

# **STEM JOURNAL** OF ANAMBRA STATE (STEMJAS), 3(1); 2020

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#### EDITORIAL

It is my pleasure to present to you the Volume 3 Number 1 of STEM JOURNAL OF ANAMBRA STAN (STEMJAS). This is one of the products of the our Bi-annual conference of Science Teachers Association of Nigeria, Anambra State Chapter with the theme Curriculum Crisis in Science, Technology, Engineering and Mathematics (STEM).

The article were peer renewed and edited thus, gave rise to Volume 3 No.1 edition. The articles in this edition is centered on the conference theme.

The volume 3, No. 1 STEMJAS is rich and therefore recommended to students, science teachers, curriculum planners and indeed the general public.

#### Happy Reading.

**Prof. Rita N. Nnorom** *Editor-In-Chief* 



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#### CULTURAL BELIEFS: AN IMPEDIMENT TO SCIENCE EDUCATION CURRICULUM

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#### Abstract

This paper determined to find out the influence of some cultural beliefs on science education curriculum. The study set out to identify, classify, analyze and relate some cultural beliefs to science concepts and scientific explanations. Four research questions guided the study while 250 senior secondary school two science students from ten public secondary schools in Onitsha North local government area of Onitsha Education Zone in Anambra State was employed as sample. These 250 SS2 students were asked to collect some cultural beliefs of some natural phenomena and their explanations in their environment. Out of the numerous cultural beliefs collected, 24 were science based, 16 beliefs relate to biology, 5 beliefs relate to chemistry while 3 beliefs relate to physics and almost all the cultural beliefs listed seemed to have influence on students understanding of science. It was recommended among others that teachers should use proper teaching approaches that should minimize the conflict between these cultural beliefs and science concepts.

Keywords: Cultural Beliefs, Science Education, Curriculum

#### Introduction

Curriculum development has been seen as the process whereby a set of learning packages are constructed and monitored for an educational system (Patrick, 2021).



These learning opportunities are packaged intending to bring about certain changes in pupils in the areas of knowledge, skills and attitude. Curriculum according to Okafor and Uchechi (2010) is that which equip the learners for development in local and global challenges for ensuring peace and resolving conflicts, devastating health problems and myriads of social, economic and political demands that stare individuals and societies fontally on daily basis. Any curriculum that does not respond to the major waves of changes in the learners' environment is valueless. Musuzawa (2018) sees curriculum as that which is responsive to students' multi-ethnic and cultural heterogeneous setting.

According to Igbokwe (2010) the influence of cultural background in science curriculum and the learning of science involves making science an extent of knowledge that negotiates meaning comparing what is known to new experiences and resolving discrepancies between what is known and what seems to be implied by new experiences. These discrepancies are very prominent in Africa where science education has been influenced by cultural beliefs. In Africa, there is conflict between some of people's everyday life-world and the world of science. Igbokwe (2010) for instance, has observed that in Africa in general and Nigeria in particular, scientific explanation has not been an integral part of the people's social life. Rather, power of witchcraft and evil spirit are means of providing explanations to natural phenomena. For instance, culturally, the African child would believe that a baby not crying at birth would mean that the baby is from the evil or spirit world instead of attributing the phenomenon to suffocation because of lack of oxygen or malformation in the womb. This problem is complicated by the fact that in Nigerian classroom today, children are of varied cultural background whose world view and cognitive references such as myths, personal beliefs, metaphor and learning styles are varied. The implication is that students can interpret the same science phenomena in different ways depending of their varied world view. Adeniyi (2017) gave the following example on how the interpretation of the same phenomena depends on one's world view.

Three men went to see Niagara falls, one was an Indian from India. One was Chinese from China and one an American. One seeing the falls, the Indian as a matter of course, thought of his god manifesting in this grandeur of nature. The Chinese simply wished to have a little hut beside the fall, where he might invite his friend or two, serve tea and enjoy conversation. The American however, on viewing the falls,



immediately asked himself what could be done to make the most of such an enormous amount of energy.

