



CONVERGENCE-DIVERGENCE LEARNING STYLES AND ACADEMIC PERFORMANCE OF SOME SELECTED SECONDARY SCHOOL STUDENTS IN CHARANCHI LOCAL GOVERNMENT AREA OF KATSINA STATE, NIGERIA

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Abstract

This study investigated convergence-divergence cognitive styles and students' academic performance in Charanchi Local Government, Katsina State. The study has two objectives and two hypotheses. A descriptive survey design was used for the study. The population of the study consists of 526 students from which the sample of 210 was drawn from the population. The Uses of Objects or Things Test (UOTT) for convergent and divergent dimension developed by Hudson (1967) was modified and adapted. t-test at 0.05 level of significant was used in $\tan \pi - \frac{1}{15}$ analyzing the data. The findings showed that significant difference exist between convergent and divergent students in their academic performance in mathematics and social studies. It was recommended that teachers should not rely on intelligent tests alone in testing the abilities and capabilities of children but also consider the creative children in classroom. Also teachers and parents should not force children to study school subject(s) and programmes that do not suit their abilities and capabilities. Schools, education authorities and other examination governing bodies should not depend entirely on intelligent tests alone for students' academic achievement and placement.

Key words: Convergence, Divergence, Cognitive Styles, Mathematics, Social Studies

Introduction

Most teachers from experience have known the types of children, the intelligent ones who do well in school activities, examination, tests, sciences and mathematics. The second are those who are less inspiring but who perform better in arts and humanities. As Mukherjee (2002:91) put it, these students do well in arts subjects, love music and creative work in arts. They perform better in open-ended tests than intelligent tests. They are too much freedom and refer much to teachers' point of view. The former types of children are known as convergent thinkers or convergers while the later types are known as divergent thinkers or divergers.

To distinguish creativity from intelligence, some researchers used distinction between convergent and divergent thinking proposed by Guilford as reported by Henry (1996: 481). Guilford explains that, convergent thinking may lead to a correct and conventional answer whereas divergence thinking involves generating many novel answers or solutions. (Wallach and Kagan 1965 reported Henry 1996: 481) shed more light on divergent thinking and said that, it is similar to ideational fluency which helps refers to a number and kinds of ideas that an individual can generate. For example how many different things can you do with a brick?



Also Finke (1990) reported in Dennis (1995 & 2007) explained that divergent thinking is an important part of creative thinking, but there is more to it. To be creative, the solution to a problem must be more than novels, unusual or original but it must also be practical if it is intentional and sensible.

The concept of convergence and divergence thinking dates back to 1959 when Guilford used factor analytic approach for the study of creativity. Hayes (1998: 107) reported the work of Hudson (1966) which identified two different difficult learning (cognitive) styles called convergent and divergent dimension which were found through analysis of approach in the school boys' task in their academic work. The work of Cropley (1967) on creativity attempted to distinguish between convergent and divergent thinkers. Cropley's work which was revised by Victorlee (1981) cited in Adeyanju (1996) explained that the subjects who performed well in intelligent test in an academic subjects like Mathematics and Physical Sciences which lead to single answer are convergence thinkers.

A good number of researches have discussed the conceptual ideology of convergence and divergence thinkers based on their individual findings. Hudson (1967) in Adeyanju (1996) reported in Adamu (2010) has discovered that, a diverger is an individual who tends to be better at finding many solutions to an open-ended problem than solving a problem which has a single correct solution. The converger on the other hand is an individual who tends to be better at finding single correct answer or solution to a problem. Also Lytton (1971) in Adamu (2010) who reported the work of Guilford (1968), argued that, convergers have closed system of thinking and divergers have adventurous thinking. In other words in divergent thinking operation,

the individuals tend to think in different directions which often search for variety. In the views of Mukherjee (2002: 91) stated that, a convergent is a person who scores more in an intelligent test rather than in an open-ended test and similarly, a divergent may be referred to as a person who scores more in an open-ended test than in an intelligence test. Even though, a convergent scores higher in intelligence test than a divergent, yet we cannot hurriedly conclude that convergent are more intelligent than divergent.

Ability Identification of Learning (Cognitive) Style of Convergence and Divergence Dimension

There are several instruments used in the categorization of the dimension. In the early days, test of creativity were used to determine divergence thinking but today researchers are using varieties of instruments to identify this dimension. Adeyanju (1996:100-151) reported in Adamu (2010) had presented some of these tests employed by many authors.

1. **Uses of Objects or Unusual Uses of Things:** In this test subjects are required to think as many uses of common objects or words found in the environment presented to them in a test situation as possible. The numerously and the originality or the unusual nature of responses are used as the basis for classifying convergent and divergent production.
2. **The Line Meaning Tasks (LMT):** This involves visual stimulation materials in which the subjects are confronted with about eight (8) or more lines to generate meanings relevant to each of the line in questions. The complexity of production and meaningfulness are used for classifying convergence and divergence thinkers.



