

# Influence of high-stakes tests on teaching styles of science teachers in senior secondary schools in Nigeria

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## ABSTRACT

The problem of teaching styles of teachers in the science arm of secondary schools in Nigeria has been a subject of concern and discuss. Many studies have been carried out to investigate factors that affect teaching styles but very few have considered the role of high-stakes tests. This study, therefore, investigated the influence of high-stakes tests on the teaching styles of science teachers in senior secondary schools in Nigeria. Two research questions were raised and answered, and three hypotheses were formulated and tested to guide the study at a .05 level of significance. The study used a descriptive research design. A sample of 6349 students and teachers was utilized for the study. The research instrument used for data collection was the questionnaire titled: High-stakes and Teaching Styles Questionnaire (HSTSQ). The instrument was subjected to face and content validity; Cronbach Alpha reliability analysis yielded a 0.84 coefficient. The data collected were analyzed using descriptive statistics, multiple regression and independent t-test statistics. The results using multiple regression revealed that significant influence exists for the independent variable (high-stakes tests,  $r = 0.408$ ,  $p < 0.05$ ). The mean difference in the opinions of the respondents regarding high-stakes tests was higher for teachers ( $\bar{X} = 53.63$ ,  $SD = 6.77$ ) than students ( $\bar{X} = 52.8904$ ,  $SD = 7.55$ ),  $t_{(6347)} = -2.704$ ,  $p > 0.05$ ,  $F = 1.322$ ,  $p = .250$ ), and there was a significant difference. In conclusion, high-stakes test factors have a significant influence on the teaching styles of teachers. Therefore, it is recommended among others, that teachers and educators should pay attention to the effects of high-stakes testing in their schools.

**Keywords:** High-stakes tests, washback effect, test pressure, test anxiety, teaching styles.

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## INTRODUCTION

The economic attainment and development of any nation depend on the quality of science education in that nation. Real development involves the creative capacity of people to effectively transform natural resources of the environment into goods and services through imaginative and practical application of their creative talents and productive labor force. Advances in science and technology contribute to the social and economic development of nations that result in an improved standard of living manifested through good health, food security, adequate housing and sustainable use of natural resources, environmental protection and economic growth (OECD, 2016). Indeed, no nation can

survive educationally, economically or otherwise without the knowledge of science. Thus, the importance of effective teaching of science subjects in institutions, particularly secondary schools, cannot be overstressed. Logically speaking, this cannot be done without science teachers who are expected to utilize suitable and effective instructional (teaching) methods in creating meaningful teaching and learning process in school systems.

The primary purpose of teaching at any level of education is to bring a fundamental change in the learner (Blazar, 2016). To facilitate the process of knowledge transmission, teachers need to apply appropriate

teaching styles to methods and techniques that best suit specific learning objectives and outcomes. Teaching styles, sometimes referred to as teaching approaches, are described as the general principles, educational, and management strategies for classroom instruction (Balachandran, 2015). The style or approach used by teachers in presenting their lessons is very important because it can make the learners like or dislike subjects and can generate students' love for or alienate them from school (Blazar, 2016).

The combination of different styles of teaching science is therefore something each professional science teacher should not only know but also implement in their classroom. It is widely known that the teacher must consider certain factors before selecting the style(s) of teaching scientific concepts. Some of these factors include the school mission statement, instructional objectives, classroom management, teaching philosophy, standard tests, etc. Many researchers have however concluded that some of these factors are quite weighty on teachers, almost pressurizing and compelling them to adopt certain styles and approaches in teaching science subjects (Blazar, 2016; Balachandran, 2015). One such factor includes high-stakes (standard) tests.

The simplest definition for high-stakes testing is, "A test administered and scored in a consistent or standard manner, and that is administered under standardized or controlled conditions that specify where, when, how and for how long students respond to the questions" (Ekoh, 2012). In high-stakes tests, the questions, conditions for administering, scoring procedures, and interpretations are consistent. Globally, high-stakes examinations are very important to all stakeholders in the educational system including the teachers, students, parents, public examining bodies, and policymakers. High-stake examinations, besides being used to gauge the quality of teaching and learning in schools, also determine the future career of students; teachers are usually assessed based on the number of students who perform well in the exams, and students are placed at different levels and streams, depending on their performance in the exams too (Ekoh, 2012). High-stakes tests have also been described as harmonized examinations, the results of which have significant consequences for schools and other stakeholders (parents/guardians, districts, and so on) (Ekoh, 2012).