This example illustrates succinctly how the understanding of science concepts could depend on students' world view. In view of this diversity in perception, it becomes vital for science teacher to address the different languages, customs and experiences that these students from different communities bring to science classroom. Science teachers are therefore, faced with increasing complex problem of creating a suitable learning environment for science students with varied cultural background.

The neglect of diverse background and activities of students and failure of science teachers to consider varied cultural resources of the students while teaching science appear to remain one of the main reasons for the alienation of students from science. Students seem to find it difficult to see meaning in the learning of science, which they perceive as foreign culture quite different from their indigenous culture especially where many science teachers in Nigeria are not equipped to teach science from the varied cultural perspective of the students. This situation if not arrested will continue to affect negatively the much cherished science education curriculum in Nigeria. To arrest the trend, science education curriculum must incorporate learning environment that would produce functional students who could effectively exploit their environment by observing the relationship between the science they learn and their individual cultural environment and experiences.

This study aimed at investigating the influence of some cultural beliefs on science education curriculum. Specifically, the study will:

- Identify the listed cultural beliefs on natural phenomena that are related to some biology concepts.
- Identify the listed cultural beliefs on natural phenomena that are related to chemistry concepts.
- Identify the listed cultural beliefs on natural phenomena that are related to physics concepts.
- Identify the cultural beliefs on natural phenomena that influence students understanding of science concepts.



#### **Research Questions**

The following research questions were formulated to guide the study;

- What are the listed cultural explanations of natural phenomena that are related to biology concepts?
- What are the listed cultural explanations of natural phenomena that are related to chemistry concepts?
- What are the listed cultural explanations of natural phenomena that are related to physics concepts?
- What cultural beliefs of natural phenomena influence students' understanding of science concepts?

#### Methods

The study employed survey design which involved 250 SS2 science students who were randomly sampled from ten public secondary schools in Onitsha North local government area of Onitsha Education Zone in Anambra State. The sampled students were asked to make a list of cultural beliefs of some natural phenomena in their environment and also give the meanings and explanations of their communities on the listed cultural beliefs of these natural phenomena. The listed cultural beliefs of these natural phenomena were collected after two weeks, this is to enable them find out the meaning and explanations of these cultural beliefs from their communities. These beliefs were classified according to their relationships to science subjects (biology, chemistry and physics). Out of 54 cultural beliefs of some natural phenomena collected only 24 relate to science concepts. Sixteen related to biology, five related to chemistry while three related to physics.

These science related cultural beliefs were validated and the reliability tested using Cronbach alpha, this gave a reliability index of 0.75. These classified science related cultural beliefs of these natural phenomena were administered to students in form of a questionnaire to determining their own explanations. Mean was used to find out which cultural beliefs of these natural phenomena influenced students' understanding of science.



#### Results

Table 1: Classification of cultural beliefs of natural phenomena, explanations and their relationship to biology concepts.

S/N	Cultural	Cultural	Related	Scientific
0/11	Beliefs of	Explanations	Science	Explanations
	Natural	1	Concepts	<b>L</b>
	Phenomena		•	
1	A baby not crying at birth.	The baby is from the evil world.	Reproduction	Suffocation because of lack of oxygen or malformation in the womb.
2	Pregnant women should not see masquerade	They will give birth to the replica of the masquerade.	Reproduction (genetics)	Genetic mutation
3	High mortality rate in children of the same parents.	The dead children are regarded as ogbanje (reincarnation).	Genetics	Sickle cell disease or other inherited diseases.
4	Death of an old person followed by the birth of a new born baby in the family who resembles the dead person.	Reincarnation.	Genetics	Genetic mutation
5	Cries of certain birds at night.	<ul><li>i). Death of a person in the community.</li><li>ii). Bad omen.</li></ul>	Birds characteristics	Natural characteristics of night birds
6	Jerking of one's eye brows	That a person will see someone he/she has not seen for a long time.	Movement of the nervous system.	Involuntary movement of the muscles
7	When one	Someone is calling	Pollution or	The sneezing may



