

Cultural Beliefs and Gender as Predictors of Students' Self-Efficacy in Some Topics in Senior Secondary Biology in Benue State

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Abstract

The study examined cultural beliefs and gender as predictors of students' self-efficacy in some topics in senior secondary Biology in Benue State. Three research questions and three null hypotheses guided the study, of which correlational research design was adopted. The study population comprised 14,635 SSII Biology students in 285 Public Secondary Schools in Benue State, out of which 378 (171 males and 207 female) students participated in the study. Data were collected using questionnaires on cultural beliefs and self-efficacy developed by the researchers. Reliability index of 0.87 and 0.85 were obtained for cultural beliefs and self-efficacy respectively. Data were analyzed using simple and multiple regression. The study revealed that 23% of students' self-efficacy in Biology is negatively influenced by their cultural beliefs, which is statistically significant (p<0.05), among others. It was therefore recommended among others, that Biology teachers should sufficiently explain the various Biology topics to students with scientific justifications.

Keywords: Cultural Beliefs, Gender, Self-Efficacy, Biology

Introduction

In a social milieu, one mechanism that largely determines people's actions and behaviour is their culture. This is to say, every society or group of people living together have their own way of life. Thus, according to Gbor (2016), culture refers to people's way of life in a particular setting which is based on accumulated knowledge transmitted from past generation. It involves the people's beliefs, norms, habits, religion, industry, dresses, languages and value system (Kim, 2017). From these assertions, culture could be simply defined as the totality of the way of life of a people and includes the knowledge, beliefs, arts, dressing, morals, customs and any other capabilities acquired by people as members of a given society. This implies that, the culture of a particular ethnic group therefore defines, determines and regulates their ways of life, distinguishes how the people live, dress, act and behave.

In Benue State, for instance, there are different cultural groups such as the *Tiv*, *Idoma* and *Igede* among others, with varying cultural beliefs. The *Tiv* have some strong cultural beliefs. Demilola (2016), identified the cultural beliefs of the *Tiv* people as being hinged on the "*Aondo*, *Tsav* and *Akombo*". The *Aondo* is recognized by the *Tiv* as an *otiose* god (Sky) who created the universe, however they do not believe that *Aondo* has any interest in them. The *Tsav* on one hand is believed to be the evil in the hearts of human beings which are the forces that causes *Akombo*. Thus, Akombo is perceived as the disease or misfortune believed to be inflicted on others by evil doers. These cultural beliefs have a synergy and influence the thoughts of many Tiv people. On the other hand, the *Owoicho Omanchala*, an *Idoma* deity, is worshipped indirectly through intermediary gods, goddesses and spirits inhabiting the earth, certain trees, streams and other places (Ochima, 2012). The *Igede* people are being controlled and regulated by the belief in the Supreme Creator - God, *Ohe Oleji* and reverence for ancestors and elders.

It is pertinent to note that the *Tiv*, *Idoma* and *Igede* people are culturally sensitive. Among the *Tiv* people, children are not allowed to mention male or female reproductive organs, else they would die prematurely. Again, that if one's eyelid tingles continuously, it means the person would hear about death of a close relation. Among the Idoma people, children should not be given either eggs or fish, else they would grow to be thieves, and a pregnant woman should not eat roasted yam, else it will make the unborn child to be black and dirty when born. In the same way, the *Igede* people believe that any child born deformed should be thrown away to avoid the wrath of the gods and that infertility in man is a curse by the ancestors as a punishment for an evil deed perpetrated by the said man (Agogo, 2002). These cultural values may have some influence on students' learning of science subjects. For example, some topics such as Reproduction, Nutrition in Animals, Heredity, Microorganisms, Nervous coordination, Adaptation,

Sense Organs, among others, found in Biology, could potentially be impacted. Studies (Okoye, Okeke, & Igbokwe, 2010; Ochima, 2012) have also suggested that cultural practices and beliefs may have potential influence on students' learning of Biology.

