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<th>Serial No</th>
<th>ISBN: 978-37639-0-3</th>
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<td>Author 1</td>
<td>NWOSU, Apollonia Anaele</td>
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<td>Title</td>
<td>Integrating Stan/STM-Based Research Finding into Science Teaching and Learning: Status, Educational Implications and the Role of Stan</td>
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<td>Description</td>
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<tr>
<td>Category</td>
<td>Education</td>
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<tr>
<td>Publisher</td>
<td></td>
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<tr>
<td>Publication Date</td>
<td>October, 2008</td>
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Science Teachers Association of Nigeria

REFOCUSING RESEARCH IN SCIENCE, TECHNOLOGY, AND MATHEMATICS (STM) EDUCATION

PROCEEDINGS OF THE 45TH ANNUAL CONFERENCE 2004

MATTHIAS AKALE
Editor

Sponsored by Heinemann Educational Books (Nigeria) Plc
Science Teachers Association of Nigeria

Proceedings of the 45th Annual Conference

2004

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ISBN: 978-37639-0-3

Produced for

Science Teachers Association of Nigeria

by

Heinemann Educational Books (Nigeria) Ltd
CONTENTS

Members of the National Executive Board, 2004 ........................................ vi
Members of the Conference Planning Committee ........................................ vi
Foreword ........................................................................................................ vii
Preface .......................................................................................................... viii
President's Address ....................................................................................... ix
Professor Onesime Okeke ................................................................................ 1
Keynote Address ........................................................................................... 3
Professor Gilbert O. M. Ojukwu ...................................................................... 3

Sub-Theme A
An Investigation into the usefulness of Research Results Among Secondary School Science Teachers

Tonde Ladii Ihsein ........................................................................................... 15
Evaluating Written Science Education Research Report: The Issue of Standard

Mrs. E. O. Ayibo & Alice Ogbu ..................................................................... 19
A Peep into the Conduct of STM Related Research Studies by WASC in Its Member

Countries

Dr. S.O. Adeyeye & Dr. (Mrs) Modupe Oke ..................................................... 21
An Evaluation of Research Skills Displayed in Unpublished Graduate Theses and

Published Researches in Science Education

Dr. (Mrs.) Alice E. Asu, Dr. Iroha Kalu & Mrs. Cecilia O. Ekwaret ............... 26
In Between Quality and Quantity: The Place of Predictive Research in Science Education

Widi, S. W. and Desaka, A. ............................................................................. 30

Emume Nkolika Lucy (Mrs) & Onyeneho Comfort C. (Mrs) ......................... 34
Trends and Statistical Procedures Employed in Science Education Research in Nigeria:

1990 – 2001

Tonde Ovwokhai .............................................................................................. 40

Reframing Research in Science, Technology and Mathematics (STM) Education in

Nigeria: Issues, Challenges and The Way Forward

Jocinta A. Opara ........................................................................................... 43

The Status of Research in Science, Technology and Mathematics (STM) Education

in Selected Colleges of Education (COES) in Nigeria

Dogara, M.M., Ahonu, H.O. and Lawal, F.K. (Mrs) ......................................... 50

Sub-Theme B

Reframing STM Education for Sustainable Development in Africa

Dr. Armando S. Gbore ............................................................ 55
Reframing Data Presentation in STM Researches: Postmodern Philosophical

Perspectives

Dr. Nwokah - Abansi Udofia ........................................................................ 60
Postmodernism Versus Sciences: Transgressing the Boundaries of Research in Science,

Technology and Mathematic Education (STM)?

Dr. Menman A. Wessalu & Adeola Bpe ....................................................... 65

Sub-Theme C

Research into STM Curriculum and School Examinations in Nigeria: The State of the Art

Dr. S.O. Adeyeye ........................................................................................... 70
Refocusing on Application of Science Education Research in Nigeria
Dr. G. A. Ajovwo & Olayeni A. Badejo

Constraints on STM Research Effectiveness in Nigeria
Elekamenu, O.N. (Mrs.) & Reogo C.N. (Mrs.)

An Investigation into the Problems of Implementation of Research Findings in the Teaching of Chemistry in Enugu State
Ugonw Anthonia N. (Mrs.)

