Education Annals

Research Article

Teachers' Perception on Teaching Mathematics Using Ethnomathematics Approach in Dekina Local Government Area of Kogi State

Nicholas Samuel Yakusak and Mathias Achema Dansofo

Departments of Mathematics, Federal College of Education, Okene, Nigeria.

Received 30 September 2024; Acceptance 4 November 2024; Published 26 November 2024.

Abstract

In this study, teacher's perception on teaching mathematics using ethno-mathematics approach is presented. A descriptive survey design is adopted for the study. The population of the study is the total number of one hundred and sixty (160) mathematics teachers. Twenty four (24) schools where purposively selected with 48 teachers from each of the ward in Dekina Local Government as the sample. Questionnaires was the instrument used, mean and standard deviation were used to analyze the data collected. A content validity of the instrument was carried out to confirm the suitability of the instrument the reliability test was done use test retest method and was analyzed using Pearson Product Moment Correlation (PPMC) with the result of 0.81. The findings shows that mathematics teachers have negative attitude toward the use of ethnomathematics while teaching mathematics because some contents are too hard to be used and the time allocation is not enough but some mathematics teacher have positive attitude toward it simply because, using ethnomathematics approach while teaching enable easy retention of mathematics concept. It is recommended that, the teacher educators, administration and planners of teacher training program should address the concern about teacher's attitude on the use of ethnomathematics. Also, teachers should be provided with all support and training regarding teaching mathematics using ethnomathematics approach.

Keywords: Mathematics, Ethnomathematics, Perception**.**

Introduction

Correspondence to: Nicholas Samuel Yakusak, e-mail: yakusaksamuel@yahoo.com

How to Cite: Yakusak and Dansofo (2024). Teachers' Perfective on Teaching Mathematics using Ethnomathematics Approach in Dekina Local Government Area of Kogi State. *Education Annals,* **1(11)**. DOI: 10.5281/zenodo.14220435

Mathematics is among the major subject of science and technology, it serves as bedrock for the development of science and technology, it is a subject which year, this is as a result of its significant to humanity. It has a great influence on every aspect of human endeavor such as science and technology, politics economy etc. It is at the core of scientific and technology logical advancement of any nation (Ozofor and Onos, 2018).

Everyday activities of people from deferent groups, cultures, communities, societies are all rooted in the concept of Mathematics. Research shows that different cultural actives of people have rich idea in mathematics when dealing with counting objects, designing, location of position, playing games among others (Bishop, 1990). People from different group process their mathematical ideas in performing activities base of the work or Jobs.

The term ethnomathematics is derived from the three Greek words ethno, mathema, and tics. It is a program that integrates mathematical concepts and methods used by individuals from various cultural groups, which are distinguished from indigenous societies by a group of workers, professionals and children of a certain age groups as well (D'Ambrosio, 2001). This program examines the reasons why people from particular cultures (ethno) have developed the measuring, calculating, inferring, contrasting, and categorizing methods and ideas (tics) that enable them to simulate natural and social environments and contexts to explain and comprehend these phenomena (mathema) (Rosa, 2016). Ethno mathematics also deals with the concept of reality and action of space and time, and the ways of comparing and classifying, explaining, generalizing, inferring, as part of actions, quantifying, measuring, and evaluation (D' Ambrosio, 2006). Previous studies found that teachers were excited and fascinated by the learning approach through ethno-mathematics (Verner et al., 2013). Teachers also claim that ethno-mathematics approach supports students in improving self-conception and higher-order thinking skills, making the subject more accessible (Fouze & Amit, 2018b; Utami et al., 2019).