Biology is an important science subject for students in Nigeria's senior secondary schools. It is one of the science subjects as stipulated in the Nigerian National Policy on Education (FRN, 2013:24). According to Chukunyerenmuwa (2013), Biology is an essential science whose teaching and learning are widely accepted due to its relevance to life. The knowledge of biology is fundamental to the study of biochemistry, genetics, physiology and anatomy, ecology, medicine, molecular biology, and some human activities (Olutola, Daramola, & Bamidele, 2016). The authors asserted that the knowledge of biology helps in resolving issues of food scarcity, health, hygiene, family life, poverty eradication, natural resource management and conservation, biotechnology, among others. Perhaps, this is why Aina (2013) maintained that the study of biology is critical for any developing economy such as Nigeria. Based on this assertions, one can argue that the importance of biology cannot be underestimated.

It is unfortunate to note that despite the importance of Biology, the achievement of students in the subject as reported by some researchers (Amedu, 2015, Odagboyi, 2015; Sakiyo, Aishatu & Kawu, 2018) is not encouraging. Evidence from WAEC Chief Examiner's Report between 2016 to 2020, shows that students' achievement in Biology has been fluctuating and poor. Researchers like Okeke and Njelita (2002) have tried to unraveled the complex determinants of the poor academic achievement in Biology which has been described as persistent and worrisome. This unfortunate situation is anticipated by the researchers to be as a result of the influence of students' cultural beliefs on their self-efficacy in Biology topics such as Reproductive system in Vertebrates, Nutrition in Animals, Heredity, Microorganisms, Characteristics of living things, Nervous coordination, Adaptation. Reproductive Sense Organs, Behavious and Ecology/Terrestrial Habitat, among others.

Self-efficacy is a critical construct in students' learning. Generally, self-efficacy refers to individual's overall belief in their ability to succeed in assigned tasks (Bandura, 2009). It is a term that describe people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (LaMorte, https://www.ajstme.com.ng



2016). Self-efficacy can therefore be viewed as students' belief in their ability to finish tasks and reach a goal, aim or target, such as success in Biology. According to Bandura (2009), strong sense of selfefficacy efficacy enhances students' accomplishment and personal well-being in many ways. The author noted that people with high self-efficacy set challenging goals and maintain strong commitment towards achieving the goals. In relation to students' cultural beliefs, Ongowo and Hungi (2014) in their study revealed that students who do not rely on cultural beliefs are more likely to exhibit high self-efficacy, resulting to high performance in Biology.

To this effect, students from Tiv, Idoma and Igede tribes of Benue State are more likely adhere to various cultural beliefs; for example, pouring out water from wash dishes at night can elicit the wrath of ancestral spirits, and sweeping one's house at night can result in the depletion of one's wealth. While teaching topics such as hygiene and microorganisms, these can have a negative impact on the students' self-efficacy in biology. This is because, students may be confused about which to practice or believe; considering the variation between what is taught in biology and their cultural beliefs. Likewise, cultural beliefs such as sneezing suddenly is a sign that one is being discussed somewhere and twitching upper eyelid is a sign of good luck can have a negative impact on a student's understanding and self-efficacy in Biology topics such as nervous coordination. These cultural beliefs, such as myths, rituals, taboos, and superstitions, have the potential to cause confusion among students, leading to low self-efficacy in Biology. This often vary depending on students' gender.

Gender is basically viewed as a social construct that distinguishes males from females based on assigned roles. Akani (2009) views gender as a social and cultural construct that specifies the qualities, behaviour and roles in which different societies ascribe to females and males. These roles differentiates females from males in terms of what they are not expected to do and vice-versa. Furthermore, Ivowi (2019) defined gender as the roles and responsibilities of men and women that are created in families, societies and culture. In this study, gender is thus defined as a social construct that explains the variations in the roles of men and women, boys or girls as defined by the society.

