

Underscoring Creativity of High-Achieving Secondary School Students: A Discourse on Gender, Environment and Cognitive Interference

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Abstract

This study examined gender, environment and cognition factors as determinants of creativity among high-achieving secondary school students in Oyo, Nigeria. The study adopted an ex-post facto research design. Four hundred and sixty (460) High achieving students were selected to participate in the study through a systematic sampling technique across twenty-three secondary schools in Oyo, Nigeria. Three research Instruments used in the study were Slosson's Intelligence Test (SIT) $\alpha = 0.97$, Ibadan Creativity Assessment Scale (ICAS) $\alpha = 0.79$ and Socio-Economic Status Scale (SES) $\alpha = 0.73$. Three hypotheses were tested at 0.05 level of significance data collected from the study were analysed using multiple regression analysis and t-test statistics. The results showed that environmental, gender and cognitive factors, when taken together significantly predicted creativity in participants, ($F_{(12; 447)} = 7.514$) $p < .05$. Also, there was no significant difference between male and female students' performance on creativity ($t = 0.212$; $df = 458$; $p > .05$). Based on these findings, it was concluded that home and school environments were critical to the expression of creative behavior in the participant students. Recommendations were however made based on these findings for parents, teachers, government and all stakeholders to creatively re-structure both home and school environments with a view to facilitate the development and enhance future planning of creative potentials of high-achieving secondary school students in Oyo, Nigeria.

Keywords: creativity, environment, gender, cognition, high achieving students

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Introduction

Creativity is a complex concept. It is derived from a Latin word “Creatus” which means “to bring into being.” More often than not, creativity has been associated with the arts—painting, dancing, sculpture, literature and the likes. In some cases, creativity is considered synonymous with innovation or invention. Researchers in the area of creativity have used terms such as innovation, novelty, imagination, discovery, newness, ingenuity, uniqueness, unusualness, intuition, originality and invention to describe the nature of creativity (Oyundoyin, 2003). Innovation and creativity are distinct but interconnected core ideas and both are crucial for teaching and learning successful outcomes. Esu (2015) contended that in an educator’s journey, it is not creativity that propels his/her creations development but rather innovation, but innovation does not take place unless a teacher possesses creative abilities, accordingly, whenever a teacher permits bureaucracy to hinder creativity, it might result in lack of novelty in his/her teaching, hence, a creative teacher carries out the innovative process by being the first to identify potential opportunities for teaching and learning.

Creativity is often acknowledged superficially; some schools are now seeing genuine instances of innovation taking place beyond their premises. Psychologists contend that creativity is not an optional addition to the classroom, but rather, a distinct and measurable set of psychological skills that enhances learning and it is crucial in the era of technological advancement, that is 21st century (Fraser, 2022; Nakano & Wechsler, 2018; Stephenson et al., 2021).

In his book titled *Creativity in the Classroom*, Startho (2018) enumerated techniques that foster creativity as addressing problems, exploring several possibilities and encouraging inquiry which facilitates profound comprehension, creativity might serve as a predictor of school success, surpassing the contribution of standardized test results, the use of creativity may enhance learning experience upon achieving educational milestone. Creativity encompasses more than simply the act of developing or producing art; it extends to living in a creative manner (Sternberg, 2012).

Humaira (2012) investigated the efficacy of creativity, creative writing and classroom tactics among English instructor in Pakistan, using both closed-ended and open-ended questionnaire as well as group interview as data collection devices. The finding revealed that the currently employed were experiencing a lack of clarity on the techniques required to stimulate students’ enthusiasm for creative writing. Also, revealed was a strong connection between creativity and creative writing. In the same vein, Zairil et al. (2015) researched on the use of creative thinking abilities in the context of academic essay writing in an Islamic higher institution of learning. The study included two experimental groups of undergraduate students receiving treatment via the Cognitive Research Trust Programme, and the control group that are left with conventional method. The result of the research revealed a favourable correlation between instructors’ creativity and students’ performance, thus, suggesting that in order to enhance educational standard required in this current age of globalization, there should be an improvement on conventional teaching method.

High achieving students are generally found exhibiting some creative characteristics, Nwazuo (1996) identified in them a general average or above average of intelligence, ideational fluency, discriminating observations, superior memory, ability to synthesize disparate ideas, cognitive flexibility and the production of unusual but appropriate ideas.

