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IMPACT OF INTEGRATING CULTURE FOR THE EFFECTIVE TEACHING AND LEARNING OF SCIENCE IN SECONDARY SCHOOLS IN ENUGU URBAN

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Abstract: The study investigated the influence of integrating culture for the effective teaching and learning of science in secondary schools in Enugu Urban**.** Design used in this study was descriptive survey design. Three research questions guided the study. This study was carried out in Enugu Urban. The population for this study comprises all 64 Science teachers in the 28 secondary schools. The sample size for this study was 64 teachers. The instrument for data collection was a structured questionnaire titled "Integration of Culture in Teaching and Learning of Science Questionnaire (ICTLSQ). The instrument was subjected to face validation by three specialists; one from Departments of Science Education, one from Physics Education and one from Measurement and Evaluation Unit from Faculty of Education, Enugu State University of Science and Technology, Enugu. To ensure reliability of the instrument, Cronbach alpha method of reliability measure was applied and the Reliability index is 0.87. The research questions were answered using mean and standard deviation. The finding of the study shows that combination of native languages contributes to the effective teaching and learning of science in secondary schools in Enugu urban. Based on the findings the study recommended among others Science education curricular developers should emphasize on cultural content in the programmes and regularly restructure and update them relative to changes. Government and other bodies should provide Science students and researchers research grants to promote learning.
Key words: Culture, Science, Integration.

Introduction

A country's socioeconomic progress is greatly influenced by the quality of its science education. A variety of societal ills are believed to be cured by scientific knowledge, which has become a key component in the creation of prosperity (UNESCO, 2019). In Budapest, Hungary, a UNESCO world science conference made the following declaration: Science should serve mankind as a whole and help everyone gain a greater knowledge of nature and society, a higher standard of living, and a sustainable and healthy environment for both the present and the future. Therefore, the emphasis of the science education curriculum in Africa should be on the relationship between science education and society, while also seeking to give students a wide foundation in science, The vast majority of people who will not actively pursue scientific endeavors should be able to collaborate intelligently with those who are and be able to criticize or appreciate the contributions of science and technology, according to Newton

(2018), who argues that science education should provide enough understanding of the role of science in society. For individuals to actively participate and address development concerns, there must be widespread access to scientific knowledge (De la Rosa, 2014). This necessitates good science instruction and learning in the area of biology, chemistry and physics especially in secondary schools. Understanding science can help prevent environmental deterioration such as desertification, erosion, water hyacinth, and air, land, and water pollution. Biology and Physics are viewed in the context of this study as subjects that are taught to achieve the fundamental unity of science through a shared method of scientific inquiry. They can be taught in a culturally appropriate setting. Different viewpoints are used to view culture. Hammond (2018) described it as an interpretation of custom as a result of it. According to Asaru (2017), culture is best understood when compared to the context in which it exists. Examples of this can be seen in various cultural activities. The conventions, taboos, experiences, and beliefs of a people are implied by their cultural practices, which they exhibit in their everyday behavior. Therefore, cultural customs are particularly unique to each civilization, which children also exhibit at home and at school. Over the past 50 years, there has been a lot of research on how human mental growth progresses (De la Rosa, 2020; Nwachukwu, 2015). For instance, it is now understood that a child's awareness of the social forces and environmental stimuli around him increases as his biological development progresses (Nwachukwu, 2015). Prior to attending school, a youngster often adjusts to the society in which he finds himself. Perhaps for this reason Sawyerr (2017) stated that the majority of children arrive at school having mental concepts and preconceptions that they acquired from their family, peers, and the community throughout the earlier stages of their mental development. This finding also applies to students who are enrolling in science classes for the first time. Ameh (2014) noted that students are not starting science classes with a pure slate. This is true because when students are learning about science, they frequently bring in prior experiences from their families, friends, and communities. Such encounters are a part of the cultural traditions that children have ingested and rely on when attempting to understand their science lesson at school. Students learn the customs of their respective cultures in those environments. These customs may differ from tribe to tribe, but they typically help students develop their personalities and ways of thinking. According to Ameh (2014), many science professors in elementary and early secondary schools (Junior and Senior School) frequently overlook or are unaware of the cultural practices that students bring to their science lectures. However, this should not be the case because science should not be taught in a completely culturally-neutral environment. This is so because society creates the cultural contexts and practices that serve as the fundamental pillars for the growth of science both now and in the future (Asaru, 2017). The foundational knowledge children hold upon entering elementary and later secondary school, particularly with regard to science and in most cases, is based on their cultural practices in terms of the people's values, experiences, norms, expectations, and beliefs. In some instances, a student can successfully integrate and reconcile his cultural values, experiences, norms, expectations, and beliefs from his upbringing with his schoolwork when studying biology. This is not always easily doable. No meaningful learning would occur in the latter