Some gender-based beliefs, such as the belief that if a pregnant woman eats grass, her baby will sleep more deeply at night, or that a pregnant woman who



eats eggs will have children who will be thieves, can also have a negative impact on female students' selfefficacy in nutrition in animals or mammals. Similarly, gender-based beliefs that when a menstruating woman cooks for her husband, he becomes ill; and that seeing a female first thing in the morning is a sign of bad luck for the man, also could have potential influence on the self-efficacy of both male and female students in related Biology topics such as reproduction and variation. Important to note also is that, when students' self-efficacy in Biology is affected, their achievement in the subject may also be negatively affected.

In a previous study, Rajesh and Roshan (2016) revealed that there was a significant influence of gender on student self-efficacy, where female scored higher than their male counterparts. Lars and Leiv (2016) reported that female students have significantly lower self-efficacy level and self-efficacy strength than their male peers. Similarly, Aurah (2017) reported gender differences in both self-efficacy and academic achievement, with female students performing better than male students in both outcome variables. However, the study by Katie and Randy (2017) showed that there was no relationship between gender and self-efficacy, as well as no correlation between femininity and self-efficacy. The implication of this inconsistency is that the search for more empirical evidence on the issue of gender differences in students' biology self-efficacy is germane. Moreover, empirical literature on cultural beliefs and gender as predictors of students' self-efficacy in some topics in senior secondary school Biology, is lacking, particularly in Benue State, which is the target of this study, thus the need for this study; cultural beliefs and gender as predictors of students' self-efficacy in some topics in senior secondary Biology in Benue State. Specifically, the study sought to determine:

- 1. degree of variation in students' self-efficacy in Biology that can be attributed to cultural beliefs;
- 2. magnitude of variation in students' selfefficacy in some topics in Biology that is attributable to gender;
- 3. degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender;

Based on the purpose of the study, the study was guided by the following research questions:

- 1. What is the degree of variation in students' self-efficacy in Biology that is accounted for by cultural beliefs?
- 2. What is the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender?
- 3. What is the degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender?

Also, the following hypotheses were formulated in the study and were tested at .05 level of significance.

- H_{01} : The degree of variation in students' self-efficacy in Biology that is accounted for by cultural beliefs is not statistically significant.
- H_{02} : The magnitude of variation in students' selfefficacy in some topics in Biology that is attributable to gender is not statistically significant
- H_{03} : The degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender is not statistically significant.

Method

The study employed correlational research design. This is because the researchers were interested in establishing the direction and magnitude of the relationships that exists among cultural beliefs, gender and students' self-efficacy towards some topics in Biology, which made the design more appropriate. The study was carried out in Benue State, Nigeria, in consideration of the potential influence of some of the cultural and gender related beliefs of the people of the area on students' self-efficacy towards some topics in Biology. The population for the study comprised 14,635 Senior Secondary Two (SS II) Biology students made up of 6, 669 males and 7,966 females across 285 public schools in the three Education Zones (A, B and C) in the State (Directorate of Planning, Research, Statistics and Computer, Benue State Teaching Service Board. June, 2020). Multistage sampling procedure was used to draw a sample of 378 (171 males and 207 female) SSII Biology students for the study. These set of students were used because they are expected to have covered chosen topics in the senior secondary Biology curriculum. school The instruments used for data collection were: Questionnaire on Students' Cultural Beliefs (QSCB)

and Students' Biology Self-Efficacy Questionnaire (SBS-EQ) developed by the researchers. The Questionnaire on Students' Cultural Beliefs (QSCB) was developed by the researcher. It has two sections (A and B). Section A elicits the demographic information of respondents such as School's Zone (A, B, or C), tribe (Tiv, *Idoma*, lgede or Itilo) and gender (Male or Female). Section B contained 27 items which elicited data on cultural beliefs with response options of Strongly Agree (SA), Agree (A), Disagree (D), to Strongly Disagree (SD) with numerical values of 4 3, 2, 1 respectively.