	sneezes frequently	the person sneezing from a distance.	cold	be caused by cold, catarrh, cough or allergy due to pollutants
8	Eggs should not be given to children.	Prevent them from stealing.	Class of food (nutrition)	Children generally eat egg as source of protein for growth.
9	If one develops pain in the neck after sleeping.	The person should tie a string of mat around the neck to stop the pain.	Posture	The neck was wrongly placed while sleeping and should be straightened or relieved by taken drugs.
10	A baby cutting the upper teeth before the lower ones.	An abomination	Growth and development	Growth and development depending on nutrition.
11	Orange seed swallowed mistakenly.	That the seed will germinate and grow out of the person's head	Seed germin- ation and food digestion.	The seed will be digested and egested
12	Vulture perching on top of one's roof.	The person's enemies are at work/bad omen	Scavengers	The vulture is scavenging for food.
13	One should not sweep one's house at night.	One will sweep off his/her wealth away.	To avoid pollution	Cleaningness of the house and environment is essential no matter the time of the day.
14	When one crosses over one's legs when he/she is sitting down.	That the person's growth will be retarded, unless the legs are crossed over the second time in	Growth and development	Growth and development depends on hormones and nutrition.



15	When one has some itching on one's palm.	opposite direction. One will receive plenty of money from an unexpected person.	Irritation	Irritation may be due to allergy		
16	If sand enters one's eyes	The person should look up and down several times for the sand to go out of the eyes.	Eye and foreign bodies	Sand may be removed by means that is safe, bearing in mind the sensitivity of the eyes.		

Table 1 which answered research question 1 revealed that out of the 24 listed cultural beliefs of natural phenomena that relate to science only 16 relate to biology concepts.

Table 2: Classification and identification of cultural beliefs of naturalphenomena, explanations and their relationship to chemistry concepts.

S/N	Cultural Beliefs of Natural	Cultural Explanations	Science Concepts	Scientific Explanations
	Phenomena			
17	If red sparks of light are observed at the bottom of a heated pot.	A person's palm fruits has ripened	Carbon and its compound	Burning of charcoal (carbon) at the bottom of the pot.
18	Appearance of rainbow	<ul> <li>i) Rain will not fall</li> <li>ii) Python is giving birth to its new born</li> <li>iii) Prominent person or king will die.</li> </ul>	Light	Refraction of light rays by droplets of water.
19	When it is	Cow or elephant is	Water cycle	The rain that comes



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	raining and the sun is shining at the same time.	given birth	(condensation)	by sudden condensation of the cloud that was not dense enough to overshadow the rays of the sun
20	Sound of thunder and lightning	One claps the two lips making a unique sound, so that the thunder and lightning will not harm the person.	Thunder and lightning (chemical reaction)	Due to the interaction between particles of different charges.
21	When wind raises papers, dusts and other particles in a circular motion	The evil spirit are passing	Cyclone	Eddy's motion

Table 2 which answered research question 2 revealed that out of the 24 listed cultural beliefs of some natural phenomena that relate to science concepts only 5 have relationship with chemistry concepts.



# Table 3: Classification and identification of cultural beliefs of naturalphenomena, explanations and their relationship to physics concepts.

S/	<b>Cultural Beliefs</b>	Cultural	Science	Scientific Explanations
Ν	of Natural	Explanations	Concepts	
	Phenomena	-	-	
22	Eclipse of the sun (solar eclipse).	The sign that the gods are angry and the beginning of destruction or disaster.	Light	Occurs when moon passes in a direct line between the earth and the sun. The moon's shadow travels over the earth's surface and blocks out the sun's light as seen from the earth.
23	Water ripples	<ul> <li>i) water spirits are in heated argument,</li> <li>ii) dispersal of fish eggs by water birds.</li> </ul>	Waves	Water waves
24	Acrobatic displays of some traditional dancers and masquerades.	Witchcraft and use of charms.	Equilibri um of forces.	Balancing of forces.

Table 3 which answered research question 3 revealed that only 3 cultural beliefs out of the 24 cultural beliefs have relationship with concepts in physics.



