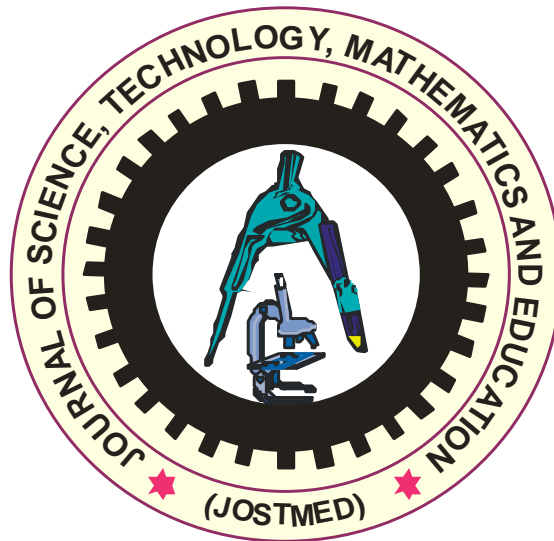


**JOURNAL OF SCIENCE, TECHNOLOGY,  
MATHEMATICS AND EDUCATION  
(JOSTMED)**



**ISSN: 0748 – 4710**

**VOLUME 15(4), DECEMBER, 2019**

## WELCOME TO JOSTMED

Welcome to the Journal of Science, Technology, Mathematics and Education (JOSTMED). The JOSTMED is a scholarly based journal published four times in a year by the Department of Science Education, School of Science and Science Education, Federal University of Technology, Minna, Nigeria, since September 1998. The scope of the Journal includes the research, development, and practice in all areas of Science, Technology, Mathematics and Education.

### INSTRUCTIONS TO CONTRIBUTORS

#### 1. General Guidelines

(i) **Types of Manuscripts:** The Editorial Board of the Journal of Science, Technology, Mathematics and Education accepts only scholarly and original articles that meet its aim and scope. Contributions must be original, therefore, authors is/are to guarantee that their article is original and not currently being considered for publication elsewhere.

(ii) **Language:** The JOSTMED is published in English Language.

(iii) **Length:** Usually full-length article, survey or report should be between 3,000 - 5,000 words (12 – 15 pages).

(iv) **Abstract and Keywords:** Each article should be summarized in about 150 -200 words, serving as a brief description of the content of the article. In addition, following the abstract, supply 4 - 5 keywords/phrases that characterize the content of the paper and which can be used for indexing purposes.

(v) **Manuscript:** Manuscripts, including the abstract and references, should be typed double-spaced on A4 paper set-up using Times New Roman, 12 font size.

(vi) **Review:** Each submission will be subjected to blind peer-review by at least two experts in the fields of the articles. Before the publication of accepted article, corresponding authors will receive a PDF version of their manuscript for final proofing. It should, however, be emphasized that changes in content (new or additional results, corrected values, changes in article title, etc) are not permitted without the approval of the Managing Editor.

#### 2. Copyright

Only original papers will be accepted and processed. Paper accepted will be subjected to viper anti-plagiarize detector software. In addition, no compensation will be given in respect of published papers. However, authors reserve the right to use their own materials for purely educational and research purposes.

#### 3. Format of Submitted Manuscripts

All manuscripts, written in good English, should be submitted electronically as an e-mail attachment (in Microsoft Word format not scanned copy) to the journal e-mail: 1, [jostmedscience@yahoo.com](mailto:jostmedscience@yahoo.com) or managing editor's e-mail: [gambarii@yahoo.com](mailto:gambarii@yahoo.com), [gambari@futminna.edu.ng](mailto:gambari@futminna.edu.ng).

When submitting manuscript in a paper version three copies should be submitted in double line spacing with wide margins, and not more than 12 pages with illustrations inserted. Extra page will attract additional amount of N1,000.00/\$7.00 per page. Each article submitted must be accompanied with an assessment fee of three thousand naira (N3,000) only in cash or bank draft in favour of the Managing Editor (JOSTMED). Submission of manuscript is accepted throughout the year.