Furthermore, they are original in their ideas and to these set of students, repeated failures would not intimidate them into submission.

Studies which investigated gender differences in creativity are often characterised by contradictory results. Some of the findings showed male superiority over females, some vice versa, yet others did not implicate and differentiate between the two sexes. Some psychologists opined that creativity is sex inclined, as their findings favour males, that is, creativity is commonly found more among the males than the females due to perharps, the sex roles difference emphasized in the society (Eric, 2003).

Tagano and Moran (1989) assessed the development of sex differences in creativity of pre-school and early elementary school children in terms of ideational fluency and discovered that sex differences were not found in pre-school but by third grade, boys scored significantly higher than girls on both popular and original responses.

However, in a study conducted, Kim and Michael (1995) found the relationship of creativity measure on learning and thinking style using 92 male and 101 females Korean II grade, it was discovered that females are more creative than their male counterparts. In the same vein, Orioux and Yewchuk (1990) had found that gender effects favoured females than males in creative performance. Other researchers such as Gonen (1993) and Selby (1993) in their various studies found on the contrary, no significant difference between males and females performance in creativity scores.

On the relationship between creativity and environment, many research studies had been conducted. Nwazuo et al. (2002) in Nigeria's cultural context identified home as playing a central role in fostering or inhibiting creativity. It was advanced that parents, being the child's first educator in life, occupy a privileged position with respect to the nurturance of creativity in the child, therefore parents should be prepared to accommodate the divergent views or opinion of their children unconditionally in order to encourage the creativity potentials in them. Also, observed was that rigid, authoritarian parenting would stifle creativity because such an approach had the potential of making children very protective of the status quo and unable to question the relevance or usefulness of certain practice.

Lee and Lee (2003) confirmed the psychosocial and functional impact of physical surroundings on creativity; their study focused on significant physical attributes that support individual creativity universal skills such as divergent and convergent thinking and idea generation which were identified as the components of creative performance at work along with professional and motivational factors. Also considered in the study was inspiration for creative idea generation, social exploration, recharging and mixed-used spaces with balanced workplace layouts. The study further provided experimental evidence of the effect of interior design element on creativity, while perceptually stimulating environments could enhance creativity through physical contexts. Social spaces were frequently found to be influential on creativity.

In another study, Oyundoyin (2003) examined environmental factor as a predictor of creativity, these factors include parents' academic attainment, family, parental occupation, attitudes and position in the family, teachers' attitude, classroom interaction, and expression of opinion, it was discovered that these factors did not significantly predict creativity among secondary school students.

It is worthwhile to report that many scholars actually studied the effects or relationship between intelligence and creativity. This is evidenced with the usage of intelligence tests and creative scores to express their correlation. The cognitive factor predicts creative performance in a study (Oyundoyin, 2003).

Vincent et al. (2002) had found very low correlation between intelligence and creative scores in various tests. Nwazuoke (1996) further asserted that individuals may be above average in intelligence but not necessarily being gifted. In another development, support for distinctions between intelligence and creativity was reported to have come from a study of young children by Moore and Sawyers (1987) in which they reported that original thinking is distinct from intelligence. Equally, Runco (2003) had found a non-linear, positive relationship between intelligence and creativity test scores.

The creative person has been described as one who has the ability to see beyond existing structure and invest relationships with a view to bringing something into existence, to invent, innovate and provide the means for meeting challenge of life in a rapidly changing world. Thus, Adediran and Adebajo (2025) contended that if we were to identify children as high achieving or gifted simply on the basis of intelligence tests, we would eliminate from consideration approximately seventy percent of the most creative. Students with high grades in school may or may not be creative well in school or on the job or never generate any original ideas. There are also children who do poorly in school and demonstrate little motivation but have a high degree of creative talent. Thus, Moglia and Abalos-Merino (2024) corroborated this assertion that the relationship between creativity and intelligence is therefore complex, involving numerous variables, including social context and personal experience. As research continues to explore these dynamics, it becomes clear that both constructs are multifaceted and essential for effective problem-solving and innovation across various domains.

Hypotheses

Three hypotheses were tested at 0.05 level of significance.

1. Gender factor will not significantly predict creativity of the participant students.
2. Environment factors will not significantly predict creativity of the participant students.
3. Cognitive factor (Intelligence Quotient) will not significantly predict creativity of the participant students.