In Nigeria, examples of high-stakes examinations are specifically the ones whose results thereof determine candidates' entry into tertiary institutions (Universities, Polytechnics, Monotechnics, and Colleges of Education). Examples of such examinations are the ones conducted by the West African Examination Council (WAEC) and National Examination Council (NECO) for final year students of senior secondary schools, Unified Tertiary Matriculation Examination (UTME), and National Board for Technical and Business Education (NABTEB) for final year students of technical schools. The examination

conducted by these public examining bodies is known as Senior School Certificate Examination (SSCE). It is a standardized examination in which candidates must pass a minimum of credit level in at least five subjects including English Language and Mathematics.

Because of the importance attached to the success rate in the high-stakes examinations, teachers often struggle to meet the demands of proprietors/proprietresses, the government and parents. That is, they struggle so that their students 'excel' in the examinations. Students on the other hand struggle to satisfy their parents and guardians and also struggle to meet the requirements for admission into tertiary institutions. Because of this, there can be a "wash-back effect" on teaching and learning. That is "shaping both what is taught and how it is taught" and often changing the frame in terms of what counts as worthwhile knowledge (Schissel, 2018). Washback or backwash, also known as measurement-driven instruction, is a common term referring to the influence of testing on teaching and learning, which is a prevailing phenomenon in education.

While the effects of high-stakes tests on teaching and learning are grounds for concern, the effects it has on teachers' and students' physical and emotional well-being are also quite troubling and deserve attention, with both parties usually having a gamut of rather negative attitudes and feelings generated by tests. Students often show mixed feelings towards the exam itself, recognizing on the one hand that the exam makes them work to achieve good scores but at the same time thinking that exams are not an accurate reflection of all aspects of their study.

Generally, the tests are reported to generate 'an atmosphere of high pressure, anxiety and fear of test results among teachers and students (Fulton, 2016). Teachers feel that the success or failure of their students reflects on them and they speak of pressure to cover the materials for the exam' (Ozturk and Okan, 2019). The pressure on teachers also encourages them to focus more on specific test subjects (and areas) rather than on curriculum standards, and sometimes guides teachers to participate in inappropriate test preparation. Consequently, the pressure and anxiety from tests also make most students lose interest in other aspects of learning that they do not deem necessary for acing said high-stakes tests (Abbas and Sarwar, 2018).

So far, there is a dearth of research in the area of managing science classrooms and far more dearth in research on high-stakes tests and their effects. There have been some similar studies in Arts and Languages in Western Europe such as the United Kingdom (Saville and Hawkey, 2004) and Greece (Tsagari, 2009), and in Asia such as China (Sultana, 2018). There is, however, a scarcity of empirical studies in the area of science subjects and more importantly, there is a dearth of literature on the aforementioned concepts in sub-Saharan

Africa, especially in Nigeria. It is against this background that this study would examine high-stakes tests as a determinant of teachers' styles of teaching science subjects in senior secondary schools in Nigeria.

### Research questions

The study attempted to find answers to the following questions:

- i. What is the level of high-stakes test factors (washback effect, test pressure, test anxiety) among science teachers and students in senior secondary schools in Nigeria?
- ii. What are the preferred teaching styles (expert, formal authority, personal model, facilitator and delegator) among science teachers in senior secondary schools in Nigeria?

### Hypotheses

This study was guided by the following hypotheses:

H<sub>0</sub>1: There will be no significant composite influence of high-stakes test factors (washback effect, test pressure, test anxiety) on the teaching styles of science teachers in senior secondary schools in Nigeria.

H<sub>0</sub>2: There will be no significant relative influence of high-stakes test factors (washback effect, test pressure, test anxiety) on the teaching styles of science teachers in senior secondary schools in Nigeria.

H<sub>0</sub>3: There will be no significant mean difference between the opinions of teachers and students with regard to high-stakes test factors in senior secondary schools in Nigeria.

## METHODOLOGY

This section presented the methodology and procedures employed in the study. It contains information about the population of the study, sample and sampling techniques, research instrument, the validity of the instrument, reliability of the instrument, administration of the instrument and method of data analysis.

### Research design

The descriptive-survey research design was adopted for this study. This research design is considered appropriate because the study involved the collection of data to factually describe existing phenomena, without any manipulation or randomization. Furthermore, the research design allowed the researchers to obtain a proper picture of the present situation of the particular

phenomena under study.