Towards an Optimal Application of STM Education Research in Solving the Problems Associated with Development in Nigeria
Dr. (Mrs.) B. A. Egede

Integrating STANSTM-Based Research Findings into Science Teaching and Learning: Status, Educational Implications and The Role of STAN
Dr. Apollonia Amadi Nwosu

Sub-Theme D
Development and Estimation of Reliability Co-efficients of an Instrument for Evaluating STM Education Research
Dr. Hycienah Layiga, Nzogha

Resources for Science, Technology and Mathematics (STM) Education Research and National Development: Problems and Prospects
Enosamuel Edekin Imiere

Agricultural Science Panel
An Assessment of the Application of Selected Teaching and Assessment Techniques used by Senior Secondary School Agricultural Science Teachers in FCT, Abuja
I. E. Lambe

Agricultural Research, A Veritable Instrument for Food Security in Nigeria
Udeme, J. O. J.

Biology Panel
Usage of Science Education Research Findings by Practising Biology Teachers: Lesson and Conclusions
Dr. Onyeogbue Nwadi

Integrating Biotechnology Research Findings into the Secondary School Biology Curriculum
Dr. Chinwe Nwagbo

Attitudes of Biology Teachers to Research and Research Findings
Mr. Uppere Anthony Ossai

An Investigation of Pre-service Teachers’ Errors in Biology Practice: A Case Study
Dr. (Mrs.) D. O. Ayiri

Chemistry Panel
Science Technology and Mathematics Education Research & Chemistry Teaching/ Learning in Nigerian Schools: An Overview
Elder M. A. Olajumobi

Gender & STM
Innovative Programmes to Counter Gender in Science among Primary School Pupils
Bernadette Edemedo

Home Economics
Resources for Home Economics Education Research
Mrs. Ezeonu O. Okechukwu
Refocusing Research Towards Improving the Nutritive Contents and Organoleptic Qualities of Millet Foods in Nigeria

Integrated Science Panel

An Evaluation of Integrated Science Education Trends in Nigeria

Mathematics Panel

The Relationship Between Students’ Performance in Junior Secondary Mathematics and Senior Secondary Mathematics, Further Mathematics and Physics

Adelade S. Ilumujea


Annie, Sikiru Adejina, Ebo, Matta Onwuzom & Oluomot Ijebunmegbe

Second Year Science Students’ Attitudes to Learning of Mathematics in Information Technology: Implications for Mathematics, Teachers and Teacher Preparation

Sikiru Adejina Aminu & Mokaila Alade Rahman

Refocusing Research in Science, Technology, and Mathematics Education: A Case for Mathematics Laboratory

Dr. Ebi F. Abari

Students’ Performance in Mathematics as Correlates of their Performance in Other Basic Science Subjects

Ademola K. Badru

Physics Panel

World Year of Physics 2005 (Wyp2005) and the Planetary Emergencies

Andrew Edei Esiepyung

Physical & Health Education Panel

Research Approach in Secondary School Physical Education

Dr. Rufus O. Okonjo

Science-Technology-Society Panel

Appraisal of the Students’ Industrial Work Experience Scheme (SIWES) in Anambra State

Usoro M. O. (Mrs.)

The Incidence of Drug Abuse in Selected Secondary Schools in Ondo Town

C. A. Oluremi and A. O. Adegbe

Teacher Education Panel

Application of Research Findings in Science, Technology and Mathematics Education (STME) to Enhance Classroom Instruction: The Place of Cooperative Learning Strategy

Dr. C.V. Nsia & Dr. M. C. Anikebe

Fostering the Application of Science Education Research Findings in Nigerian Classrooms: Strategies and Need for Teachers’ Professional Development

Dr. L. C. Nsia

ODT and Teacher Retraining: A Case of Continuing Education Centre and Workplace Training (CCET & WTC) Nsukka

Dr. (Mrs) J. E. Nwagbo

Shifting Misconceptions in STEM: Some Applications of the Powerful Ideas in Physical Sciences Conceptual Change Model

Parad A. Eniayefu, Augustine A. Eniayefu & Mary Lakpita

Workshops

Empowering Teachers in Curriculum Development

Resource for Science, Technology and Mathematics Education (STME) Research: A Case Study of Virtually Inspired Participation in Science

E. S. Iwokkach, Emmanuel Karmat & Daniel Yalner

Reflecting Students' Assimilation and Understanding after Taking a Class in Science (Using Chemistry as an Example)

Reni Olumiran

Innovative Developments of the Solutions of Quadratic Equations with Real Roots

Cyril Chukwukol Nwanyongi

Workshop on "Bacteriological Quality of Drinking Water"

