between intellectual style (Field dependency /independency) with creativity

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