### Population of the study

The targeted population comprised all Senior Secondary school science teachers and students in Senior Secondary School who registered for the 2021 West African Examinations Council (WAEC) examination.

### Sample and sampling techniques

A total of 6,720 respondents formed the sample for this study. The study sites were mapped based on the six geo-political zones in Nigeria. Multi-stage sampling technique was used to select participants for this study. In the first stage, a simple random sampling technique was used to select one state from each geopolitical zone in Nigeria, giving a total of six (6) states. Abuja, the Federal Capital Territory, was also included as a separate category because of its peculiarities. In the second stage, four (4) local government areas (LGA) were selected from each state to reflect the urban and rural areas, using a simple random sampling technique, making a total of 28 LGAs. In the third stage, purposive sampling was used to select ten (10) secondary schools from each LGA, which have participated in high-stakes tests for at least five (5) years, making a total of 280 schools. In the next stage, purposive sampling was also used to select three (3) senior secondary school science teachers who teach science in selected schools, making a total of 1120 teachers. A stratified random sampling technique was used to select 20 science students in senior secondary schools, who have been registered for high-stakes tests (WAEC, NECO, UTME), making a total of 5600 students. In all, a total of 6720 respondents, consisting of five thousand six hundred science students (5600) and one thousand one hundred and twenty (1120) science teachers, were used as participants in this study.

### Research instrument

The instrument for this study was a self-developed questionnaire High-stakes and Teaching Styles Questionnaire (HSTSQ), which was designed and adapted in line with the research questions and hypotheses that were raised for the study. The instrument was used for all categories of respondents (students and teachers). The questionnaire was divided into five sections; A, B, C, D and E. Section A of the instrument focused on the demographic data of the respondent (that is their gender, age, educational qualification, and so on). Section B elicited information on high-stakes tests with respect to SSS3 students and science teachers while Sections C comprise items on teachers' teaching styles.

For all sections, the sub-scale was a modified Likert-type scale with four response options rates as follows: Strongly Agree (4), Agree (3), Disagree (2) and Strongly Agree (1). Also, students' and teachers' questionnaires were structured from the aforementioned questionnaire.

### Data analysis

Data collected from the field were clean, coded and inputted into a computer system, for statistical analysis using Statistical Package for Social Sciences (SPSS) software, version 21 for mac iOS. The research questions were analysed using descriptive statistics of mean ( $\bar{x}$ ) score and standard deviation (SD). Mean was used to describe the data. A criterion mean ( $\bar{x}$ ) of 2.50 was set for the study. In this case, a mean score of 2.50 and above was adjudged moderate, high and very high as the case may be while a mean score below 2.50 was adjudged low (performance) extent. Standard deviation was used to determine how the responses of the respondents varied. Hypotheses were tested using multiple regression and independent sample t-test statistics. An alpha level of 0.05 significance was set for the inferential statistics.

## RESULTS

The purpose of this study was to investigate the influence of high-stakes tests on the teaching styles of science teachers in senior secondary schools in Nigeria. This section presents the results of the analysis of the data collected from all respondents (science students and science teachers) involved in the study. The results are presented based on the research questions and hypotheses formulated for the study. The findings were outlined and discussed accordingly.

The research instrument was dispatched to 6700 respondents with 6349 (94.8%) of the dispatched questionnaire retrieved.

### Demographic profile of the participants

#### Status of the respondents

The study sought information on the status of the respondents. Table 1 presents a summary of the status distribution for all the categories.

Out of the 6349 respondents, 5501 respondents representing 86.6% of the sample represented the science students while 848 respondents, which constituted 13.4%, represented the science teachers.

#### Gender of the respondents

The study sought information on the gender of the respondents. Table 2 presents a summary of the gender distribution for all the categories of respondents.

Out of the 6349 respondents, 3263 respondents, representing 51.4% of the sample represented male while 3086 respondents, constituting 48.6%, represented female participants. This slight difference may be a result of gender stereotypes, which have been reported to be part of the major factors contributing to the gender gap in the field of science<sup>1</sup>. There were however slightly more female science students (2791) than male students (2710), suggesting that there could be an improvement in the number of females opting for science courses from the high school level.

**Table 1.** Demographic characteristics of respondents' status.

Status	Frequency	%
Students	5501	86.6
Teachers	848	13.4
Total	6349	100.0

Source: Abdallah (2021).