circumstance unless the conflicts between the learners' values, experiences, norms, expectations, and beliefs that they gained at home were resolved and appropriately merged with those of the school, at least in terms of science subjects like Chemistry, Biology, Physics and the likes (Beth, 2018). Every society teaches its young in the knowledge, values, and behaviors essential to maintaining that society. The child is first exposed to this process in her home environment, where social learning develops through seeing and modeling other people's behaviors (Reimer, 2019). This means that everything that occurs in the school is influenced by the cultural climate of the school, and it inevitably affects what the students will learn, how they learn it, and the desire to study. It is therefore important to understand the cognitive structure of the Nigerian students. Therefore, this study aims to finds out the benefits of the integration of culture and people for better teaching and learning of Science in secondary schools in Enugu Urban.

Statement of the Problem

The cultural expectations, values, and experiences that students studying science bring to the classroom influence their learning. The science teacher may occasionally be unaware of the type and extent of these cultural values, practices, experiences, and expectations that the students bring to the class, which may unavoidably have an impact on the students' academic performance in the subject. According to a content study of the existing Biology and Physics curricula in Nigeria, it is possible that not enough was provided to help students successfully merge science with their cultural values, practices, experiences, and expectations. This means that some people may view the science curriculum as lacking in its ability to handle the concerns of cultural values, experiences, and practices that tend to enhance its teaching and learning. Additionally, this will have an impact on how well students succeed in the course. Therefore, it is necessary to pinpoint the cultural customs that might have an impact on students' interest in Biology and Physics at a time when those interests are dwindling in secondary schools in Enugu urban and probably leading to poor academic performance in science subjects in secondary schools in the area. Therefore, this study aims to find out the benefits of the integration of culture and people for better teaching and learning of Science in secondary schools in Enugu Urban.

Purpose of the Study

The main purpose of this study is to determine the importance of integrating culture for teaching and learning of Science in secondary schools in Enugu Urban. Specifically, the study sought find out:

i. how combination of native language can facilitate teaching and learning of Science
ii. how respect for the values of the society can facilitate teaching and learning of Science
iii. how incorporation of cultural symbols can facilitate teaching and learning Science

Research Questions

The following research questions guided the study:

1. To what extent does the combination of native language facilitate teaching and learning of Science?
2. To what extent does respect for societal values improve the teaching and learning of Science?
3. To what extent does incorporation of cultural symbols influence teaching and learning of Science?