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Table 4: Students' mean response on cultural beliefs of natural phenomena that influence their understanding of science concepts.

S/ N	Cultural Beliefs of Natural Phenomena	Cultural Beliefs and Scientific Explanations	Mean on Cultur al Beliefs	Mean on Scientific Explanati ons
25	A baby not crying at birth.	<ul> <li>i) The baby is from the evil or spiritual world.</li> <li>ii) Suffocation as a result of lack of oxygen or malformation in the womb</li> </ul>	3.93	1.86
26	Pregnant women should not see masquerade	<ul><li>i) They will give birth to the replica of the masquerade</li><li>ii) Genetic mutation.</li></ul>	3.91	2.00
27	High mortality rate in children of the same parents.	<ul><li>i) The dead children are regarded as ogbanje (reincarnation).</li><li>ii) Sickle cell disease.</li></ul>	3.97	1.87
28	Death of an old person followed by the birth of a new born baby in the family who resembles the dead person.	<ul><li>i) Reincarnation</li><li>ii) Genetic mutation</li></ul>	3.05	1.25
29	Cries of certain birds at night.	<ul> <li>i) Death of a person in the community.</li> <li>ii) Bad omen</li> <li>iii) Characteristics of night birds.</li> </ul>	4.00 3.00	1.00
30	Jerking of one's eye brows	i) The person will see someone he/she has seen	3.11	



		ii)	for a long time. Movement of the		1.80
31	When one sneezes frequently	i)	Someone is calling the person sneezing from a distance.	2.60	2.00
		ii)	As a result of cold, catarrh, cough, pollution or an allergy.		
32	Eggs should not be given to	i)	To prevent them from stealing in future	1.40	3.00
22	children.	ii)	For growth & development.	1.00	
33	If one develops pain in the neck	1)	The person should tie a string of mat around the neck to stop the pain	1.80	3 60
	atter siceping.	ii)	The neck is wrongly placed while sleeping so pain drugs should be taken to relieve of the		3.00
24		•、	neck pain.	2.00	
34	A baby cutting the upper teeth before the lower ones.	1) ii)	An abomination Development as a result of growth hormone.	3.00	1.88
35	Orange seed swallowed	i)	The seed will germinate and grow out from the	1.48	2.14
	mistakeniy.	ii)	The seed will be digested.		3.14
36	Vulture perching	i)	Bad omen	4.01	
	on top of one's roof.	ii)	Vulture scavenging for food.		2.10
37	One should not sweep one's	i)	One is believed to sweep off one's wealth away.	3.10	
	house at night.	ii)	Sweeping should be		2.12



		done at any time to	
38	When one	i) One's growth will be	3.12
	crosses over	retarded unless the legs	
	he/she is sitting	second time in the	2.04
	down.	opposite direction.	
		ii) Growth depends on	
20	When one has	i) The person will receive	2 71
39	some itching on	some money from an	5.71
	one's palm.	unexpected person.	1.18
		ii) Irritation due to an	
40	If and ontars	allergy.	2 27
40	one's eves	and down several times for	2.31
	, and the second se	the sand to go out of the	
4.1		eye.	2.07
41	If red sparks of light are	1) The person's palm fruit has ripened	3.07
	observed at the	ii) Burning of charcoal	1.01
	bottom of a	(carbon) at the bottom of	
10	heated pot.	the pot.	2.11
42	Appearance of rainbow	<ol> <li>Rain Will not fall</li> <li>Python is giving birth</li> </ol>	3.11 2.57
	Tuilloow	iii) Prominent person or	2.51
		king will die	1.18
40	XX71 · · ·	iv) Refraction of light rays	2.00
43	when it is raining and the	1) Cow or elephant is given birth	2.98
	sun is shining at	ii) Condensation (water	2,11
	the same time.	cycle) of water.	
44	Sound of	i) One should claps the	3.18
	lightning	two fips making a unique sound so	
		that the thunder and	1.39