The use of cultural artifacts helps to reduce mathematical anxiety among children when the start enjoying learning mathematics, teaching becomes meaningful, Sharma and Orey, (2017). With the use of ethno-mathematics approach base on learners and current experience regarding everyday activities, teaching mathematics can be more effective and interesting, (Pradhan, 2019). Sitti and Alam (2021) Albeit the research on the ethno-mathematics have extensively undertaken, little empirical evidence reports teachers' perception on the ethno-mathematics approach, the study found from the findings that by ethno-mathematics students can grab the lesson easily and acknowledge their own culture based on the Indonesian National curriculum. Literacy is the integration of schools and cultural context through the process of cultural dynamism (Ajaps & Obiagu, 2020; Bigagli, 2019; Newton et al., 2020).

The failure of student in the subject of mathematics in our schools is alarming, many approached to address the problem, such as mathematics modeling to reduce failure in mathematics in secondary school, and

some emphasized on mathematics anxiety as reason for the massive failure in mathematics and there was suggestion on how teacher can help calm the nerves, but still persistent, but Ethno-mathematics has not been fully in our schools. In view of the above problem, this paper wants to investigate the view of mathematics teachers on the usefulness of ethno-mathematics in teaching secondary school mathematics in some selected schools of Dekina Local Government Areas of state.

Research questions

This study intends to answer the following questions:

i. Does mathematics teacher use ethno-mathematics while teaching mathematics?
ii. What are the views of mathematics teachers about ethno-mathematics approach in secondary school students?
iii. Does the use of ethno-mathematics approach friendly to the secondary school students?
iv. What are the perceptions of teacher towards students in ethno-mathematics class?
v. To what extent do mathematics teachers relate culture and mathematics while teaching mathematics in secondary school?

Research method

In this study, the descriptive research design was employed, through the data gathering process of a descriptive survey study design, the researcher explains several facets of a phenomenon or a subject without in any way altering. This design is suitable for this research. The populations of this study consist of secondary schools mathematics teachers in Dekina Local Government of Kogi State. With the total population of 160 teachers in fifty (50) schools across the ward in the local government. Twenty four (24) schools out of fifty (50) schools where selected from each ward in Dekina Local Government Area. Simple random sampling technique was use to select the two (2) schools per-ward.

Instruments

In this study, questionnaires designed by the researcher is used as the instrument for the collection of data. Questionnaires are chosen because it can easily generate reliable information from the respondents. The questionnaire is made up of 24 items arranged systematically based on the research question. The instrument for the data collection was developed by the researchers using four-point scales: SA – Strongly agreed; A – Agreed; D – Disagree; SD – Strongly disagree and it consists of six segments. The questionnaire was subjected to content validity by expert. They advise, make suggestions and recommendations to help in establishing the content validity of the instrument. The reliability was

established using test re-test method. The data obtained from the testing was analyzed Pearson Product Moment Correlation (PPMC) and a reliability coefficient was 0.81.

Method of Data Collection

The researchers employed direct determining and retrieval procedures for administration to the respondents. A total number of forty eight (48) copies of ethno-mathematics opinion survey questionnaire was distributed. An introductory letter was collected from the department of mathematics education, federal college of education Okene, Kogi state affiliated with University Ibadan. All the sample schools in Dekina LGA, Kogi State were visited to introduce seek the permission from the principals for conducting the research.

Results and Discussion

In this section, we present the analysis of the data collected follow by discussion, summary, conclusion and recommendation.

3.1 Presentation and Analysis of Data According to Research Question

In the cause of the analysis, opinions of teachers and students were scored using 4-point rating scale for a better understanding and clear interpretation of data. Data on this aspect were analyzed using mean and standard deviation. A Criterion of mean of 2.50 was set for decision making. Therefore, a mean score of 2.50 and above was classified and regarded as accepted (Positive), and a mean score below 2.50 was classified and regarded as rejected (negative). Where N = sample size, X =Mean, and SD=Standard deviation.

Research Question One

Does mathematics teacher use ethno-mathematics while teaching mathematics?