The beginning of the manuscript must bear the title of the paper and the full names of authors and their affiliations for correspondence (including e-mail and telephone number). Where there are two or more authors include the addresses for correspondence (e-mail and postal addresses) for the contact author.

Once the article is accepted for publication, the final version should be submitted online. Where that is not possible, the manuscript must be provided, accompanied by a Recordable CD of the same version labelled with: author name(s); titles of article and file name. The author must ensure that the final submission is complete, grammatically correct and without spelling or typographical errors. In preparing the disk, please use Microsoft Word. The sum of Fifteen Thousand (N15,000) naira only (£50.00 or \$100 US Dollar) should be paid to journal account. The online version of the published articles are available at [www.futminna.edu.ng](http://www.futminna.edu.ng) and can be accessed through the Internet free of charge.

#### **4. Organization**

The background and purpose of the manuscript should be given first, followed by details of methods, materials, procedures and equipment used (where applicable). Findings, discussion, conclusions and recommendations should follow in that order. Appendices are not encouraged, but may be countenanced if considered necessary for the manuscript content to be understood. Specifically, author is/are advised to consult the current APA Manual for the details they may need.

#### **5. Figures and Tables**

Figures, charts and diagrams should be kept to a minimum, they must be numbered consecutively with roman numerals and a brief title. When submitting electronically, figures should be prepared separately, numbered consecutively and submitted in one of JPEG File interchange (jpg), CompuServe GIF (gif), and PC Paintbrush (pcx). Images should not exceed width of 450 pixels.

#### **6. References**

The author should ensure that the references given are complete. References to personal letters, papers presented at meetings and other unpublished material may be included. Where such materials may help in the evaluation of the paper, copies should be made available to the Managing - Editor. Papers that are part of a series should include a citation of the previous papers, and explanatory materials may be appended to the manuscript to avoid footnotes. Citation of an author's work in the text should follow the author / date method of citation; the surname of the author (s) and year of publication should appear in text. Generally, the format for citations in the Manuscript for references is that of the latest edition of the American Psychological Association (APA) format. At the end of the article, a reference list in alphabetical order must be given.

#### **7. Disclaimer**

The views and styles expressed in the articles in this publication are those of the individual authors and are not necessarily shared by the reviewers, the editors, the editorial consulting board, the Department of Science Education, or the Federal University of Technology, Minna.

**Prof. Gambari, A. I.**

The Managing Editor, (JOSTMED),  
Department of Educational Technology, Federal University of Technology, PMB. 65, Minna,  
Nigeria

**E-mail:** [gambarii@yahoo.com](mailto:gambarii@yahoo.com); [gambari@futminna.edu.ng](mailto:gambari@futminna.edu.ng)

**Website:** [www.gambariamosaisiaka.com.ng](http://www.gambariamosaisiaka.com.ng)

**Mobile Phone:** +234-816-680-7534; +234-803-689-7955; +234-805-558-6716

## EDITORIAL BOARD

Editor-in-Chief	-	Prof. (Mrs.) V. I. Ezenwa
Managing Editor	-	Prof. A. I. Gambari
Assistant Managing Editor	-	Mr. A. A. Yaki
Associate Editor	-	Dr. T. O. Alabi
Associate Editor	-	Mr. U. S. B. Idris
Associate Editor	-	Dr. O. C. Falode
Account Editor	-	Dr. (Mrs.) R. G. Wodu
Business Editor	-	Dr. (Mrs.) A. Umeh

## EDITORIAL ADVISERS

NAME	SUBJECT	ADDRESS
Prof. (Mrs.) V. I. Ezenwa	Chemistry Education	F.U.T. Minna
Prof. Afolabi Ayo Samuel	Civil & Chemical Engineering,	University of South Africa
Prof. M. O. Yusuf	Educational Technology	University of Ilorin
Prof. (Mrs.) R. Uyanga	Science Education	University of Uyo
Prof. P. A. O. Okebukola	Biology	L. A. S. U., Lagos
Prof. I. O. Inekwe	Mathematics Education	A.B.U. Zaria
Prof. Sanjay Mistra	Computer Cyber Security,	F.U.T. Minna
Prof. C. Ugodulunwa	Test and Measurement	UniJos
Prof. (Mrs.) U.N.V. Agwagah	Science Education	University of Nigeria Nsukka

