



Influence of Cultural Practice – Related Misconceptions on The Achievement of Senior Secondary Biology Students

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Abstract

This study investigated the influence of culture practice-related misconception on achievement of senior secondary Biology students. Purposive sampling technique was used to select two hundred (200) senior secondary school students from secondary schools in Ogun State. The instruments used in gathering data for the study were Cultural Practice-related Misconceptions Biology Achievement Test (CPMBAT) and Cultural Practice-related Misconceptions Achievement Test (CPMAT). The data were analysed using simple percentage and t-test statistics. Findings revealed that there are no significant differences between performances of students in cultural practice misconception based on gender and age grade and a negative relationship exist between cultural practices related misconception and students' achievement in Biology. Authors of Biology textbooks should therefore make extra efforts to use identified cultural practice and related misconceptions to illustrate Biology concepts in order to promote meaningful learning. Teachers should also reinforce good scientific conception and discourage alternative conception in students.

Keywords: Biology, Cultural practice, Achievement, Misconceptions, Achievement.

Introduction

Biology is derived from the Greek words 'bios' meaning life and 'logos' meaning study and is generally defined as the science of life. It is a natural science concerned with the study of life and living organism including structure, function, growth, evolution, distribution and identification taxonomy. Biology is a subject of great importance to everyone as it fosters economic development and reduces poverty among the populace. It is on this not that Biology is regarded as a compulsory and general course in secondary school education in Nigeria.

Misconceptions have been defined as a consistent departure from an agreement that has been reached and accepted universally by experts in a particular field or a particular conception (Ivowi, 2010). They are referred to as views and opinions that are incorrect based on faulty thinking and misunderstanding. The example of the earth rotating rather than the sun orbiting the earth is one of many that teachers refer to collectively as misconceptions. Misconceptions can be categorized as preconceived notions, non-scientific beliefs, conceptual misunderstandings, vernacular misconceptions and factual misconceptions. There has been extensive research into students' informal ideas about science topics, and studies have suggested reported misconceptions vary considerably in terms of properties such as coherence, stability, context-dependence, range of application etc (Taber, 2009)

Although culture is usually thought of as the collection of knowledge and traditions that are transmitted outside of Biology, evidence continues to accumulate showing how biology and cultures are inseparably intertwined. The persistence underachievement in science particularly in Biology has elicited a lot of concerned and generated resources to establish the causes of the repeated failures. However, the empiricist and realists derived education from "educare" and conceive education as the process of training



or forming the mind of the child. The presupposition here is that the mind of the students is nothing but a receptive blank sheet which waits to be written on by the teacher (Gregory and Scott 2012).

Culture may therefore be summed up as the totality of people's ways of life within a given environment while Biology is one of the science subjects that studies life. Therefore both culture and Biology share two things in common which is "LIFE". Misconception could arise not only from the nature but also from cultural beliefs, norms and values. It is the superstitious beliefs derived from all the concepts of biology that students bring from their immediate environment into the classroom settings. Some examples of the cultural misconceptions biology students bring into the biology classes are; eating of snail by pregnant woman can lead to the birth of a salivating baby which can be explained biologically that the snail is one of the sources of protein required by pregnant women. Students also believe that when a black couple gives birth to an albino child, they possibly had sex in the afternoon. Meanwhile, the albinism is due to the lack of melanin which is not pigmented by the skin. Also, students believe that sweeping of the house in the night leads to depleting of one's wealth, biologically, it means preventing ones from microorganism and diseases. (Ododo, 2014).

Cultural practice misconception will occur only when the beliefs and traditions of one cultural group present a challenge to the acceptance of biologically proven theories. Such a challenge will elicit brain processes involved in cognitive, decision making, emotional activation and physiological arousal associated with achievement. As noted by Okoye (2007), scientific knowledge and explanations have not be an integral part of African life, rather power of witchcraft and evil spirits are means of providing explanation to natural phenomena.