The Students' Biology Self-Efficacy Ouestionnaire (SBS-EO) had two sections (A and B). Sections A elicits the demographic information of respondents such as School's Zone (A, B, or C), tribe (Tiv, Idoma, lgede or Itilo) and gender (Male or Female). On the other hand, sections B contained 17 items on biology students' self-efficacy. The students were also requested to express their responses to the statements by ticking on any of the options; Strongly Agree (SA), Agree (A), Disagree (D), to Strongly Disagree (SD) with numerical values of 4 3, 2, 1 respectively. The instruments were subjected to face validation by five experts; two each from Biology Education and Measurement and Evaluation and one from the Arts and Social Science Education. The validators were requested to assess the instruments in terms of clarity of the items, relevance and appropriateness of items to the purpose of the study, and suitability of grammar or simplicity of vocabulary. The observations, criticisms, suggestions and corrections of the experts were used to improve the quality of the final version of the instruments. Additionally, the construct validity of the instruments was established using factor analysis. In doing this, 50 copies of the questionnaires were administered to 50 students drawn from the two public secondary schools in Benue State that were not part of the actual study, their responses were coded and subjected to factor analysis on SPSS (Statistical Package for Social Sciences), version 26. This was done in order to ensure that only items that are good or valid indicators of the constructs under study were included in the final version of the instruments.

The reliability of the instruments was ascertained after trial-testing the instruments on a similar sample of 30 SS II students in one Public Secondary School in Benue State that were not part of the sample for the actual study. The reliability coefficients (r) for the QSCB and SBS-EQ obtained



using Cronbach's Alpha method were 0.87 and 0.85 respectively, which showed that the instruments were reliable. The instruments were administered and collected by the researcher with the help of one research assistant. Data collected were sorted and coded in the Statistical Package of the Social Sciences (SPSS). However, since gender as a dichotomous variable was to be correlated with students' selfefficacy which were continuous variables. The continuous scores from these variables were dummycoded (0 and 1) in order to be at the same level with gender which was also coded 0 for males and 1 for females. In the dummy coding, the lowest score of 17 and highest score of 68 obtainable from the Students' Biology Self-Efficacy Questionnaire (SBS-EQ) were added and divided by 2, in order to group the scores into two ranges; 17-42 and 43-68 which were further coded 0 and 1 respectively. The data generally were analyzed the correlation coefficients (r) and coefficients of determination (r^2) obtained from simple linear and multiple regression analysis to answer the research questions while the null hypotheses were tested using the ANOVA for regression generated from the analysis at 0.05 level of significance

Results

This section deals with the presentation of results. The results are presented in Tables in line with the research questions and the null hypotheses formulated for the study.

Research Question 1: What is the degree of variation in students' self-efficacy in Biology that is accounted for by cultural beliefs?

Table 1: Regression Analysis of the degree of variation in Students' Self-Efficacy in Biology that is accounted for by Cultural Beliefs

Variables	Ν	R	R ²
Cultural Beliefs	378	-0.48	0.23

Students' Self-Efficacy

KEY: N = Number of respondents, R = Correlation coefficient, R^2 = Coefficient of determination

Result in Table 1 shows that the correlation coefficient (R) obtained between students' cultural beliefs and their self-efficacy was -0.48. This depicts that there is an inverse or negative correlation between students' cultural beliefs and their self-efficacy in some topics in Biology. In other words, the more

students hold on to their cultural beliefs, the less selfefficacy they would have towards some topics in Biology and vice and versa. Furthermore, the coefficient of determination associated with the correlation coefficient of -0.48 was 0.23. This coefficient of determination explains that 23% variation in students' self-efficacy in Biology is accounted for negatively by their cultural beliefs. The result of the interview also showed that cultural beliefs negatively affect students' self-efficacy in Biology.

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Hypothesis 1

H0₁: The degree of variation in students' self-efficacy in Biology that is accounted for by cultural beliefs is not statistically significant.