## SUSSCRIPTION RATES

Nigeria Rate (Personal)	₦1,000.00
Rate (Institutions)	₦2,000.00
Other Countries Rate (Personal)	\$25.00 / £15.00
Rate (Institutions)	\$35.00 / £22.00

All Cheques should be made payable to:

The Managing Editor, JOSTMED, Department of Educational Technology,  
Federal University of Technology, Minna, Nigeria.  
Subscription must be pre-paid and must include 10% handling charges

### Contact

**Phone No:** +234-816-680-7534

**E-mail:** [jostmed@futminna.edu.ng](mailto:jostmed@futminna.edu.ng), [jostmedscience@yahoo.com](mailto:jostmedscience@yahoo.com)

**Website:** <https://jostmed.futminna.edu.ng>

### Copyright ©

**Journal of Science, Technology, Mathematics and Education**

All rights reserved

**ISSN 0748-4710**

## CONTRIBUTORS TO THE ISSUE

- 1. AHMED EL-IMAM, A. M., & ISMAILA, Z.**  
Microbiology department, Faculty of Life Sciences,  
University of Ilorin, P.M.B. 1515, Ilorin Nigeria.  
**E-mail:** [ahmedelimam.am@unilorin.edu.ng](mailto:ahmedelimam.am@unilorin.edu.ng)  
**Phone No:** +234-806-937-6094
- 2. OBATERU, O. C<sup>1</sup>., ADAKAYI, P. E<sup>2</sup>., ISHAYA, S<sup>2</sup>., YAHAYA, T. I<sup>3</sup>., & YISA, C. L<sup>4</sup>.**  
<sup>1</sup>Government Girls Science Secondary School, Kuje, Federal Capital Territory, Nigeria  
<sup>2</sup> Department of Geography and Environmental Management,  
University of Abuja, FCT, Nigeria  
<sup>3</sup>Department of Geography, Federal University of Technology, Minna, Nigeria  
<sup>4</sup> Department of Geography, Niger State College of Education, Minna, Nigeria  
**E-mail:** [bukieobat@yahoo.com](mailto:bukieobat@yahoo.com)  
**Phone No:** +234 803-655-6332
- 3. HASSANA IBRAHIM MUSTAPHA\*, MUTIUSALAWU<sup>A</sup>**  
<sup>a</sup> Department of Agricultural and Bioresources Engineering,  
Federal University of Technology, Minna.  
**E-mail:** [h.i.mustapha@futminna.edu.ng](mailto:h.i.mustapha@futminna.edu.ng)  
**Phone No:** +234-803-701-1315
- 4. EYITAYO A, AFOLABI**  
Chemical Engineering Department, Federal University of Technology, Minna,  
Niger State, P.M.B. 65, Nigeria  
**E-mail:** [elizamos2001@yahoo.com](mailto:elizamos2001@yahoo.com)  
**Phone No:** +234-810-526-2842
- 5. GBADAMOSI, ABIODUN SAFIU<sup>1</sup> & GALADIMA, NUHU USMAN<sup>2</sup>**  
<sup>1, 2</sup> Department of Electrical and Electronics Engineering  
Federal University of Technology  
, Minna. Niger State. Nigeria.  
**E-mail:** [g\\_safiuits@futminna.edu.ng](mailto:g_safiuits@futminna.edu.ng)  
**Phone No:** +234-806-051-1079
- 6. SANI, Y. M<sup>1</sup>., ETUK, S. O<sup>2</sup>., ADAMU, M<sup>3</sup>., & ADAMU, A. A.<sup>4</sup>**  
<sup>1,2,3</sup> Department of Information and Media Technology, <sup>4</sup>Department of Computer  
Science,  
Federal University of Technology, Minna, Niger State, Nigeria  
**E-mail:** [yahayasani@futminna.edu.ng](mailto:yahayasani@futminna.edu.ng)<sup>1</sup>, [abiolastella@futminna.edu.ng](mailto:abiolastella@futminna.edu.ng)<sup>2</sup>  
[bejian2004@yahoo.com](mailto:bejian2004@yahoo.com)<sup>3</sup> [adamu.auwalu@st.futminna.edu.ng](mailto:adamu.auwalu@st.futminna.edu.ng)<sup>4</sup>  
**Phone no:** +234-806-591-8550, +234-703-567-4352, +234-807-977-5565
- 7. S. M. UMAR**  
Department of Mathematical Sciences,  
Bayero University, P.M.B. 3011, Kano- Nigeria.  
**E-mail:** [surajoumar@yahoo.com](mailto:surajoumar@yahoo.com) [msmumar.mth@buk.edu.ng](mailto:msmumar.mth@buk.edu.ng)