Consequently, there is a conflict between student's everyday life world and the world of science. Dealing with misconceptions in science and especially in biology is one of the hardest tasks in science teaching. They must be removed as soon as possible, before they create deeper root into the students' cognitive structure. Hence, the first job of a teacher in the classroom is to eliminate all superstitions beliefs and explain biology as the study of natural phenomena by minimizing the curiosity and misinformation arising from superstitions belief to bring meaningful understanding and learning. Biology is one of the science subjects that has a lot to do with human life and human beings' ways of doing things, there is therefore the likelihood of cultural practices wielding influence on teaching, learning and manipulating of concepts since it is the way of life of people. The implication of this is that there could be a wide cultural gap between the student's cultural explanation and scientific interpretations of reality as the contradictory notions are capable of obstructing the learning of Biology concept and their application, resulting in misconceptions and underachievement. Guided by this, this study therefore tends to investigate the influence of cultural practice related misconception on achievement of Biology students. The following research questions guided the study:

1. Is there any significant difference between performances of students in cultural practice misconception based on gender?
2. Is there any significant difference between performances of students in cultural practice misconception based on age grade?
3. What is the correlation effect of cultural practice related misconception on students' achievement in Biology?

Research Hypotheses

The following hypotheses were formulated to guide the study:

- H0₁:** There is significant difference between performances of students in cultural practice misconception in Biology based on gender.
- H0₂:** There is significant difference between performances of students in cultural practice misconception based on age grade.
- H0₃:** There is significant relationship between cultural practices related misconception and students' achievement in Biology.



Methodology

Design of the study

Descriptive research design was adopted for the study to establish the association between cultural practices related misconceptions and students achievement in Biology.

Population and Sampling Technique of the study

Purposive sampling technique was used to select the sample size. Since the population in the study area is relatively large, a purposive sampling technique was used to select a sample consisting of two hundred (200) senior secondary school students in SS two from each selected secondary schools in Ogun State.

Instrumentation

The instruments used for the study were Cultural Practice-related Misconceptions Biology Achievement Test (CPMBAT) and Cultural Practice-related Misconceptions Achievement Test (CPMAT).

Method of data Collection

The researcher seek permission from the principal of selected schools to allow their school to be used for the study and the designed instrument was administered to the students. The data gathered were analysed using simple percentage and t-test statistics using Statistical Package for Social Science (SPSS V. 20).

Validity/Reliability

The face validity of the research instrument was done by some experts in Science Education. To check the reliability, the Cronbach Alpha Reliability test was used, and this yielded an alpha value of 0.87.

Findings

Analysis of Demographic Data of the Respondents

Table 4.1: Respondents Distribution based on Gender, Age Range and Religion

Variables		Frequency	Percentage (%)
Gender	Male	108	54
	Female	92	46
	Total	200	100
Age	<18 yrs	158	79
	19 yrs >	42	21
	Total	200	100
Religion	Christian	115	57.5
	Muslim	85	42.5
	Total	200	100

From the table 4.1, it can be observed that: 54% of the respondents were males while 46% were females; 79% of the respondents were below 18yrs while 21% were 19yrs and above and 57.5% of the respondents were Christians while 42.5% were Muslims.

Analysis of Hypotheses

H₀₁: There is significant difference between performances of students in cultural practice misconception based on gender



Table 4.2: Gender difference in performance of students in cultural practice misconception

	Gender	N	Mean	Std. Deviation	Std. Error Mean	
CPMAT	Female	108	14.07	5.064	.487	
	Male	92	13.42	4.300	.448	
				Levene's Test for Equality of Variances	t-test for Equality of Means	
				F	Sig.	
CPMAT	Equal variances assumed			3.405	.067	.969
	Equal variances not assumed					.982

Table 4.2 shows that there is no significant difference in students' academic performance in cultural practice misconception based on gender ($p > 0.05$). This implies that both genders performed better in cultural practice misconception, which also indicates that both gender (male and female) hold less misconception.