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			lightning will not harm		
			the person.		
		ii)	Interaction between		
			particles of different		
			charges.		
45	When wind	i)	The evil spirits are	3.99	
	raises papers,		passing		1.01
	dusts and other	ii)	Cyclone (eddy's		
	particles in a	ŕ	motion).		
	circular motion				
22	Eclipse of the	i)	The sign of angry gods	2.11	
	sun (solar		which will lead to		
	eclipse).		destruction or disaster.		3.07
	-	ii)	The moon passes in a		
			direct line between		
			earth and the sun. The		
			moon's shadow travels		
			over the earth's surface		
			and blocks out of sun's		
			light as seen from the		
			earth.		
23	Water ripples	i)	Water spirits are in	2.05	
			heated argument.	2.19	
		ii)	Dispersal of fish legs		3.00
			by water birds.		
		iii)	Water waves		
24	Acrobatic	i)	Done by use of	3.71	
	displays of some		witchcraft.	3.68	
	traditional	ii)	Done by use of charms		2.02
	dancers and	iii)	Balancing of forces		
	masquerades.		(equilibrium).		

In Table 4, it revealed that students believed more on cultural beliefs explanations of natural phenomena than the scientific explanations according to their mean responses on each of the items. This implies that cultural belief explanations of certain natural phenomena had a great influence on students understanding of science on these



natural phenomena. Item numbers l(i), 2(i), 3(i), 5(i), 12(i), 15(i), 21(i) and 24(i) had the highest mean responses. This implies that those items are widely believed and had greatest influence than other items.

#### Discussion

The findings of this study, found that out of the 24 listed cultural beliefs of natural phenomena by the student, that relate to science 16 relate to biology concepts, 5 relate to chemistry concepts and 3 relate to physics concepts.

The findings also revealed that these cultural beliefs of natural phenomena influence students learning of science to a great extent especially in biology. Students believed more on the cultural belief explanations than scientific explanations of these natural phenomena. This is in line with the findings of Adeniyi (2017) who observed that Africa and Nigeria scientific explanations on some natural phenomena had not been an integral part of people social life, since the power of witchcraft, evil spirits and charms are means of providing explanations to natural phenomena. He also said that culturally, the African child would believe that a baby cutting the upper teeth first before the lower teeth is from evil spirit instead of attributing that to growth and development.

Tobin (2017) also opined that this discrepancy is very prominent in Africa where science education has been influenced by cultural beliefs and this had resulted in a conflict between some of the students everyday life experience and the world of science. Therefore, science classroom should provide a lesson plan with opportunities for all students to make meaning of their cultural experiences and science in classroom. Science curricular activities planned in this way will necessitate the use of cultural beliefs of students from various ethnic group into the classroom. This will go a long way preventing science curriculum conflicts with cultural beliefs of various students. Another way of preventing this science curriculum conflicts due to cultural beliefs, thus, providing them with opportunities to negotiate meaning as well as experiences and to construct new meaning. That is, the teaching/learning of science should integrate the cultural beliefs on these natural phenomena or events into curriculum to avoid curriculum conflict or crisis.



#### Conclusion

Earlier discussions revealed that there is conflict between cultural beliefs of students and science teaching, learning and this remain one of the main reasons for crisis in science education curriculum, it is important that the learning of science should be culture dependent because students will be able to use their cultural experiences to interpret science concepts, they would also be able to relate what they know with these experiences and compare it with science explanations.

#### Recommendations

It is recommended that there should be a close cooperation between cultural beliefs and science even where conflict seems to exist. This is because many a times a belief may be in the air for many decades or even centuries before receiving scientific confirmation on the basis of conclusive research.

It is also recommended that science teachers should know the level of their students' beliefs and modify their teaching approach so as to help the students achieve more in science.

Finally, it is important to recommend that curriculum activities of the science teachers', educators as well as curriculum planners be directed towards how to incorporate cultural beliefs in science curriculum, after all cultural beliefs are not peculiar to Nigerians alone but exist everywhere. Workshops, seminars and visit to areas of interest where scientific explanations can be demonstrated which contradict cultural beliefs are necessary because, this will help in preventing curriculum and cultural belief crisis in science education.

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