- 8. ABDU MASANAWA SAGIR**  
Department of Basic Studies,  
Hassan Usman Katsina Polytechnic, Katsina, Katsina State, Nigeria  
**E-mail:** [amsagir@yahoo.com](mailto:amsagir@yahoo.com)  
**Phone No:** +234-803-947-4856
- 9. AUDU, R.<sup>1</sup>, MA'AJI, S. A.<sup>2</sup>, IDRIS, A.<sup>3</sup>, JIDO, S. H.<sup>4</sup>, & SHEHU, I. Y.<sup>5</sup>**  
<sup>1&2</sup>Industrial Technology Education Department,  
Federal University of Technology Minna, Niger State, Nigeria  
<sup>3&4</sup>Department of Science and Technology Education, Bayero University Kano, Nigeria  
<sup>5</sup>Department of Vocational and Technology Education,  
Abubakar Tafawa Balewa University, Bauchi, Nigeria  
**E-mail:** [rufai.audu@futminna.edu.ng](mailto:rufai.audu@futminna.edu.ng)  
**Phone No:** +234-803-317-4958
- 10. AYELAGBE, SINA OPEOLUWA (PH.D) & KAREEM, IBRAHIM AHMED (PH.D)**  
Department of Educational Technology,  
Adeyemi College of Education Ondo, Ondo State, Nigeria.  
Department of Curriculum and Instruction, School of Education,  
Federal College of Education (Special) Oyo, Oyo State, Nigeria.  
**E-mail:** [oayelaabge@yahoo.com](mailto:oayelaabge@yahoo.com) & [iaabdulkareem2009@gmail.com](mailto:iaabdulkareem2009@gmail.com)  
**Phone No:** +234-803-370-3168
- 11. DR. ITYAVZUA, T. M.<sup>1</sup>, JEM, S. S.<sup>2</sup>, & NMADU, J.<sup>3</sup>**  
<sup>1, 2</sup> Department of Educational Foundations,  
University of Agriculture, Makurdi, Benue State, Nigeria  
<sup>3</sup>Department of Science Education,  
Alex Akwueme Federal University, Ndufu-Alike Ikwo, Ebonyi state, Nigeria  
**E-mail:** [ityavzuatermoses@gmail.com](mailto:ityavzuatermoses@gmail.com), [anasalutation@gmail.com](mailto:anasalutation@gmail.com)  
[johnnmadusaba@gmail.com](mailto:johnnmadusaba@gmail.com)  
**Phone No:** +234-805-934-4461, +234-803-468-2071, +234-803-468-2071
- 12. ZUBAIRU, D. M., GIMBA, R. W. (PhD)., NDAKO, U. Z., & MOHAMMED, N. J.**  
Department of Science Education,  
Federal University of Technology, Minna, Niger State, Nigeria  
**E-mail:** [zmdanlami@gmail.com](mailto:zmdanlami@gmail.com)  
**Phone No:** +234-803-647-7733, +234-803-285-3603
- 13. DR. AJIBOYE, SAMUEL KOLAWOLE<sup>1</sup>, ANYAWU FRANCIS<sup>1</sup> & DR. SAIDU ABUBAKAR<sup>2</sup>**  
<sup>1</sup>Department of Counsellor Education, University of Ilorin, Ilorin, Nigeria  
<sup>2</sup>Department of Arts Education, University of Ilorin, Ilorin, Nigeria  
**Email:** [ajiboye.sk@unilorin.edu.ng](mailto:ajiboye.sk@unilorin.edu.ng) [ajiboye.sk@unilorin.edu.ng](mailto:ajiboye.sk@unilorin.edu.ng)
- 14. DR. FATIMA S. KABIR**  
Directorate of Information and Communications Technology,  
Kaduna State University, P.M.B. 2889, Kaduna  
**E-mail:** [kfatimashehu@kasu.edu.ng](mailto:kfatimashehu@kasu.edu.ng), [kfatimashehu@gmail.com](mailto:kfatimashehu@gmail.com)  
**Phone No:** +234-803-312-1502