Dr. Ruritio Gari

Teaching Primary Science Through Problem-solving Strategy

Dr. Anor A. M. Shariha & Dr. Sani S. Ajiyi

Enhancing the IT Competencies of STME Teachers

Dr. Ayodile O. Okunola

Breaking the Learning Barrier Using the M.B.T.I. Scale And The Aristotle Effect

Ruth Esere

Developing Pre-structured Concept Maps For Science Teaching And Assessment

Dr. Abue E. Ason

Modelling, Interactive Physics and Analyses of Learning Processes

Professor Aminu Osisi & Dr. Folaaini Sadiq

INDEX

234

240

243

244

246

248

249

250

252

253

254

255
INTEGRATING STANISM-BASED RESEARCH FINDINGS INTO SCIENCE TEACHING AND LEARNING: STATUS, EDUCATIONAL IMPLICATIONS AND THE ROLE OF STAN

Dr. Apollonia Anselm Nwosu
Science Education, University of Nigeria, Nsukka

Abstract
This study investigated the extent of awareness and use of STAN and other STM-related research findings among Secondary School teachers in Nsukka Education Zone. Results indicate that although Nsukka is a university town, most of the teachers and schools are not registered members of STAN and other STM-based bodies and hardly get their research materials. Hence most of them do not use or participate in the research activities of these bodies. This implies that useful research findings are hardly implemented in the STEM classroom. Teachers called on STAN to take immediate actions to remedy this situation.

Introduction
Education is the key to national and self development. For this purpose to be fulfilled and for education to be sustainable, there is need for meaningful research activities. These will serve as the tools for not only solving problems facing the educational sector but also improving the educational standards. Meaningful educational research therefore must add value to the system. It must propel sustainable development and improvement. According to Akumilli (2004), any research that fails short of the above function is futile. However, the utility function of research lies in the appreciation and application or implementation of the findings at the appropriate sectors. There is therefore the need to disseminate and apply research findings appropriately and adequately.

Okere (2001), noted that the ultimate problems of education may be subsumed under teaching and learning. Over the years, many research studies geared towards improving learning/teaching effectiveness and learning outcomes have been carried out by individuals and various groups. In the area of science, technology and mathematics (STM) education, the Science Teachers' Association of Nigeria (STAN) and her members have contributed immensely towards research in all levels of our educational system. Very valuable research findings have been published and discussed at our conferences and workshops. The question then is how much of these findings are disseminated and utilized by the appropriate audience?

Iwosan (1985), in Alpande (2001) noted that research findings in Nigeria are more often in the libraries of universities, research institutions and individuals as well as in government files, without much regards to their various uses. This according to him, gives the impression that either such findings are worthless or unimportant. However, this is not the case with many STAN and other STM-based research findings. Iwosan made this observations about twenty years ago. Things should have on much changed for the better. The 21st century has been aptly described as an Information age. Transmission and flow of information have been engendered in this century. It is therefore necessary to find out the extent of awareness, dissemination and application of these STM related research findings (especially STAN's), in our various schools, where these findings should be appropriately applied. This study therefore was aimed at finding out the extent of teacher involvement in STAN and STM-related conferences and workshops as well as the availability and use (and factors involved in these) of STAN research information in secondary schools in Nsukka education zone. The choice of Nsukka was very much informed prompted by her being a university town, where most teachers may be interested in research.

Research Questions
1. What is the status quo of secondary school teachers in Nsukka education zone in terms of
   a. Membership of STAN/other STM related bodies
   b. Attendance at STAN/other STM related conferences and workshops, so as to benefit from their research findings?
c. Organization of post-conference/workshop activities for formation of other teachers of the deliberations and research findings

2. What is the extent of availability of STAN and other STM-related research materials in the secondary schools visited?

3. What are the teachers' perception on:
   a. The extent of dissemination of STAN/STM research materials to these secondary schools?
   b. Extent of accessibility of these research materials for teaching and learning?
   c. What STAN can do to ensure awareness to acquisition and application of her research findings in these schools that need these materials?

Research Procedure
A survey design was used. Ten schools in Nsukka education zone were used. Questionnaires were given to all the available science teachers numbering among forty-four (74). Your principals in these schools were also interviewed.