Conceptual Framework

Schematic Representation of the Study

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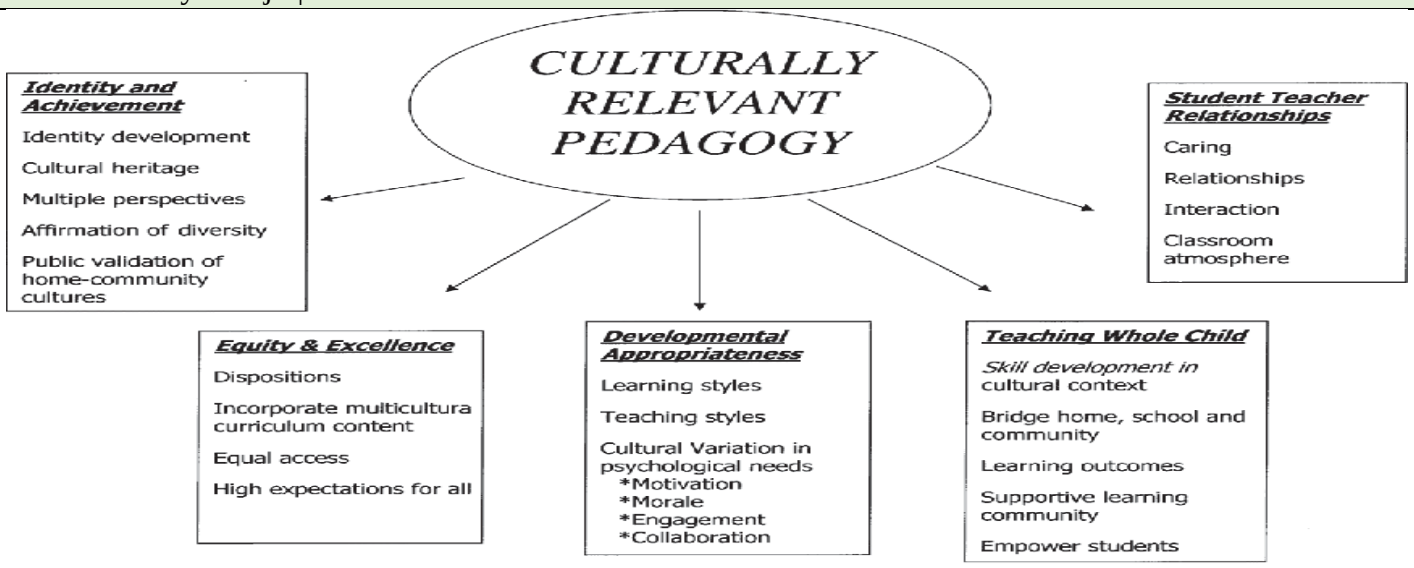

Source: The researchers, 2023

Methods

The design used in this study was descriptive survey design. According to Dengaand (2019), survey research is a form of descriptive research that is aimed at collecting large and small samples from populations in order to examine its distribution. In this study, the survey design is used to investigate the impact of integration of cultural elements and people in the teaching and learning of Science. This design was relevant because it is concerned with conditions and relationships that exist between the related cultural practices and the teaching and learning of Science. This study was carried out in Enugu Urban. Enugu urban is made up of three local government areas which include Enugu East, Enugu North and Enugu South Local Government Areas respectively. This area is predominantly occupied by the Igbos and Christians by religion. There are twenty-eight (28) public schools in Enugu urban. The choice is based on the fact that these areas constitute the main part in the state, and the tribe here are found across the entire state. The population for this study comprises all 64 Biology teachers in the 28 secondary schools. (Source: PPSMBZonal Office Enugu, 2023& 2024) and was all used for the study because it is manageable. The instrument for data collection was a structured questionnaire titled "Integration of Culture in Teaching and Learning of Biology Questionnaire (ICTLBQ). The questionnaire was developed by the researchers with two sections, A and B. Section A deals with the demographic information of the respondents while section B contains items designed to generate data to address the research objectives. There are three subscales in section B in line with the three research questions. The questionnaire was drawn strictly based on literature search on the culture integration in science learning. The response patterns are; Very High Extent [4], High Extent [3], Small Extent [2], Very Small Extent [1]. The instrument was subjected to face validation by three specialists; two from Departments of Science Education and one from Physics Education and one from Measurement and Evaluation Unit from Faculty of Education, Enugu State University of Science and Technology, Agbani. To ensure reliability of the instrument, Cronbach alpha method of reliability measure was applied and the Reliability index is 0.87. The researchers administered the questionnaire to the

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respondents. Each respondent was given a copy of the questionnaire which was collected after completion on the spot. Data obtained were collated and subjected to descriptive statistics. The research questions were answered using mean and standard deviation. Data was presented in tables. For the mean, values equal and higher than 2.5 were accepted while values below 2.5 were rejected.

Data Analysis and Results

Research Question 1: To what extent does the combination of native language facilitate effective teaching and learning of Science?