- 15. AUDU, R.**  
Industrial Technology Education Department,  
Federal University of Technology Minna, Niger State, Nigeria  
**E-mail:** [rufai.audu@futminna.edu.ng](mailto:rufai.audu@futminna.edu.ng)  
**Phone No:** +234-803-317-4958
- 16. ADEBAYO A. BUSARI, Ph.D.**  
Faculty of Social and Management Science,  
Air force Institute of Technology  
P.M.B 2104 Kaduna, Nigeria  
**Email:** [akanjibusari@yahoo.com](mailto:akanjibusari@yahoo.com)  
**Phone No:** +234-803-474-7355
- 17. KAREEM, I.A (PhD)<sup>1</sup>, AYELAGBE, S.O (PhD)<sup>2</sup>,**  
<sup>1</sup>Department of curriculum and instruction, School of Education, Federal College of Education (Special) Oyo, Oyo State, Nigeria.  
<sup>2</sup>Department of Educational Technology, Adeyemi College of Education Ondo, Ondo State, Nigeria.  
**Email:**[iaabdulkareem2009@gmail.com](mailto:iaabdulkareem2009@gmail.com), [oayelaabge@yahoo.com](mailto:oayelaabge@yahoo.com)  
**Phone No:** +234-803-370-3168
- 18. NDAKOI, MUHAMMAD GIMBA, PROF. WUSHISHI, DANTANI IBRAHIM & DR, CHADO, AMINA MUHAMMAD**  
**Email:** [muhammadgimba2014@gmail.com](mailto:muhammadgimba2014@gmail.com), [diwushishi@futminna.edu.ng](mailto:diwushishi@futminna.edu.ng), [chado,amina@futminna.edu.ng](mailto:chado,amina@futminna.edu.ng)  
**Phone No:** +2348065301692, +2348050431137, +2348036315204
- 19. JIMOH, S. B., ADESANYA, E. O., SHUAIB, S. B., AFOLABI, K. O.**  
Department of Science Education, Faculty of Education, University of Ilorin, Nigeria  
**E-mail:** [jimsaid75@gmail.com](mailto:jimsaid75@gmail.com)  
**Phone No:** +234-805-666-4768
- 20. ABDULLAHI, A., BELLO, M. R., PROF. IBRAHIM, S. A., & KOROKA, M. U. S.**  
Department of Science Education,  
School of Science and Technology Education,  
Federal University of Technology, Minna-Niger State, Nigeria  
**E-mail:** [belamin4real@gmail.com](mailto:belamin4real@gmail.com)  
**Phone No:** +234-8053166584; +234-8035927009; +234-8151761585; +234-8035965281