Methods

The study adopted ex-post facto research design. Systematic sampling technique was used to select 23 secondary schools in Oyo State, Nigeria. 20 students each were selected from each schools selected using simple random sampling method. This sums up to 460 secondary school students.

Instrumentation

The instruments used for this study include:

Slosson's Intelligence Test

This test was re-validated to suit the culture of the testees without altering content validity of the test. The test is being used in this study assess the intelligence quotient of the samples. The 1960 revision of the Stanford Binet (BS) Intelligence Test was used by Slosson (1985) as the criterion in building his test and in establishing its validity. His sample include 701 persons ranging in age from 4 to 18+ years.

Concurrent validity coefficients were calculated that the SIT correlated with its criterion, the SB, just as the SB correlates with itself. The validity and utility of the SIT thus appeared to be well established. The researcher equally subjected it to test-retest by administering it to students of C. A. C. School for the Gifted, Ibadan. The instrument yielded a high content validity and a test-retest reliability of 0.86.

Ibadan Creative Assessment Scale

This was developed by Akinboye (1977) and revalidated by Adediran (2026) it is an indigenous standardized battery of tests tapping certain creative patterns of human traits. The test was adopted, it has two broad divisions A–D and E–K. Sections A–D has some items in form of statement to which the participant is expected to indicate on a ten-point scale, the extent to which he/she agrees with each statement, while section E–K are questions requesting answers from the participants to show their creative behavior through their responses.

The section A–D comprises four sub-scales namely:

- A. Ideative fluency
- B. Ideative originality
- C. Ideative flexibility
- D. Ideative motivation

Akinboye (1977) used a sample of two hundred (200) subjects for each of the sub-scales as the psychometric properties of test construction. Thus, a subject with high scores in each of the subsections A, B, C, D indicate high creative ability. Furthermore, a score of seventy (70) on any scale indicates a minimum acceptable creativity in an individual.

Akinboye (1977) reported a construct validity of co-efficient alpha

α of 0.76 for ideative fluency

α of 0.71 for ideative originality

α of 0.64 for ideative flexibility

α of 0.77 for ideative motivation and test-retest reliabilities for each section after a period of four weeks fielded as follows:

Fluency scale	A	=	r	=	0.79
Originality scale	B	=	r	=	0.77
Flexibility scale	C	=	r	=	0.72
Motivation scale	D	=	r	=	0.85

Moreover, a face validity was ensured for each scale through item selection process. While the convergent construct validity within the scales were as follows:

Ideative flexibility with originality	r	=	0.73
Originality with fluency	r	=	0.87
Originality with creativity motivation	r	=	0.73

Socio-Economic Status Scale (SES)

The instrument was developed by Salami (2000), it was adapted and re-validated by Dada (2004), when used to determine the socio-economic status of parents of trainable pupils with mental retardation with a view to enhance self-help achievements using explicit-teaching and peer tutoring instructional strategies. A reliability coefficient of 0.73 was established. The researcher also adopted it and subjects it to test-retest to further ascertain its reliability among the pupils of C.A.C School for the Gifted, Ibadan who were not part of the sample used in this study, using Cronbach alpha, a reliability coefficient of 0.86 was recorded.

The scale has 12 items; the items 1–4 in the scale are on the pupils' bio data, the items 5–12 are based on parents' occupation, educational level, residence and types of equipment in the house.

Scoring and Interpretation of Scores

The scoring pattern for the scale is:

Parents Occupation	1–10 points
Educational Level	1–14 points
Parents Residence	1–6 points
Type of House	1–3 points
Equipment in the house	1–27 points

The maximum point is 60. The point is further divided into three parts:

0–15 points	Lower Socio-Economic Class
16–40 points	Middle Socio-Economic Class
41–60 points	High Socio-Economic Class

For the pupils understanding, the items therein were further explained in Yoruba language, while the research assistants assisted in administering the test.

Hypothesis 1

The gender factor will not significantly predict creativity of the subjects.

Table 1

Regression Summary Table Showing Effect of Gender Factor on Creativity (Analysis of Variance)

	Sum of Square	df	Mean Square	F	Significance of F
Regression	4.402	1	4.402	0.045	0.832*
Residual	44679.813	458	97.554		
Total	44684.215	459			

* Not significant at 0.05 level.