**Table 2.** Demographic characteristics of gender \* respondents' status cross-tabulation.

Gender	Students	%	Teachers	%	Total (%)
Male	2710	83.1	553	16.9	3263 (100.0) 51.4%
Female	2791	90.4	295	9.6	3086 (100.0) 48.6%
Total	5501	173.5	848	26.5	6349 (100.0)

Source: Abdallah (2021).

#### Age of respondents

The study also sought information on the age of the respondents. Table 3 presents a summary of the age distribution for all the categories.

Of the teachers, the majority (31.7%) were aged between 31 and 40 years, and those aged between 41

and 50 years (32.5%). The least age range (3.1%) was between 60 and above, with respondents under this age range originating from private schools. This clearly indicated that many teachers were young and energetic with regard to handling infrastructural matters. Although the older teachers are more experienced and more familiar with instructional issues, they might be tired and

**Table 3.** Demographic characteristics of \* respondents' age respondents cross-tabulation.

Age group	Students	%	Teachers	%	Total (%)
20 and below	5501	98.8	10	1.2	5511 (100.0) 100%
21 – 30 years	0	0	132	100	132 (100.0) 100%
31 – 40 years	0	0	269	100	269 (100.0) 100%
41 – 50 years	0	0	276	100	276 (100.0) 100%
51 – 60 years	0	0	135	100	135 (100.0) 100%
60 and above	0	0	26	100	26 (100.0) 100%
Total	5501	98.8	848	501.2	6349 (100.0)

Source: Abdallah (2021).

might lack 21<sup>st</sup>-century skills such as information and communication technology (ICT), which is a very vital component of instruction today. The student respondents were all within the range of 20 years and below.

### **Professional qualifications of respondents**

The study was also interested in finding out the professional qualifications of the respondents (teachers). The data obtained are presented in Table 4.

Table 4 shows that a total of 166 (representing 19.6%) staff respondents hold HND/PGDE, while 337 respondents (representing 39.7%) have a first-degree qualification. A total number of 319 respondents (representing 37.6%) have a Master's degree, while only 26 respondents (representing 3.1%) have a Ph.D. This was a positive gesture that human resources with adequate professional qualifications were involved in teaching in our schools. This could be instrumental to effective instructional dissemination. Evans (1999) posited that the successful 21<sup>st</sup>-century instructor will need to be very professional, competent, highly trained and a well-motivated individual. The majority of the respondents (39.7%) indicated that a first degree was their highest professional qualification while the least indicated qualification (3.1%) were respondents with a Ph.D. Degree. Hence, this indicated that the respondents had the appropriate academic professional qualifications required to handle the curriculum.

### **Teaching experience of teachers**

The study also sought information on the teaching experience of teachers. Table 5 presents a summary of the data obtained.

Out of the 848 respondents (science teachers), 270 had less than 10 years of teaching experience, representing 31.8%, 242 had 10 to 15 years teaching experience, representing 28.5%, 200 had 16 to 20 years teaching experience, representing 23.6%, 124 had 21 to 30 years teaching experience, representing 14.6% and 12 had 31 to 35 years of teaching experience,

**Table 4.** Demographic characteristics of teachers' professional qualifications.

Qualification	Frequency	%
HND/PGDE	166	19.6
First Degree	337	39.7
Masters	319	37.6
PhD	26	3.1
Total	848	100.0

Source: Abdallah (2021).

**Table 5.** Demographic characteristics of teachers' teaching experience.

Length of Service	Frequency	%
Less than 10 years	270	31.8
10 – 15 years	242	28.5
16 – 20 years	200	23.6
21 – 30 years	124	14.6
31 – 35 years	12	1.5
Total	848	100.0

Source: Abdallah (2021).

representing 1.5% of the total respondents.

### **School types of respondents**

The study sought information on the type of school all respondents were related to. Table 6 presents a summary of the school types of respondents.

Table 6 shows that 3915 respondents were from public schools, representing 61.7% of the total sample, while 2434 respondents (38.3%) were from private schools.

### **Marital status of teachers**

The study also obtained information on the marital status of respondents. The data obtained are presented in Table 7.

**Table 6.** Demographic characteristics of respondents' school types.

School types	Frequency	%
Public school	3915	61.7
Private school	2434	38.3
Total	6349	100.0

Source: Abdallah (2021).