Table 1. Mean and standard deviation of mathematics teachers' use of ethno-mathematics

S/No	Item Statement	N	X	SD	Decision
1	The school did not have the equipment to use.	48	1.22	0.90	Negative
2	The time allocation for teaching is not enough hence teachers decided not to use it.	48	1.45	0.99	Negative

3	Applying ethno-mathematics while teaching consume more time than teachers use other approach.	48	2.43	1.00	Negative
4	The concepts are too hard to use.	48	2.51	1.11	Positive
5	Teachers do not know how to use ethno-mathematics approach in teaching.	48	2.48	1.01	Negative
	Grand mean		2.02	1.00	Negative

From Table 1 above, using the benchmark of 2.50. Item 1 shows that mathematics teacher is in disagreement with the item 1 which state, the school did not have equipment to use. Item 2, which shows negative implies that mathematics teacher is in disagreement with the item stated that, time allocation for teaching is not enough. Item 3, which show negative implies that, the teacher is in disagreement with the statement that using ethno-mathematics consume more time. Item 4, shows that, mathematics teacher is in agreement with the item, that state ethnomathematics concept is too hard to use. Item 5, shows that, mathematics teachers are of disagreement with the item which state that teacher do not know how to use ethnomathematics approach in teaching. The grand mean 2.02 and standard deviation 1.00 (Negative) on the uses of ethno-mathematics reviewed that mathematics teachers does not make use of ethno-mathematics while teaching.

Research Question Two

What are the perceptions of mathematics teachers about ethno-mathematics approach in secondary school students?

Table 2. Mean and standard deviation of mathematics teachers` perceptions about ethnomathematics

S/No	Item Statement	N	X	SD	Decision
1	Ethnomathematics approach is very easy to use.	48	1.45	0.88	Negative
2	The approach motivates student's interest toward learning.	48	1.25	0.90	Negative
3	The use of ethnomathematics approach improves student understanding.	48	1.30	0.99	Negative
4	Teaching mathematics using local tools is interesting.	48	2.45	1.28	Negative
5	Ethnomathematics approach demands a lot of resources.	48	2.33	1.22	Negative

	Grand mean	1.76	1.00	Negative

From Table 2 above, using the benchmark of 2.50. Item 1 shows that mathematics teacher is in disagreement with the item 1 which state, ethno-mathematics is very easy to use. Item 2 shows that, that mathematics teacher is in disagreement with the item which state that, the approach motivate student to learn. Item 3, shows that mathematics teacher and in disagreement that the approach improves student understanding. Item 4, shows that, mathematics teachers are not in agreement with the statement that using local tools is interesting. Item 5, shows that, mathematics teacher is in disagreement with the statement which say that the approach demands a lot of resources. The grand mean 1.76 and standard deviation 1.00 (Negative) on the uses of ethno-mathematics reviewed that mathematics teachers have negative perception toward the use of ethno-mathematics.

Research Question Three

Does the use of ethno-mathematics approach friendly to the secondary school students?

Table 3. Mean and standard deviation of ethno-mathematics friendliness

S/No	Item Statement	N	X	SD	Decision
1	Ethnomathematics approach in class increases teacher-student relationship.	48	1.43	0.96	Negative
2	Student sleep in class while using ethno-mathematics approach.	48	1.49	0.91	Negative
3	Using ethnomathematics while teaching makes the class to be noisy.	48	1.22	0.67	Negative
4	Ethnomathematics concepts boring the students.	48	1.32	0.89	Negative
	Grand mean		1.09	0.69	Negative

From Table 3 above, using the benchmark of 2.50. Item 1 shows that mathematics teacher is in disagreement with the item 1 which state that, the approach increases student-teachers relationship. Item 2, shows that, mathematics teacher is in disagreement with the item that said, student sleep in class while using ethno-mathematics approach. Item 3, shows that, mathematics teacher is not in agreement with the statement using the approach making the class to be noisy. Item 4 shows that, the teachers are in disagreement with the item which state that, the concept is boring to the students. The grand mean 1.09

and standard deviation 0.69 (Negative) on the uses of ethno-mathematics reviewed that ethno-mathematics approach is friendly to the students.