3. **Drawing Completion Test:** Here the subject will be requested to meaningfully complete a stimulus line or an uncompleted meaningless diagram. The details included in the completed exercise as well as the originality of production will add-up to distinguish the convergent from divergent.
4. **Projection Test:** In the projection test, the subject is made to respond to a freehand discussing or stimulus on every under scenery. This test is very similar to the Thematic Apperception Test (TAT). Since the stimulus picture is meaningless and conveys nothing concrete. The subject is induced to bring out his interest, disposition and personality. This focus of interest in the test and in details of originality and the level of interest in the production. It should be noted that, the major difficulty in the use of these tests is the technicality of scoring and interaction of intelligence in the open-ended test production. It is very difficult to come up with very objective scores on the open-ended test itself. Adequate care should therefore, be taken in the isolation of the highest 25% of the subjects turns out to be the divergent individuals while the lowest 25% scores indicate the convergent individuals.

Personality Characteristics of Convergent and Divergent Thinkers

The study of Hudson (1963) in Mukherjee (2002:91) reported in Adamu (2010) indicates that, convergers are usually authoritarian, masculine, unemotional and sober, while divergers are liberal, feminine, emotional and humorous. He further explained that convergers are more likely to change their opinion than the divergers when

alternative judgment is given to them from authority.

In Mukherjee's observation, the convergers were seem to be authoritarians because they themselves are obedient to authority while divergers on the other hand are known to be emphatic about their believes, they are self-confident, fastidious and do not consider it desirable to obey authorities especially in skills and professional advice.

Adeyanju (1996:30) reports the work of Getzels cited in Adamu (2010) which explained that the preference of convergers in achievement test is unexpected because the convergers were duly reforming according to prediction from their IQ scores, whereas divergers performed above their IQ predictions. This tends to see the divergers as ones achiever. He further affirmed that, divergers are known to be unpopular with their teachers and often seem to be unhappy with their relationship with them, rather they believe with their classmates as they could turn out to be the starts among their mates.

Educational Implication and Scholastic Achievement of the Convergence and Divergence Thinkers

One of the numerous researchers in this domain is Kolb (1984) who shows that, the divergent learning style depends mainly on the dominant learning capacities of active experimentation and abstract conceptualization. With this active capacity, the style has great advantage in decision making, problem solving, intelligent test and practical application of theories.

The work of Getzels and Jackson reported in Mukherjee (2002:93) in Adamu (2010) found that, divergers had significantly lower scores in Mathematics and Sciences attainment test than the convergers, whereas the convergers who scored highly in sciences and



intelligence tests are significantly more popular in the eyes of their teachers than the divergers.

In a similar view, Seka et al (2002:153) also reported the work of Getzels and Jackson (1968) in Adamu (2010) discussed some personal intellectual characteristics of convergent and divergent thinkers as follows:

- i. The high creative child has a taste for the bizarre. This is one of the manifesting means of producing a more general conceptual freedom.
- ii. The divergers have cultural interest while convergers are more practical and out of doors.
- iii. The divergers interest outside school curriculum are readings, current affairs and arts, whereas the convergers are more concern with cars, radios, model building, natural history etc.
- iv. The divergers tend to have a broad range of interests while convergers' interest is narrow.
- v. Convergers are much more likely than divergers to produce uses for objects involving aggressiveness or to produce violent themes for drawings.
- vi. Divergers tend to be more likely than convergers to be witty. Their high creativity sometimes runs to elaborate and sustained fantasy, both comic and bizarre.
- vii. Divergers are also much more likely to have views which are liberal and non-authoritative.
- viii. They diverger is emotionally opens while the converger is emotionally defensive and closed.

Many researches have indicated the school achievement and classroom implication and practice of convergent and divergent thinking. Roa (1941) and Hudson (1967) in Saka, Sam and Khairat (2002:155) favored

convergers in Mathematics and natural sciences performance. While Mackinnon (1971) in the same book described that, divergers favour creativity. Saka continued to explain the classroom mode of thinking of the convergent and divergent dimension and stated that:

- i. Both convergence and divergence required school curriculum to be diversified enough to accommodate their thinking style.
- ii. Informal school system should be advocated to encourage divergent thinking. This demands the flexibility of the instruction to enable students collect data through projects, educational tour, group work, interactions and so on.
- iii. Teachers should develop a knowledge based upon which students can build and come out with a variety of reasonable solutions to problems.
- iv. Students should be encouraged to interact with accomplished models to enable them become original and imaginative.
- v. Dialectic is important to enhance divergent thinking.
- vi. Elements or creativity such as fluency, originality and flexibility should be introduced into the teaching learning process.
- vii. Knowledge on students' cognitive style will be valuable in counseling them on their academic and career choices. This is particularly important in Nigeria today where few objective criteria like scholastic aptitudes or vocational interest tests exist for counselors to base their advisory services upon.

It is therefore, reasonable to ask, how can we encourage convergent and divergent thinking strategies since our society needs the services



of more creative scientists than it does of creative artists.

Objectives

- (1) To identify the differences in academic performance between convergent and divergent students in mathematics.
- (2) To identify the differences in academic performance between convergent and divergent students in social studies.

Hypotheses

Ho₁: There is no significant difference in academic performance between convergent and divergent students in mathematics.

Ho₂: There is no significant difference in academic performance between convergent and divergent students in social studies.