**Table 7.** Demographic characteristics of teachers' marital status.

Marital status	Frequency	%
Married	624	73.6
Single	173	20.4
Divorced	51	6.0
Total	848	100.0

Source: Abdallah (2021).

Table 7 shows that 624 respondents were married, representing 73.6% of the total sample (teachers) used in the study, 173 respondents were single representing 20.4% of the sample and 51 respondents were divorced, representing 6.0% of the total sample.

### Research Question 1: What is the level of high-stakes tests factors (washback effect, test pressure, test anxiety) among science teachers and students in senior secondary schools in Nigeria?

Table 8 (a to c) will be used to answer research question 1.

Table 8a showed that each of items 1 to 4 on the level

of washback to science teachers and students, influenced by high stakes tests, obtained a mean score above 2.50. The above results implied that the respondents rated the influence of the washback effect on science teachers and students as high. The grand mean score was **3.12**, which was above the criterion of **2.50** set for the study, while the standard deviation was **0.78**, indicating that the respondents were not far from the mean and from one another in their responses. Also, the table revealed that item 1 had the highest mean of **3.41** while the least mean was that of item 4 with a mean score of **2.75**. This result implies that the grand mean score of **3.12** indicated that the level of washback effect on science teachers and students in secondary schools in Nigeria is to a high extent. Therefore, the level of washback effect on science teachers and students in secondary schools in Nigeria is on a high extent with a grand mean score of **3.12**.

Table 8b showed that each of items 1 to 6 on the level of test pressure to science teachers and students, influenced by high stakes tests, obtained a mean score above 2.50. The above results implied that the respondents rated the influence of test pressure on science teachers and students as high. The grand mean score was **3.232**, which was above the criterion of **2.50** set for the study, while the standard deviation was **0.734**, indicating that the respondents were not far from the mean and from one another in their responses. Also, the table revealed that item 2 had the highest mean of **3.3341** while the least mean was that of item 4 with a mean score of **3.0499**. This result implies that the grand mean score of **3.232** indicated that the level of test pressure on science teachers and students in secondary schools in Nigeria is on high extent. Therefore, the level of test pressure on science teachers and students in secondary schools in Nigeria is to a high extent with a grand mean score of **3.232**.

**Table 8a.** Descriptive statistics on washback effect.

Items	N	$\bar{x}$	Std. Dev.	R
1. Teachers often practice past/old questions with students to help them prepare for high-stakes tests (WAEC, NECO, UTME)	6349	3.41	.73	HE
2. Teachers often concentrate on topics that are frequently associated with SSCE/NECO/UTME Examinations	6349	3.25	.78	HE
3. Teachers teach students the tips and tricks in answering high-stakes examination questions	6349	3.06	.81	HE
4. At this level, teachers' drive to teach is primarily for the sake of students passing final examinations	6349	2.75	.80	ME
<b>Average Total</b>	<b>6349</b>	<b>3.12</b>	<b>.78</b>	<b>HE</b>

R: Remarks; VHE: Very High Extent (3.50 and above); HE: High Extent (3.00 – 3.49); ME: Moderate Extent (2.50 – 2.99); LE: Low Extent (Below 2.50). Source: Abdallah, 2021

**Table 8b.** Descriptive statistics on test pressure.

Items	N	$\bar{x}$	Std. Dev.	R
1. High-stakes tests put teachers under pressure to cover all the topics in the syllabus before examination periods	6349	3.3032	.66785	HE
2. Pressure from high-stakes tests makes teachers concentrate on areas/questions that usually come out in SSCE	6349	3.3341	.75812	HE
3. Teachers worry about what students' grades will be	6349	3.3120	.75775	HE
4. Teachers worry about what the school and students' parents will say if they do not perform as expected	6349	3.0499	.80378	HE
5. High-stakes tests are an accurate way to assess what students know	6349	3.3212	.64905	HE
6. Students' high performance in high-stake tests is an indication of good teaching	6349	3.0737	.76752	HE
<b>Average total</b>	<b>6349</b>	<b>3.232</b>	<b>.734</b>	<b>HE</b>

R: Remarks; VHE: Very High Extent (3.50 and above); HE: High Extent (3.00 – 3.49); ME: Moderate Extent (2.50 – 2.99); LE: Low Extent (Below 2.50). Source: Abdallah (2021).