Table 1: Respondents' mean ratings on the facilitation of effective teaching and learning of Science through combination of native language

N = 204

S/N Items	$\bar{X}$	SD	Decision
1. Learning and combining native languages promotes a smooth transition between home and school.	2.60	.46	Accepted
2. Learning and combining native languages promotes the interactive learner centred approach	2.50	.40	Accepted
3. Combining native languages promotes creativity and innovation in designing teaching materials	2.70	.46	Accepted
4. Combining native languages promotes support of the general community in the teaching/learning process	2.70	.46	Accepted
5. Combining native languages promotes emotional stability which translates to cognitive stability in Science	2.54	.53	Accepted
6. Combining native languages promotes metalinguistic awareness especially in taxonomy aspect of Science	2.38	.52	Rejected
7. Combining native languages promotes insight into cultures for proper understanding of Science.	2.50	.50	Accepted
8.well-developed identities and self-esteem	2.60	.49	Accepted
Cluster Mean	**2.57**		**Accepted**

Seven out of the eight elements for the combination of native languages mentioned in Table 1 have mean scores between 2.50 and 2.70, indicating that the combination of native languages facilitates efficient teaching and learning of biology. The respondents did not accept the last item, which had a mean value of 2.38. The range of the standard deviations is 0.40 to 0.53. This indicates that the respondents' mean evaluations were not greatly dissimilar. The cluster means of 2.57 demonstrated that native language is needed for effective science.

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Research Question 2: To what extent does respect for the values of the society improve the teaching and learning of Science?

Table 2: Respondents' mean ratings on the respect for the values of the society improving the teaching and learning of Science

N = 204

S/N	**Items:** Respect for the values of the society promotes	$\bar{X}$	SD	Decision
9.	Personality development of individuals in order to shape their future.	2.51	.57	Accepted
10.	Science students to be attuned to changing scenarios while handling their social, moral, and democratic duties efficiently	2.80	.40	Accepted
11.	instils spirit of patriotism as well as develops religious tolerance in science students	2.69	.50	Accepted
12.	Promotes the spirit of curiosity and inquisitiveness towards the orthodox norms	2.90	.54	Accepted
13.	Good manners and responsibility and cooperativeness necessary for teaching science	2.89	..54	Accepted
14.	Teacher effectiveness and encourages active and appropriate participation in classroom activities	2.60	.49	Accepted
15.	Positive, supportive, and respectful relationships between teachers and students	2.80	.78	Accepted
16.	The aim of Science education to inculcate knowledge of facts hence the spirit of enquiry is actualized	2.59	.64	Accepted
Cluster Mean		**2.72**		Accepted

Table 2 demonstrates that the mean scores for all the criteria provided for upholding social values range from 2.51 to 2.90, demonstrating that upholding social values enhances science teaching and learning. The range of the standard deviations is 0.40 to 0.78. The cluster means of 2.72 indicated that high-level science instruction and learning are supported by respect for societal values.

Research Question 3: To what extent do cultural symbols aid the teaching and learning of Science?

Table 3: Respondents' mean ratings on how cultural symbols aid the teaching and learning of Science

N = 204

S/N	**Item on cultural symbols Ability to:**	$\bar{X}$	SD	Decision
17.	Application of Rattles as an indigenous cultural object support student learning with clear and detailed expectations.	2.90	.70	Accepted

18. Application of Kola-nut as one of the indigenous cultural symbols facilitate the development of children's scientific understanding.	2.90	.54	Accepted
19. Application of the African Talking drum as an indigenous cultural object support writing and recording	2.80	.54	Accepted
20. Application of Baby dolls as indigenous cultural symbols relate closely to science theories, and might be used to support children's developmental symbolic thinking	2.58	.49	Accepted
21. Application of beads as an indigenous symbol represent science reality in human mind	2.60	.70	Accepted
22. Application of native cutting comb understand shared meanings, values, and behaviors because they are expressions of how people interact	2.71	.63	Accepted
23. Application of horse whip as an indigenous symbol serve as visible, developed, and powerful means of solidarity in teaching natural sciences like Biology and Physics	2.50	.30	Accepted
24.Application of pictures, words illustrations and African dressings may be used as cultural symbol to teach the botanical name and meaning and act as a reminder of words previously known but then forgotten	2.99	.60	Accepted
Cluster Mean	**2.65**		Accepted

According to Table 3, all of the items provided for cultural symbols have mean scores between 2.50 and 2.99, indicating that they effectively support science teaching and learning. The range of the standard deviations is 0.54 to 0.78. The cluster mean of 2.65 demonstrated that the use of cultural symbols helps to teach and understand science at a high level.

Summary of Findings

The findings of the study are summarized as follows:

1. That combination of native languages contributes to the effective teaching and learning of Science in secondary schools in Enugu urban.
2. The respect for values of the society contributes to the actualization of the goals of teaching and learning of Science in secondary schools in Enugu urban.
3. That cultural symbols help in the effective teaching and learning of Science in secondary schools in Enugu urban.