Results
Results of data analysed using frequencies, percentages and descriptive/qualitative approaches are as follows:

Table 1
Teachers' Responses on the membership of STM-based Associations

<table>
<thead>
<tr>
<th>Membership</th>
<th>Yes</th>
<th>No</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers as members of STAN</td>
<td>12(26.2%)</td>
<td>62(83.8%)</td>
<td>0</td>
<td>74</td>
</tr>
<tr>
<td>Schools as members of STAN</td>
<td>23(31.1%)</td>
<td>51(68.9%)</td>
<td>0</td>
<td>74</td>
</tr>
<tr>
<td>Teachers as members of other STM-related bodies</td>
<td>8(10.8%)</td>
<td>52(78.4%)</td>
<td>4(5.8%)</td>
<td>74</td>
</tr>
<tr>
<td>Schools as members of other STM-related bodies</td>
<td>17(23.3%)</td>
<td>47(69.8%)</td>
<td>4(5.8%)</td>
<td>78</td>
</tr>
</tbody>
</table>

Table 2a
Teachers' responses on attendance of STAN Conferences and Workshops

<table>
<thead>
<tr>
<th>Attendance</th>
<th>Yes</th>
<th>No</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAN Conference</td>
<td>20(35.5%)</td>
<td>57(95.0%)</td>
<td>0</td>
<td>74(100.0%)</td>
</tr>
<tr>
<td>STAN Workshop</td>
<td>18(24.3%)</td>
<td>53(71.4%)</td>
<td>0</td>
<td>74(100.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organization of Post-Conference/Workshop Activities</th>
<th>Yes</th>
<th>No</th>
<th>No response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>13(17.6%)</td>
<td>41(55.4%)</td>
<td>20(27.0%)</td>
<td>74(100.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2b
Teachers' responses on the frequency of attendance to conference and Workshop.

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency and Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAN Conference</td>
<td>Yes 12(16.3%)</td>
</tr>
<tr>
<td>STAN Workshop</td>
<td>Yes 13(17.6%)</td>
</tr>
</tbody>
</table>

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99
Table 3
Teachers’ responses on the nature of post-conference/workshop activities taken (n = 13)

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally organize a workshop for other teachers to educate them on findings and decisions</td>
<td>8</td>
<td>61.5%</td>
</tr>
<tr>
<td>Discuss with other teachers really</td>
<td>4</td>
<td>30.8%</td>
</tr>
<tr>
<td>Integrate conference findings/decisions into teaching</td>
<td>1</td>
<td>7.7%</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4
Teachers’ Responses on the Extent of Availability of STM Research Materials to Schools

<table>
<thead>
<tr>
<th>Type</th>
<th>Many</th>
<th>Few</th>
<th>Very Few</th>
<th>None</th>
<th>No Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAN Journal/Proceedings</td>
<td>N/A</td>
<td>47(35%)</td>
<td>9(6.9%)</td>
<td>43(32.7%)</td>
<td>22(16.7%)</td>
<td>78(100%)</td>
</tr>
<tr>
<td>Other STM-related Research Materials</td>
<td>N/A</td>
<td>47(35%)</td>
<td>9(6.9%)</td>
<td>52(39.3%)</td>
<td>20(15.3%)</td>
<td>74(100%)</td>
</tr>
</tbody>
</table>

Table 5
Teachers’ responses on what can be done to ensure availability and use of STM-based research materials in schools

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Schools should sponsor teachers to STAN conference, seminars and Workshops</td>
<td>63</td>
<td>83.1</td>
</tr>
<tr>
<td>2. STAN to be attended by all teachers in the country so that teachers can be part of the research activities</td>
<td>41</td>
<td>55.4</td>
</tr>
<tr>
<td>3. STAN should disseminate research materials to schools and charge them</td>
<td>21</td>
<td>28.3</td>
</tr>
<tr>
<td>4. STAN should often retain teachers by way of conferences and workshops</td>
<td>13</td>
<td>17.6</td>
</tr>
<tr>
<td>5. Teachers should be encouraged to go for post-graduate courses</td>
<td>10</td>
<td>13.5</td>
</tr>
<tr>
<td>6. Government to pay science teachers science allowance and also encourage them to attend conferences</td>
<td>21</td>
<td>28.3</td>
</tr>
<tr>
<td>7. STAN officials to persuade principals to sponsor teachers to conferences and workshops</td>
<td>41</td>
<td>55.4</td>
</tr>
</tbody>
</table>
Fig. 1: Percentage distribution of teachers' perception on the extent of dissemination of STAN Research Materials to secondary schools.

Fig. 3: Percentage distribution on teachers' responses on the extent of accessibility of research materials for teaching and learning in schools.