Multiple R = .0010

Multiple R² = .000

Adjusted R² = 0.002

Standard Error of the Estimate = 9.877

In Table 1 the gender factor did not predict creativity. The total variance accounted for by gender factor is 0% (i.e., Multiple R² = 0.000). This implies that the variable considered did not influence creativity among secondary school students in Oyo State, Nigeria.

Hypothesis 2

The environmental factor will not significantly predict creativity of the subjects.

Table 2

Regression Summary Table Showing Composite Effect of Environmental Factors on Creativity (Analysis of Variance)

	Sum of Square	df	Mean Square	F	Significance of F
Regression	4766.354	10	529.595	5.970	.000*
Residual	39917.861	450	88.706		
Total	44684.215	460			

* Significant at 0.05 level

Multiple R = .327

Multiple R² = .107

Adjusted R² = 0.92

Standard Error of the Estimate = 9.428

In Table 2. Above, all the variables of environmental factor taken together significantly predict creativity. The total variance accounted for by all the variables of environmental factor taken together is 10.7% (i.e., Multiple R² = 0.107). This implies that the variables considered under environmental factor are all important when considering the factors that influence creativity among secondary school students.

Hypothesis 3

The cognitive factor (IQ) will not significantly predict creativity of the subjects.

Table 3

Regression Summary Table Showing the Effect of Cognitive Factor on Creativity (Analysis of Variance)

	Sum of Square	df	Mean Square	F	Significance of F
Regression	3581.225	1	3581.225	39.905	0.000*
Residual	41102.991	458	89.745		
Total	44684.215	459			

* Significant at 0.05 level.

Multiple R = .283

Multiple R² = .080

Adjusted R² = 0.078

Standard Error of the Estimate = 9.473

In Table 3, the cognitive factor significantly predict creativity among the subjects. The total variance accounted for by the cognitive factor is 8% (i.e. multiple R² = 0.080). This implies that intelligence quotient is important when considering the factors that influence creativity.

Discussion

The findings of this study in hypothesis 1 revealed that gender did not predict creativity among the high achieving students considered in the study (Table 1). There was no discrimination between male and female students' performance in creativity score. This result is not surprising but rather corroborates the findings of Gonen (1993) and Selby (1993) who found no significant difference between males and females students' performance in creativity scores. On the contrary, Kim and Michael (1995) discovered in a study that females are more creative than their male counterpart, in the same vein Orioux and Yewchuk (1990) had found in a study that gender effect favoured females than males in creative performance.

In the hypothesis 2; the result showed that environmental factors taken together significantly predict creativity. This finding is in line with the submission of Lee and Lee (2003) that confirmed the psycho-social and functional impact of physical surrounding on creativity. On the contrary, Oyundoyin (2003) discovered that the environmental factors did not significantly predict creativity among secondary school students.

In hypothesis 3 which stated that cognitive factor (intelligence quotient) will not significantly predict creativity of the participant students was not sustained. The results showed that the cognitive factor predict students' performance in the study. This was not in consonance with Oyundoyin (2003) that asserted that cognitive factor predicts creative performance in a study, although, Vincent et al. (2002) had found very low correlation between intelligence and creativity score in various tests. In this study, it is suggested that students should be given freedom to express their creative tendencies. A liberal classroom environment which leads to discoveries should favour creativity better than a mere rigid and stereotyped condition. Adediran and Adebajo (2025) in their submission posited that students with high grades in School may or may not be creative well in school or on the job or never generate any original idea.

Conclusion

This study has revealed some factors that predicted creativity among high achieving students. Some variables considered include gender environment and cognition as they were able to predict creativity.

It was establishment that the variables considered as independent variable were all important influence creativity. However, the environmental factor both in school and at home are very significant as human being are deemed to respond to their environment, either actively or passively. Active response is more likely for one who has had an opportunity to develop a sense of self-worth through a supportive environment, particularly in the formative years. A stimulating environment world ignites a spark in the individuals to be creative. The physical and emotional climates would therefore very crucial to creation expression.

Also, gender was seen not to determine creative ability of students but rather, it does shape creative opportunities, recognition and expression through social mechanism.

This study suggested that gender has a negligible direct influence on human creative potential, thus a weak predictor of creativity, however, observed differences in creative achievement are largely explained by environment.

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