Discussion of Findings

Contribution of combination of native languages for Effective teaching and learning of Science.

In table one, the finding of the first research question revealed that combination of native languages contributes to the effective teaching and learning of Science in secondary schools in Enugu Urban. The findings of the study are in line with Ekpenyong and Ojo (2018), who stated that using one's native language alongside a common language helps one preserve highly developed abilities necessary for thriving in their community. This is also in line with Obereh (2011), using a variety of local languages

can help scientific instruction and learning to be more successful. Both instructors' usage of the students' mother tongue greatly aided in their knowledge, which supports what Acquh, Eshun, and Afful-Broni (2014) stated about the importance of the mother tongue in the learning of topics. Again, this also confirms the view held by Fredua-Kwarteng and Ahia 2015a, 2016b) that Nigerian students will do well in the examinations if the questions were translated into native language of the student.

Contribution of Respect for values of the Society for Effective teaching and learning of Science.

In table 2, the finding of the second research question revealed that respect for values of the society highly promotes effective teaching and learning of Science. The findings resonate with the findings of Chukwuneke (2020) who stated that creating a character education program on respect, justice, responsibility, citizenship, flexibility, helpfulness, and honesty, for instance, and integrated it into the science education program. The character education program had a positive impact on student interaction. Despite the small number of studies on values teaching in science education, nearly all of them highlighted the same findings as this research. It can be inferred that certain techniques or programs are successful in promoting values education if the results of the present study are consistent with the results of the prior studies. The incorporation of this value in biology instruction through assignments based on activity-based values education may be responsible for the beneficial changes in students' values of responsibility.

Contribution of Cultural Symbols for Effective Teaching and Learning of Science

In table 3, the finding of the third research question revealed that cultural symbols promote effective teaching and learning of Science in secondary schools. This result is consistent with Ezeani's (2018) finings that regional cultural symbols particularly relate to phenomena, languages, patterns, acts, etc. that can express particular meanings in a particular place. It possesses expression, transmission, and perceptive qualities. This was in line with Oboreh's (2020) observation that symbols are an aesthetic representation of the local typical culture and that their cultural characteristics also play a significant role in the improvement of scientific teaching and learning. The factors like the shape and meaning of the characters are thoroughly taken into consideration throughout the process of character creation, growth, and evolution. It has a priceless and significant cultural background and meaning. The cultural character of the local cultural symbols perfectly satisfies the cultural requirements for studying science. Regional cultural symbols will also have a deeper modern interpretation when intriguing words and cultural qualities interact with cultural attributes of cultural symbols. This occurs when words that creatively combine form and meaning have a more vivid and exciting fusion.

Conclusion

Based on the study's findings, it has been determined that culture is, in general, one of the most significant aspects in the evolution of man and society. Man exists and acts as an individual, as well as a social community (family, professional, territorial, ethnic, etc.), and as the complete human community residing in a world that has been modified by only natural human work and culture. Each country's progress and transcendence could be intrinsically linked to its vibrant, healthy culture, which contributes significantly to the development of that society's sense of identity. Thus, culture is essential to a person's social growth as well as the realization of their beliefs and values. Many academics think that language has a significant role in determining

the national spirit that serves as the foundation of language, in addition to being a method of expressing culture. According to the worldview of a certain nation or group of people, language serves to pass down the ideas, customs, and cultures from generation to generation. In light of this, it is essential for the study of science, especially biology and Physics, to consider the importance of culture as a human activity and as a system of moral and material values, norms, and behavioral patterns.

Recommendations

Based on the findings of this study, the researcher proffers the following recommendations:

1. The administrators of secondary schools should develop an educational program built upon these ideals would include the following: (a) small group action-oriented cooperative learning tasks, (b) the use of Native elders in explaining and sharing traditions, (c) the identification of and appreciation for traditional values and beliefs in their (i.e., students) daily lives
2. Science education curricular developers should emphasize on cultural content in the programmers and regularly restructure and update them relative to changes.
3. Government and other bodies should provide Science students and researchers research grants to promote learning.
4. Government at all levels should fund the training and re-training of the Science education graduates in culturally enabling environments to enhance their success in operations.

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