Research Question Four

What are the perceptions of teacher towards students in ethno-mathematics class?

Table 4. Mean and standard deviation of perceptions of secondary school students about ethno-mathematics.

S/ No	Item Statement	N	X	SD	Decision
1	Student understands mathematics better using ethno-mathematics approach in teaching.	48	2.30	0.91	Negative
2	The use of ethno-mathematics approach improves learning.	48	1.33	0.89	Negative
3	Using ethno-mathematics approaching while teaching enables easy retention of mathematics concept.	48	2.54	1 .67	Positive
4	Teaching using ethno-mathematics approach gives more room for playing in the class.	48	1.31	0.99	Negative
5	Ethno-mathematics helps students to know different concept in mathematics	48	2.00	1.11	Negative
	Grand mean		1.90	1.11	Negative

From Table 4 above, using the benchmark of 2.50. Item 1 shows that, mathematics teacher are in disagreement with the item 1 which state, Student understands mathematics better using ethno-mathematics approach in teaching. Item 2 shows that, mathematics teacher is in disagreement with the item which state that, the approach improve students learning. Item 3, shows that, mathematics teachers are in agreement with the item which state that, using ethno-mathematics approach while teaching enable easy retention of mathematics concept. Item 4, shows that, mathematics teacher is in disagreement with the item, which state that, the approach gives more room for playing in the class. Item 5, shows that, the teacher is in disagreement with the item, which state that, the approach helps students to know different concept in mathematics.

The grand mean 1.90 and standard deviation 1.11 (Negative) on the uses of ethno-mathematics reviewed the negative perception the teachers have toward the students about ethno-mathematics while teaching.

Research Question Five

To what extent do mathematics teachers relate culture and mathematics while teaching mathematics in secondary school?

Table 5. Mean and standard deviation of the extent mathematics teacher relate culture and mathematics.

S/No	Item Statement	N	X	SD	Decision
1	Some mathematics teachers are not familiar with the intersection of culture and mathematics.	48	1.40	1.05	Negative
2	Most mathematics concepts cannot be interpreted culturally.	48	2.45	1.51	Negative
3	Most students do not know their culture.	48	1.48	0.99	Negative
4	The school did not permit using culture while teaching.	48	1.49	1.00	Negative
5	The teachers do not know how to relate culture and mathematics.	48	2.10	1.04	Negative
	Grand mean		1.80	1.12	Negative

From Table 4.5 above, using the benchmark of 2.50. Item 1 shows that, mathematics teacher is in disagreement with the item 1 which state, some mathematics teachers are not familiar with the intersection of culture and mathematics. Item 2, shows that, mathematics teacher is not in agreement with the item which state that, most mathematics concepts cannot be interpreted culturally. Item 3, shows that, mathematics teacher is in disagreement with the item, which state, most students do not know their culture. Item 4, shows that, mathematics teacher is not in agreement with the statement in the item, which state that, the school did not permit using culture while teaching. Item 5, shows the disagreement of the mathematics with the statement in the item, which state that, the teachers do not know how to relate culture and mathematics. The grand mean 1.80 and standard deviation 1.12 (Negative) on the uses of ethno-mathematics in their responses reviewed that mathematics teachers are in disagreement with the items in the whole research question five (5).

Discussion of Findings

From Table 1 as observed, mathematics teachers have negative attitudes towards the use of ethno-mathematics while teaching mathematics, this is because some of the concepts are too hard to be used and usually the time allocation for teaching is not enough, agreed with Mosimege and Egara (2022), that

teachers use the ethnomathematics approach and materials in teaching and learning mathematics to a lower extent. Table 2, shows that teaching mathematics using local tools is not interesting and ethno-mathematics is not easy to use, in that case most of mathematics teachers have negative perception of ethno-mathematics approach in secondary schools, in line with Rosa and Orey (2015) that teachers understand of the use of ethnomathematics approach, most of mathematics teacher were of the view that learners would not learn mathematics if everyday context were Incorporated in the teaching process.