Table 8c showed that each of items 1 to 7 on the level of test anxiety to science teachers and students, influenced by high stakes tests, obtained a mean score above 2.50. The above results implied that the respondents rated the influence of test anxiety on science teachers and students as high. The grand mean score was **3.129**, which was above the criterion of **2.50** set for the study, while the standard deviation was **0.771**, indicating that the respondents were not far from the mean and from one another in their responses. Also, the table revealed that item 1 had the highest mean of **3.4324** while the

least mean was that of item 3 with a mean score of **2.6774**. This result implies that the grand mean score of **3.129** indicated that the level of test anxiety among science teachers and students in secondary schools in Nigeria is on high extent. Therefore, the level of test anxiety among science teachers and students in secondary schools in Nigeria is to a high extent with a grand mean score of **3.129**.

Thus, the level of washback, test pressure and test anxiety in senior secondary schools in Nigeria is to a high extent.

**Table 8c.** Descriptive statistics on test anxiety.

Items	N	$\bar{x}$	Std. Dev.	R
1. Teachers feel very anxious about their students' final examinations	6349	3.4324	.75455	HE
2. Teachers often think about the consequences of their students' failure	6349	3.1555	.80283	HE
3. Teachers worry that some students might forget the materials learned on the day of the examination	6349	2.6774	.88121	ME
4. Students find it more difficult to concentrate as the examination gets closer	6349	2.9627	.79718	ME
5. Teachers think students will make careless mistakes when taking the examination	6349	3.1249	.72926	HE
6. High-stakes tests should not be the only assessment tool to measure students' performance	6349	3.3078	.72064	HE
7. Students' high performance in high-stake tests is an indication of good teaching	6349	3.2391	.71321	HE
<b>Average Total</b>	<b>6349</b>	<b>3.129</b>	<b>0.771</b>	<b>HE</b>

R: Remarks; VHE: Very High Extent (3.50 and above); HE: High Extent (3.00 – 3.49); ME: Moderate Extent (2.50 – 2.99); LE: Low Extent (Below 2.50). Source: Abdallah, 2021.

### Research Question 2: What is the preferred teaching style (expert, formal authority, personal model, facilitator and delegator) among science teachers in senior secondary schools in Nigeria?

Table 9 would be used to answer research question 2

The mean was used in adjudging the distribution of preferred teaching styles of science teachers in senior secondary schools in Nigeria. Table 9 above revealed that the most preferred teaching style of science teachers is Expert/formal Authority with a mean score of **28.3854**. The second preferred teaching style was Delegator/Facilitator/Expert with a mean score of **25.3619**, followed by Facilitator/Personal Model/Expert with a mean score of **25.0599**. The least preferred teaching style was Facilitator/Personal Model/Expert with a mean score of **22.5593**.

### Hypotheses

The hypotheses tested below were used to establish whether the independent variable of the high stakes test has a significant relationship with the teaching styles of teachers. This was done using multiple regression and analysis of variance (ANOVA) at a .05 level of significance. The correlation matrix of the variables was presented in Table 10 to reveal the degree of inter-

correlation among the factors of the independent variable in the study. The opinions of science teachers and students were equally tested using a t-test to know whether there are significant differences or not in the opinions/responses.

### Regression

**H<sub>0</sub>1:** There will be no significant composite influence of high-stakes test factors (washback effect, test pressure, test anxiety) on the teaching styles of science teachers in senior secondary schools in Nigeria.

### Summary of regression on the influence of high-stakes tests factors on teaching styles of science teachers

Table 11b shows the regression correlation (R) between high-stakes tests and the teaching styles of teachers in senior secondary schools in Nigeria. The results show that the regression correlation (R) is **.408**, R square equals **.166** and Adjusted R square equals **.166**. This implied that the combination of high stakes test factors contributed **16.6%** to the variation in teaching styles of science teachers in senior secondary schools in Nigeria.

**Table 9.** Descriptive statistics on the preferred teaching style of science teachers.

Teaching styles	N	$\bar{x}$	Std. Dev.
1. Expert/Formal Authority	6349	28.3854	5.10269
2. Personal Model/Expert/Formal Authority	6349	25.0599	4.29081
3. Facilitator/Personal Model/Expert	6349	22.5593	3.4599
4. Delegator/Facilitator/Expert	6349	25.3619	4.04025

R: Remarks; VHE: Very High Extent (3.50 and above); HE: High Extent (3.00 – 3.49); ME: Moderate Extent (2.50 – 2.99); LE: Low Extent (Below 2.50). Source: Abdallah (2021).