## TABLE OF CONTENTS

1.	Proximate Composition and Microbial Load of Varieties of Millet-Based <i>Kunun Zaki</i> Drinks. <b>Ahmed El-Imam, A. M., &amp; Ismaila, Z.</b> .....	1
2.	Effect of Climate Variability on Some Tuber Crop Yields in the Federal Capital Territory (FCT), Nigeria. <b>Obateru, O. C., Adakayi, P. E., Ishaya, S., Yahaya, T. I., &amp; Yisa, C. L.</b> .....	11
3.	Assessment of Potability of Bossocampus Borehole Water, Federal University of Technology, Minna. Nigeria. <b>Hassana Ibrahim Mustapha, Mutiu salawu</b> .....	23
4.	Computational Fluid Dynamics Analysis of Carbon Nanotube Synthesis in a Chemical Vapour Deposition Reactor System. <b>Eyitayo A, Afolabi.</b> .....	31
5.	Promoting an IoT-Based Waste-Bin Management System in Higher Institution. <b>Gbadamosi, Abiodun Safiu &amp; Galadima, Nuhu Usman</b> .....	48
6.	Opinion Mining System for Predicting Election Outcome Using Aspect-Based Sentiment Analysis. <b>Sani, Y. M., Etuk, S. O., Adamu, M., &amp; Adamu, A. A.</b> .....	55
7.	Modified Family of Generalized Multivariate Semi Pareto (III) Distributions and its Characterization Property. <b>S. M. Umar</b> .....	65
8.	Prediction of the Future Effect of Nigeria Economy Growth on Import and Export Commodities. <b>Abdu Masanawa Sagir.</b> .....	73
9.	Entrepreneurship Education for Alleviating Youth Unemployment in Nigeria: A Case Study of Technical Vocational Education and Training. <b>Audu, R., Ma'aji, S. A., Idris, A., Jido, S. H., &amp; Shehu, I. Y.</b> .....	86
10.	Effect of Blended Mobile Phone Application on Academic Performance of Adult Literacy Learners in Ondo State. <b>Ayelagbe, Sina Opeoluwa (Ph.D) &amp; Kareem, Ibrahim Ahmed (Ph.D).</b> .....	100
11.	Assessment of Teachers' Creativity in Teaching Mathematics in Senior Secondary Schools in Keffi Local Government Area of Nasarawa State. <b>Dr. Ityavzua, T. M., Jem, S. S., &amp; Nmadu, J.</b> .....	110
12.	Effects of Computer Simulation Instruction and Jigsaw I Method on Achievement in Physics among Secondary School Students in Katcha Local Government, Niger State. <b>Zubairu, D. M., Gimba, R. W. (Phd)., Ndako, U. Z., &amp; Mohammed, N. J.</b> ....	118
13.	Causes of Delinquent Behaviour among in-School Adolescents as Percieved by Teachers in Kwara State, Nigeria. <b>Dr. Ajiboye, Samuel Kolawole, Anyawu Francis &amp; Dr. Saidu Abubakar</b> .....	128
14.	Technology-Enabled Distance Education: An Innovation Based Strategy for Sustainable Development via Quality Tertiary Education. <b>Dr. Fatima S. Kabir</b> ....	136



15. Perception of Teachers and Dministrators on the Teaching Methods Employed in Teaching Motor Vehicle Mechanics Work in Niger State: A Qualitative Approach. **Audu, R.** ..... 147
16. Influence of Psycho-Demographic Factors on Students' Academic Engagement in The Southwestern Nigeria. **Adebayo A. Busari, Ph.D.**..... 157
17. Effects of Web-Enabled Sculpture Package on Colleges of Education Students' Performance in Fine Arts in South-West, Nigeria. **Kareem, I.A., Ph.D, Ayelagbe, S.O., Ph.D.** ..... 170
18. Analysis of 60:40 Ratio Admission Policy Implementations for Science and Arts Related Courses in Kwara State Tertiary Institutions. **Ndakogi, Muhammad Gimba, Prof. Wushishi, Dantani Ibrahim & Dr, Chado, Amina Muhammad** ..... 180
19. Occupational Skills Required by Secondary School Leavers in Sorghum Production for Wealth Creation in Kwara State, Nigeria. **Jimoh, S. B., Adesanya, E. O., Shuaib, S. B., Afolabi, K. O.** ..... 187
20. Perception of Out-of-Field Secondary School Biology Teachers' Anxiety on Content Mastery in Niger State. **Abdullahi, A., Bello, M. R., Prof. Ibrahim, S. A., & Koroka, M. U. S.**..... 198