H0₂: There is significant difference between performances of students in cultural practice misconception based on age grade

Table 4.3: Age difference in performances of students in cultural practice Misconception

	Age	N	Mean	Std. Dev.	Std. Error Mean
CPMAT	< 18yrs	138	13.92	4.726	.376
	19yrs >	42	13.21	4.745	.732

Table 4.3 shows that there is no significant difference between performances of students in cultural practice misconception based on age grade. $F(0.171, P > 0.05)$. This implies that the students with the age grades (< 18yrs and > 19yrs) have same level of performance in cultural practice misconceptions.



	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	
CPMAT	Equal variances assumed	.171	.680	.864	198	.388	.710	.821	-910
	Equal variances not assumed			.862	64.311	.392	.710	.823	-934

H0₃: There is significant relationship between cultural practices related misconception and students' achievement in Biology.

Table 4.4 shows that there is a strong negative correlation between Cultural Practice Related Misconception Achievement Test (CPMAT) and Cultural Practice Misconception Biology Achievement Test (CPMBAT). ($r = -.092, N=200$). The null hypothesis is therefore accepted while the alternative is rejected. This is shown by its value of .196 which is greater than the level of significance (0.05).

Table 4.4: Pearson Correlation showing relationship between Cultural practice-related misconception and students' achievement in Biology

		Cultural Practice Misconception Biology Achievement Test	Cultural Practice Misconception Achievement Test
CPMBAT	Pearson Correlation	1	-.092
	Sig. (2-tailed)		.196
	N	200	200
CPMAT	Pearson Correlation	-.092	1
	Sig. (2-tailed)	.196	
	N	200	200

Discussion of Findings

The result of hypothesis one shows that there is no significant difference between performances of students in cultural practice misconception based on gender. This supports the findings of Oludipe (2012) and Igbokwe (2010). Both asserted that there are no significant differences in academic achievement of male and female students. Igbokwe (2010) further explained that a favourable learning environment bridges the gap that exists between the achievement of male and female Biology students. However, the finding of this study disagrees with Ogunleye and Babajide (2011), who reported that male supremacy and gender stereotyping are factors among others that were identified to influence achievements and Abdu-Raheem and Atovigba (2012) who observed that gender had significant effect on achievement in favour of males.



Contrary to these, the finding of Adebule and Aborishade (2014) is consistent with the result under study, who reported that both male and female students have almost the same attitude towards science. To buttress this finding, the results of Fatokun, Egya and Uzoechi (2016) revealed that gender has no influence on the achievement and retention of those exposed to treatment. Finally, there is no disparity in the attitudes of students towards science based on sex.

The result of hypothesis two reveals that there is no significant difference between performances of students in cultural practice misconception based on age grade. This finding is in line with Mlambo (2011) who revealed that age does not have a significant impact on academic performance. The results of this study are therefore pointers to the fact that cultural practices which are at variance with Biology concepts and which persist even with years of teaching and learning, can cause misconceptions which can lead to underachievement of Biology students. In other words, students may have multiple and layered cultural explanations of a single concept, the complexity of which may not surface in response to an assessment strategy that requires only that students have memorized the “right answer”. This finding also agree with Obidi (2005) who pointed out that the societies are characterized by authoritarianism and rigid conformity where children are expected to be seen and not heard and to blindly learn from the experience of elders irrespective of their age. This result is not in agreement with Chiappetta and Koballa (2006) who identified culture, peer influence and teacher’s explanations, as sources of students’ alternative conceptions.