**Table 10.** Correlation matrix of independent and dependent variables.

Independent variables	Washback	Pressure	Anxiety	Teaching styles
Washback effect	1.00	-.168*	-.075*	.606*
Test pressure		1.00	.322*	.250*
Test anxiety			1.00	.004
Teaching styles				1.00

**Table 11a.** Model summary.

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. error of the estimate	Change statistics				
					R <sup>2</sup> Change	F Change	df1	df2	Sig. F Ch.
1	.408 <sup>a</sup>	.166	.166	16.67848	.166	1267.534	1	6347	.000

a. Predictors: (Constant), High-Stakes tests.

**Table 11b.** Summary table of ANOVA.

Model	Sum of squares	df	Mean square	F	Sig	Remarks
Regression	352591.944	1	352591.944	1267.534	.000 <sup>b</sup>	Significant
Residual	1765555.37	6347	2781.72			
Total	2118147.31	6348				

a. Dependent Variable: Teaching Styles of Science Teachers  
 b. Predictors: (Constant), High Stakes Tests  
 Source: Abdallah, 2021.

Further verification using analysis of variance (ANOVA) produced  $F_{(1, 6347)}$  equals 1267.534;  $p < .05$ . This implied that the linear relationship among the combined variables and teaching styles of teachers is significant. This also means that there is a significant composite relationship between the factors of high-stakes tests on the teaching styles of science teachers in senior secondary schools in Nigeria.

**H<sub>02</sub>:** There will be no significant relative influence of high-stakes test factors (washback effect, test pressure, test anxiety) on the teaching styles of science teachers in senior secondary schools in Nigeria.

Table 12 presents the coefficients that indicate the

relationship between the factors of high-stakes tests and the teaching style of science teachers in senior secondary schools in Nigeria. The results show the contribution of the variables factors indicated by standardized Beta (B) weights in the order of magnitude; high-stakes tests contributed to the teaching styles of teachers with **B = 43.687, t = 29.058; p < .05**. The analysis of the result shows that the independent variables of high-stakes tests have a significant influence on the teaching styles of science teachers.

**H<sub>03</sub>:** There will be no significant mean difference between the opinions of teachers and students with regard to high-stakes test factors in senior secondary schools in Nigeria.

**Table 12.** Coefficients<sup>a</sup>.

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower bound	Upper bound
(Constant)	43.687	1.503		29.058	.000	40.739	46.634
High-Stakes tests	1.000	.028	.408	35.602	.000	.945	1.055

a. Dependent Variable: Teaching Styles of Science Teachers  
 Source: Abdallah (2021).

The independent sample t-test was used in testing the opinions of teachers and students regarding high-stakes tests in senior secondary schools in Nigeria.

From Table 13, the mean difference in the opinions of teachers and students regarding high-stakes tests was higher for teachers (M = 53.6333, SD = 6.77440) than for students (M = 52.8904, SD = 7.54522),  $t_{(6347)} = -2.704$ ,  $p < .05$ . Levene's test indicated equal variance assumed (F

= 1.322,  $p = .250$ ). Thus, it is significant. The null hypothesis of no significant mean difference in the opinions of teachers and students with regards to high-stakes tests in senior secondary schools in Nigeria is therefore not upheld. Thus, there is a significant mean difference in the opinions of teachers and students regarding high-stakes tests in senior secondary schools in Nigeria.

**Table 13a.** Group statistics on high-stakes tests.

Respondents' status	N	Mean $\bar{x}$	Std. deviation	Std. error
Students	5501	52.8904	7.54522	.10173
Teachers	848	53.6333	6.77440	.23263

**Table 13b.** Summary table of independent sample t-test on high-stakes tests.

	Levene's test		T-test for equality of means			Decision	Remarks
	F	Sig.	t	df	Sig. (2-tailed)		
Equal Variances Assumed	1.322	.250	-2.704	6347	.007	Accept	Not sig.
Equal Variances Not Assumed			-2.926	1195.187	.004		

Source: Abdallah (2021).

## DISCUSSION

This section presents a discussion on the findings of the study with respect to the influence of high-stakes tests on the teaching styles of science teachers in senior secondary schools in Nigeria.