Table 2: Regression ANOVA test of significance ofthe degree of variation in students' self-efficacy inBiology that is accounted for by cultural beliefs

Mo	odel	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	38164.147	1	38164.147	82.531	.00
	Residual	173870.518	376	462.422		
	Total	212034.664	377			

a. Dependent Variable: Students' Self-Efficacy

b. Predictors: (Constant), Cultural Beliefs

Result in Table 2 shows that an f-ratio of (F(1, 377) = 82.531, p = .00) was obtained for the degree of variation in students' self-efficacy in Biology that is accounted for by cultural beliefs. Since the associated probability (p) value of .00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis one $(H0_1)$ is therefore rejected. Hence, inference drawn is that the degree of variation in students' self-efficacy in Biology that is accounted for by their cultural beliefs is statistically significant. This implies that cultural beliefs negatively account for a significant degree of variation in students' self-efficacy in Biology.

Research Question 2: What is the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender?

Table 3: Regression Analysis of the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender

Variables	N	R	\mathbf{R}^2
Gender	378	0.39	0.15

Students' Self-Efficacy

KEY: N = Number of respondents, R = Correlation
coefficient, R^2 = Coefficient of determination

Result in Table 3 indicates that the correlation coefficient (R) obtained between students' gender and their self-efficacy in some topics in Biology was 0.39. This portrays that there is a positive correlation between students' gender and self-efficacy. Also, the coefficient of determination associated with the correlation coefficient of 0.39 was 0.15. This coefficient of determination implies that 15% variation in students' self-efficacy in some topics in Biology is attributable to the influence of their gender.

Hypothesis 2

H0₂: The magnitude of variation in students' selfefficacy in some topics in Biology that is attributable to gender is not statistically significant.

Table 4: Regression ANOVA test of significance of the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender

Μ	odel	Sum of Squares	Df	Mean Square	F	Sig.	
1	Regression	10.961	1	10.961	65.854	.00	
	Residual	62.584	376	.166			
	Total	73.545	377				

a. Dependent Variable: Students' Self-Efficacy

b. Predictors: (Constant), Gender

Result in Table 4 shows that an f-ratio of (F(1, 377) = 65.854, p = .00) was obtained for the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender. Given that the associated probability (p) value of .00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis two $(H0_2)$ is consequently rejected. Thus, the conclusion drawn is that the magnitude of variation in students' self-efficacy in some topics in Biology that is attributable to gender is statistically significant.

Research Question 3: What is the degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender?

Table 5: Regression Analysis of the degree ofvariation in students' self-efficacy in some topics inBiology that can be attributed to the combinedinfluence of cultural beliefs and gender

		Compo	osite M	odel Su	immary
Variables	Ν	R	R^2	R	R^2
Cultural Beliefs	378	-0.48	0.23	0.49	0.24
Gender	378	0.39	0.15		
Students' Self-					
Efficacy					

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KEY: N = Number of respondents, R = Correlation coefficient, R^2 = Coefficient of determination

Result in Table 5 indicates that the correlation coefficient (R) obtained from the composite relationship of students' cultural beliefs, gender and their self-efficacy in some topics in Biology was 0.49. The coefficient of determination associated with the composite correlation coefficient of 0.49 was 0.24. This coefficient of determination signifies that 24% variation in students' self-efficacy in some topics in Biology can be attributed to the interaction influence of their cultural beliefs and gender.

Hypothesis 3

H0₃: The degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender is not statistically significant.

Table 6: Regression ANOVA test of significance of the degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38343.445	2	19171.723	41.392	.00
	Residual	173691.219	375	463.177		
	Total	212034.664	377			

a. Dependent Variable: Students' Self-Efficacy

b. Predictors: (Constant), Gender, Cultural Beliefs

Result in Table 6 shows that an f-ratio of (F(1, 377) = 41.392, p = .00) was obtained for the degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender. Since the associated probability (p) value of .00 is less than 0.05 level of significance at which the result is being tested, the null hypothesis three (H0₃) is therefore rejected. Consequently, the conclusion drawn is that the degree of variation in students' self-efficacy in some topics in Biology that can be attributed to the combined influence of cultural beliefs and gender is statistically significant. This implies that cultural beliefs and gender jointly are considerable determinants of students' self-efficacy in some topics in Biology.