The result of hypothesis three shows that there is no significant relationship between cultural practice-related misconception and students’ achievement in Biology. This result is not in line with the findings of Ododo (2014) who found out that there is a significant relationship between the mean achievement of senior secondary Biology students and the cultural practice-related misconceptions they hold. This means that students who scored high on cultural practice-related misconceptions (that is, held fewer misconceptions) scored high in the achievement test. On the contrary, students who scored low in the cultural practice-related misconceptions (i.e., held more misconceptions) scored low in the achievement test. This finding is in line with those of Ausubel (2010), that students consider new information in the context of their prior knowledge and worldviews and that it takes a confrontation between these new and existing ideas and their resolution for meaningful learning to be achieved which according to Ivowi (2010), who stated that the major cause of underachievement has been traced to the persistence influence of misconceptions which students bring to biology classes.

Igbokwe (2010) also found out that the cultural environment in which Biology is taught significantly affects its learning. The results of this study are therefore pointers to the fact that cultural practices which are at variance with Biology concepts and which persist even with years of teaching and learning, can cause misconceptions which can lead to underachievement of Biology students. A number of researchers have suggested that students’ alternative conceptions can be as important to conceptual understanding as pedagogy, (Ivowi, 2010). A number of students in this study drew upon their cultural beliefs when resolving their thinking. However, more studies are still needed in this area to correct the identified misconception.

Conclusion and Recommendations

The major conclusion that could be drawn from this study is that Biology students bring less or no cultural practice misconception into Biology class. It is now widely acknowledged that students misconception in Biology hinder their meaningful understanding and good performances in Biology. The findings reported in this study will generate more interest in research with respect to students’ cultural ideas and cultural differences that may impact students learning. There is need to look for new ideas and develop more collaborative and cross-cultural researches between teachers and society if there is needs to improve outcome for all our students. Teachers, curriculum developers and researchers can work together to find better ways to help all the students to have greater achievements in Biology.



References

- Burgoon, J.N., Heddle, M.L. and Duran, E. (2011). Re-examining the similarities between teacher and Student Conceptions about Physical Science. *Journal of Science Teacher Education*, **21** (7):859-872.
- Gregory, S.B. and Scott, A. (2012). The Biology of cultural conflict. *Philosophical Transactions of the Royal Society of London*, **367**(1589): 633-539.
- Hodgson, C. and Pyle, K. (2010). A literature Review of Assessment for Learning in Science. *National foundation for Educational Research*. The Mere Upton Park, Slough.
- Igwebuike, T.B. (2012). Effects of Conceptual Change Pedagogy on Achievement By High Ability Integrated Science Students on Energy Concepts. *International Journal of Research Studies in Educational Technology*. **2** (1): 3-14.
- Ivowi, M.O. (2010). *Misconceptions in Science*. Lagos: Foremost educational services. Limited.
- Keeley, P. (2012). Misunderstanding misconceptions. *Science scope*, **35**(8):12-15.
- Lakpini, M. A. (2006). Effect of a Conceptual Change Instructional Strategy on the Achievement, Retention and Attitude of Secondary School Biology Students with Varied Ability. Unpublished PhD Dissertation, Faculty of Education, ABU Zaria.
- Lee W. A. (2005). A Study on Causes of Elementary School Students' Misconceptions in Oxidation-reduction. *Annual Report to the National Science Council in Taiwan (in China)*.
- Ododo, O.M, (2014) Influence of cultural practice-related misconceptions on Achievement of Senior Secondary Biology Students in Zone C of Benue State, Nigeria. *British journal of Education, society and behavioural science*, **4**(12), 1703-1705.
- Okoye, B.E. (2007). Efficacy of Eliminating Superstitious Beliefs Strategy on Achievement And Knowledge Retention in Genetics Among Secondary School Students. *Journal of science teachers Association of Nigeria*. **42**(1&2): 73-77.
- Savion, L. (2009). Clinging to discredited beliefs: The larger cognitive story. *Journal of the Scholarship of Teaching and Learning*. **9**: 81-92.
- Schmidt, A. (2011). Creativity in science: *Tensions between Perceptions and Practice Creative Education*. **2**: 435-445.
- Taber, K. S. (2009). *Progressing Science Education: Constructing the scientific research programme into the contingent nature of learning science*. Dordrecht: Springer.