The hypothesis, which sought the significant composite influence of high-stakes tests on the teaching styles of science teachers in senior secondary schools in Nigeria, revealed that there existed a composite influence of all the variables on the teaching styles of science teachers in senior secondary schools in Nigeria. From the result of hypothesis one, it was clear that a significant composite influence of all the factors of the independent variable on teaching styles existed. This means that the factors of high-stakes tests jointly influence the teaching styles of science teachers in senior secondary schools. This is in line with an author who posited that various factors such as testing (examinations) go a long way in influencing the choice of the teaching style of a teacher (My Free School Tanzania, 2014).

The analysis of hypothesis two which sought the significant relative influence of high-stakes test factors on teaching styles revealed that it existed. This means that high-stakes test factors have a singular influence on the teaching styles of science teachers in senior secondary schools in Nigeria. This is consistent with scholars who have reported views on high-stakes test factors having a positive relationship with the teaching styles of teachers (Schulz, 2005; Gunn et al., 2016; Adegoke, 2017). In relation to this, a scholar also reported that the pressure upon teachers and students to improve their students' test scores resulted in some educators (and students) neglecting materials not included in the test (Herman and Gollan, 2011).

Hypothesis three, which sought the opinions of respondents regarding high-stakes tests in senior secondary schools in Nigeria, revealed that the majority of the respondents agreed that high-stakes tests influence teaching and learning in senior secondary schools. From the result of hypothesis three, it was clear that a significant mean difference existed in the opinions of the two groups of respondents regarding high-stakes tests in senior secondary schools in Nigeria. This however means still indicated that high-stakes tests play a significant role in determining the way teachers teach, and how students learn. This is in agreement with a scholar who posited that high-stakes tests cause

instructors to 'teach to the test,' focusing mostly on areas that would come out in said tests (examination) and neglecting other aspects of the curriculum (also known as washback) (Wray, 2016). This also confirms a position that both teachers and students experience a lot of stress and pressure as a result of high-stakes tests, explaining that both teachers and students are pressured due to the repercussions of students failing such tests (Fulton, 2016). Whilst another author reported concerns on the impact of testing on students' well-being (Simpson, 2016), another author has described the current emphasis on testing as being out of control and calling today's students "the most tested generation in history", with the many negative consequences looming with potential harm to the educational system (Abeles, 2015). The consensus of the respondents could therefore be related to the aforementioned positions since respondents implied that they verily experience washback, anxiety and pressure relating to test preparation.

## Conclusion

High-stakes tests are critical to the success and progress of the teaching and learning process in both developed and developing countries, including Nigeria. On the basis of these research findings, the study has proven that the high-stakes test factors have a strong relationship with the teaching styles of science teachers in senior secondary schools in Nigeria. It was observed that science teachers and students in terminal classes concentrate mostly on passing upcoming high-stakes examinations rather than learning course content for career growth. Both science teachers and students in terminal classes were found to also experience a lot of pressure and anxiety resulting from the thought and fear of consequences if students do not obtain expected scores in high-stakes tests. The prime purpose of high-stakes tests is to provide some level of feedback to all stakeholders in education, so appropriate remedial actions can be taken. To a certain extent, it does this, but a lot needs to be attended to so that the tests do not cause more harm than good to the education system.

## RECOMMENDATIONS

High-stakes tests were also put in place to make

important decisions about students, educators, and schools – that is, the attempt by federal, state or local government agencies and school administrators to ensure that students are enrolled in effective schools and are being taught by effective teachers. In general, this means that test scores are used to determine punishments, accolades, advancement or compensation for teachers and students. In this regard, and based on the findings highlighted earlier, the researchers wish to make the following recommendations:

- i. Accountability for educational outcomes should be a shared responsibility of educators, public officials, parents and students. High standards cannot be established and maintained merely by imposing them on students.
- ii. High-stakes decisions such as promotion and graduation should not automatically be made on the basis of a single test score but should be buttressed by other relevant information about the student's knowledge and skills, such as grades, teacher recommendations and extenuating circumstances.
- iii. High-stakes testing programs should routinely include a well-designed evaluation component. Policymakers should monitor both the intended and unintended consequences of high-stakes assessments on students, teachers and educational institutions.

### Suggestions for further studies

Based on the findings and conclusion of this study, and the fact that the study did not cover all aspects, the following suggestions were made for further studies in the resulting areas:

- i. Determining the effects of high-stakes testing on school owners and parents.
- ii. Research to develop a framework for evaluating the costs versus the benefits of high-stakes testing programs, particularly for alternative and more authentic assessments.

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