Discussions

The main purpose of this study was to examined cultural beliefs and gender as predictors of students' self-efficacy in some topics in senior secondary Biology in Benue State. The findings of the study showed that 23% variation in students' selfefficacy in Biology is accounted for negatively by their cultural beliefs, which is statistically significant. This finding is true because when students hold on to the various cultural beliefs, for instance, pouring out water from wash dishes at night can attract the anger of the ancestral spirits; and while sweeping one's house at night time can lead to depletion of one's wealth. These can have negative influence on students' self-efficacy in biology while teaching such topics like hygiene and microorganisms. In this case, students may get

confused which one to practice or belief. This finding agrees with Agogo (2001) revealed that there is a significant relationship between cultural-practices and students' achievement in integrated science. In the same vein, Ochima (2012) disclosed that students bring a substantial amount of their cultural practices into their Biology classes, also, that there is a significant relationship between the mean achievement scores of senior secondary Biology students and the cultural practice-related misconceptions of the students. This also suggest that students who hold on to their cultural beliefs are more likely to perform poorly in a given subject area, which may be due to their lack of academic self-efficacy.

The findings of the study showed that 15% variation in students' self-efficacy in some topics in Biology is attributable to the influence of their gender, which is statistically significant. This means that gender or being a male or female, has a considerable influence on students' self-efficacy in Biology. For gender-based beliefs that when a instance, menstruating woman cooks for her husband, it makes him sick can affect the self-efficacy of both male and female students in related Biology topics like reproduction and variation. This finding is however contrary to the finding by Sawari, Siti and Mansor (2013) who discovered that there is a very weak correlation between gender and students' self-efficacy. The finding however agrees with Lars and Leiv (2016), that female students have significantly lower self-efficacy levels in Biology than their male counterparts. The finding also adds credence to Rajesh and Roshan (2016), which showed that there was a significant influence of gender on student selfefficacy. Hence, gender can be considered as a strong determinant of students' self-efficacy.

The study again found that 24% variation in students' self-efficacy in some topics in Biology can be attributed to the interaction influence of their cultural beliefs and gender, which is statistically significant. This is possible because when both male and female students over rely on their cultural beliefs such as pouring out water from wash dishes at night can attract the anger of the ancestral spirits; sweeping one's house at night time can lead to depletion of one's wealth, sneezing suddenly is a sign that one is being discussed somewhere, among others. This can affect students' self-efficacy in related Biology topics negatively, in terms of whether they are to adhered to what they learn in school or what their culture holds. This finding is in line with the Ochima (2012) who

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reported that there was a significant relationship between cultural practice-related misconceptions of the both male and female students and their achievement scores in Biology. This lends support to Lars and Leiv (2016), that female students have significantly lower self-efficacy levels in Biology than their male counterparts. In the same way, Rajesh and Roshan (2016), unveiled that there was a significant influence of gender on student self-efficacy. In this case, if students hold on to their cultural beliefs, their self-efficacy in the study of Biology is likely to decrease and vice versa.

Conclusion

Based on the findings of this study, it is concluded that cultural beliefs have strong negative influence on students' self-efficacy in some topics in Biology. Also, gender has considerable influence on students' selfefficacy in some topics in Biology. Furthermore, cultural beliefs and gender compositely, are strong predictors of students' self-efficacy in some topics in Biology.

Recommendations

Based on the findings, the researchers recommended that:

- 1. Biology teachers should ensure that the various topics in the subject are sufficiently explained to students with scientific justifications in order to increase their self-efficacy in Biology.
- 2. Teachers should help correct the wrong notions held by male and female students about the various topics in Biology.
- **3.** Government through the federal and state ministries of education should provide the required instructional materials to enhance both male and female students' understanding of the various topics in Biology

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