Methodology

The research design used in this study was descriptive survey research design. This is because this design can provide all the safeguards prerequisites for conforming or rejecting hypothesis, and it is the basic for all types of research in assessing the situation as a prerequisite to inferences and generalization.

Population of the Study

The population of this study comprises J.S.S II students of Junior Secondary Schools in Charanchi Local Government area. The schools involved are; G.S.S. Ganuwa, G.S.S.S. Kuraye and G.S.S.S. Majen waya. The three (3) schools comprised five hundred and twenty-six (526) students as per table below:

Table 1: Population of the Study

S/N	SCHOOL	MALES	FEMALES	TOTAL
1.	G.S.S Ganuwa	80	65	145
2.	G.S.S Kuraye	110	81	191
3.	G.S.S Majen waya	140	50	190
	Total			526

The Sample Size for the purpose of this research, the Research Advisor (2006) table was used to determine the sample size. Since the population of the research is 526, the researcher used a sample of 210 students,

whom were randomly selected from the total population of them as per table below:

Sample Size

The research Advisor (2006) table was used to determine the sample size which is 210 as per table below:

Table 2: Sample Size

S/N	SCHOOL	MALES	FEMALES	TOTAL
1.	G.S.S Ganuwa	30	25	58
2.	G.S.S Kuraye	40	37	77
3.	G.S.S Majenwaya	40	35	75
	Total			210

Instrumentation

The uses of Object or Things Test (UOTT) was employed for identification of the dimension. The list contained six (6) common objects and the students were asked to write ten (10) uses of each. Each correct

answer attracted 1.5 marks and the total marks for each object is 5 marks and grand total is 5marks x 6marks =30 marks

The researcher tested 210 students of the three schools in the above three tests for the purpose of scoring in each variable. The

researcher also collected the terminal examination scores in Mathematics and Social Studies to serve as academic performance data.

The first data analyses of learning (cognitive) styles tests were collected and analyzed to classify each dimension. While the second

data was collected and was used to analyze the hypotheses using inferential statistical techniques of t-test. This technique is assumed to be the most appropriate methods for handling significant differences between two or more variables.

Table 3: T-test analyses of academic performance in Mathematics for convergent and Divergent Student

Variable	N	Mean	SD	t-value	DF	p-value	Decision
Convergent	210	58.27	19.61	8.96	418	0.000	Significant
Divergent	210	38.67	14.29				

The analysis has shown that, the convergent has the mean score of 58.27 and SD of 19.61 while divergent has the mean score of 38.67 and SD of 14.29. The t-value is 8.96, DF of 418 and p-value of 0.000. Since the p-value

of 0.000 is less than the significant value of 0.05 (p-value $0.00 < 0.05$) the null hypothesis was rejected meaning that, there is significant difference in the performance of the two variables in favor of convergent students.

Table 4: T-test of performance in Social Studies for convergent and divergent students.

Variable	N	Mean	SD	DF	t-value	p-value	Decision
Convergent	210	45.67	17.69	418	8.901	0.000	Significant
Divergent	210	58.92	19.86				

The analysis has shown that, the convergent has the mean score of 45.67 with SD 17.69 and divergent has the mean score of 58.92 and SD of 19.86. The t-value is -8.901 and the p-value of 0.000. Since the p-value of 0.000 is less than the alpha value of 0.05 (p-value $0.000 < 0.05$) the null hypothesis was rejected, meaning that there is significant difference in performance of the two variables in favor of divergent. This showed that divergent performed significantly better than convergent in Social Studies.

Findings

1. The findings in hypothesis 1 showed that, the convergent students

performed significantly better than divergent students in Mathematics.

2. In hypothesis 2, the findings have showed that, the divergent students have performed significantly better than convergent students in Social Studies.

Discussion

The hypotheses which state that there is no significant differences between academic performance of convergent and divergent students in Mathematics and Social Studies was tested. The findings showed that convergent students performed better in Mathematics and divergent students performed better in Social Studies. The



findings has agreed with the findings of Victorlee (1981) which concluded that convergent students are better in Mathematics and physical sciences while divergent students are better in Social Studies as an arts subject.

Conclusion

This paper is sought to determine the relationship of learning (cognitive) styles and school academic performance among junior secondary school students has come out with the conclusion tenable for the student in this research and similar student in other communities. The hypotheses was tested and the analysis showed that, it was rejected meaning that convergent performed significantly better in mathematics, while divergent performed better in social studies. This may be because of the peculiar differences in their cognitive and possibly the skills and methods they use in solving problems. Finally, this finding made in Nigeria and other parts of the world have proved that learning style of convergent mostly perform better in mathematics and physical sciences while divergent students perform better in art, humanities and other open-ended tasks.

Recommendations

The following recommendations were made:

1. Teachers should not rely on intelligent tests alone in testing the abilities and capabilities of children but also consider the creative children in classroom.
2. Teachers and parents should not force children to study school subject(s) and programmes that do not suit their abilities and capabilities.
3. Schools, education authorities and other examination governing bodies should not depend entirely on intelligent tests alone for students'

academic achievement and placement.

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