Other Findings (from interviews with Principals and Senior Science Masters)

1. Principals and science teachers would like all science teachers to attend conferences and workshops especially those of STAN.
2. Lack of fund is the cause of non-funding, non-sponsoring of science teachers to conferences.
3. State education commission organizes workshops for teachers of schools especially computer literacy and appreciation.
4. Schools charge each student ten naira for science and this cannot help in sponsoring science teachers to conferences.
5. Science allowance which has been reduced to twenty-five naira is hardly paid to teachers.
6. Most teachers get their knowledge on how to improve their teaching either from post graduate research activities and teaching or the much they acquired during training or from school library.

Discussion and Educational Implications of Findings

The results of this study as presented earlier indicate that most secondary schools in Nasarawa and their science teachers are not registered in STAN. Most teachers do not therefore attend conferences. Their participation in the activities of STAN is not as organized as they would wish. This has a direct bearing on their standard of teaching. Therefore, efforts must be made to: provide safer and more comfortable classrooms; have larger and more books to read; provide space to store books and other teaching materials; have a room for practical work.
and workshops where enormous and useful research findings are discussed. This is appalling especially when Nitsiak is considered as a university town and science teachers in the schools are expected to be aware of the need to attend STAN and other STM related conferences.

Most of the Research work discussed at STAN and other STM-based conferences and workshops are aimed at finding solution to the problems of teaching and learning (especially at the primary and secondary school levels). This will help to achieve educational system efficiency and sustainability. Lack of attendance at STAN conferences and workshops as well as the poor dissemination and accessibility of the STAN Research materials in schools (as found in this study) implies that all the valuable STAN research findings are not known and used in our science classrooms. Research findings become useful only when they are disseminated and applied at the appropriate sectors and by the appropriate users. STAN should do something about this.

Useful Research findings at STAN conferences and Workshops especially those that can improve learning and teaching should be tried out in the various appropriate sectors. Teachers should be encouraged not only to attend conferences and workshops but also to hold post-conference workshops in their various school to inform other teachers of these useful research findings. School teachers should be encouraged to carry out Action Researches in their various schools (at close levels to try out some interesting research work/findings).

It is pertinent at this juncture to call attention of STAN members to our intentions and priorities in attending conferences and workshops. Attendance for reading of papers only for our academic gain or promotions should not be our main concern. We should ensure that the quality of science education is improved and enriched and that sustainable scientific literacy in Nigeria is achieved. Proper dissemination and application of the useful research findings can go a long way to help.

The response of the teachers on how to improve dissemination and application of STAN and other STM related research findings should be considered. STAN and her members should make deliberate efforts to ensure that teachers of primary and secondary schools are also adequately informed of our conferences and workshops. STAN should find a way of ensuring schools to sponsor their teachers. This can be achieved through the government which will be more disposed to pay attention to STAN than the principals.

To ensure that principals and governments encourage the implementation of useful research findings STAN should engender the formulation of National Science Education Standards as is done in some developed countries. These should include Content, Teaching and Professional Development Standards. The well qualified teacher should not only be efficient, but should also have an in-depth knowledge of both qualitative and quantitative research approaches (Science Teacher Education 2004). The findings in this study that some of the teachers call for in-service and post-graduate training for teachers indicate that our science teachers are willing to learn and carry out research on how to improve educational standards. They should therefore be encouraged. STAN should ensure that the National Science Education Standards should specify criteria for making judgments about the quality of classroom teaching, quality of professional development opportunities for Science teachers, and the performance of the components of science education systems responsible for providing schools with financial and intellectual resources necessary to achieve the vision of the national standards set, as is done in the United States of America (Flythe and McNamara, 1993).

To help disseminate useful pieces of research information to our schools, STAN should have a web-site and a STAN On-line Discussion Board that can allow teachers and prospective science teachers as well as others to ask questions, share research information and get pieces of advice, as is done in some countries (NSTA 2004). To make this possible, STAN should work on the government to ensure that schools are adequately provided with computers and internet facilities. Both prospective and in-service teachers should be prepared for the digital age. They should be prepared to improve their teaching by integrating the numerous online research findings into their teaching. These measures will help to ensure efficient dissemination and application of research results in our schools.

Conclusion

The findings of this study indicate a major flaw in our educational system as it relates to the use of research materials. For Educational sustainability and for the improvement of the learning teaching process, research findings must be adequately and properly utilized. This is not the case in Nigeria.