From Table 3 we observed that, using ethno-mathematics approach while teaching does not make the class noisy and the students become up and doing, while enjoying mathematics using ethnomathematics approach. Our results are in agreement with Rosa and Orey (2018), that the use of ethnomathematics in the classroom provides opportunities for students to explore mathematical methods use in their cultural environment. Table 4, revealed that ethno-mathematics approach enables easy retention of mathematics concepts and the approach does not contribute to noise making in the class, and students always pay much attention and this leads to easy understanding of the concepts. Which is in line with Mania and Alan (2021), found out that, with ethno-mathematics approach students grasp the lesson easily acknowledge their culture. From Table 5, the result indicates that mathematics teachers are familiar with the intersection of culture and mathematics and those mathematics concepts can be interpreted culturally. This is in line with Mosimege and Egara (2022), finding which found that the association of culture with mathematical content which include knowledge system, traditional activities and cultural artifact.

Conclusion

In conclusion, mathematics teachers have negative Attitude towards the use of ethno-mathematics, teachers do not find teaching mathematics through ethnomathematics approach interest and the concepts are not easy to use, despite students' negative attitude toward the relating culture and mathematics while teaching, it has been found that students know their culture and teachers are familiar with the intersection of culture and mathematics. Based on these results, the study recommends among others that teachers of Mathematics should be provided with needed support and training programs in respect to the teaching of mathematics using ethnomathematics. Adequate equipment to be provided to improve better understanding of students when ethnomathematics concepts are being applied. Principals should device the means of providing the necessary local tools that will aid retention of mathematics concept. It should be introduced and in various culture while teaching as that will help better improvement of student learning. Ethnomathematics approach should be introduced into the mathematics curriculum from lower, basic to senior secondary school levels.

References

Ajaps, S., & Obiagu, A. (2020). Increasing Civic Engagement through Civic Education: A Critical Consciousness Theory Perspective. Journal of Culture and Values in Education. https://doi.org/10.46303/jcve.2020.2

Bigagli, F. (2019). School, ethnicity and nation-building in post-colonial Myanmar. Research in Educational Policy and Management, 1(1), 1-16. https://doi.org/10.46303/repam.01.01.1

D'Ambrosio U (2016). The program ethno-mathematics: Cognitive, anthropological, historic and socio-cultural bases. PNA, 12(4), 229–247.

D'Ambrosio, U. (2001). In My Opinion: What Is Ethno-mathematics, and How Can It Help Children in Schools?. Journal on Teaching children mathematics, *7*(6), 308-310.

Rosa, M., & Orey, D. C. (2015). A trivium curriculum for mathematics based on literacy, matheracy, and technoracy: an ethno-mathematics perspective. ZDM - International Journal on Mathematics Education, 47(4), 587–598. https://doi.org/10.1007/s11858-015-0688-1.

Rosa, M., & Orey, D. (2018). STEM education in the Brazlian context*:* An Ethnomathematical Perspectives in Stem education in the junior secondary school (pp.221-247). springer's

Newton, J., Williams, M., & Feeney, D. (2020). Implementing non-traditional assessment strategies in teacher preparation: Opportunities and challenges. Journal of Culture and Values in Education, 3(1), 39-51. https://doi.org/10.46303/jcve.03.01.3

Ozofor, N. M., & Onos, C. N. (2018). Effect of ethno-mathematics on senior secondary school students' achievement in Ikwuano local government area, Abia State. *Research Journal of Mathematics*, *5*(1).30-45

Mania, S. & Alam, S. (2021). Teachers' Perception toward the Use of Ethno-mathematics Approach in Teaching Math. International Journal of Education in Mathematics, Science and Technology. Vol. 9, No. 2, 282-298

Mosimege, M. D., & Egara, F. O. (2022). Perception and perspective of teachers towards the usage of ethno-mathematics approach in mathematics teaching and learning. Journal on *Multicultural Education*, *8*(3), 288-298.