

African Regional Conference on Engineering Education: *The Journey So Far*

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ABSTRACT

The African Regional Conference on Engineering Education (ARCEE) provides a forum for all the stakeholders in engineering and technology education within the region to come together and deliberate on common problems within the compass of engineering and technology and proffering solutions to them. We have had two meetings in Lagos, Nigeria (2002 and 2004). During ARCEE 2002, it was decided that the programme be held biennially and to be rotated among the member nations while in 2004 an action plan was drawn up and strategies were mapped out for its implementation. The details of the action plan are presented in this paper. The third meeting tagged 'ARCEE 2006' is to be held in Pretoria, South Africa.

INTRODUCTION

The 1ST conference was held in 2002. It was envisioned to act as a catalyst in bringing African nations together to deliberate on seemingly common engineering and technology problems within the region. Development in engineering and technology has been at low ebb in Africa. The problems confronting each nation can no longer be solved individually, rather, working together as a team should provide timely solution(s) to the problems.

The genesis of this programme can be traced to my attendance at the Global Congress on Engineering Education which was held in Cracow, Poland in 1998. The Global congress was organized by UNESCO International Centre for Engineering Education (UICEE). Australia. At the conference, there were 140 Participants with only 2 black Africans, one from Nigeria and the other from South Africa. The thrust of discussion at the Congress bordered on globalization of engineering curriculum, international collaboration and problems that were prevalent in developing countries, unfortunately participants from African nations were inadequately represented. This concern led to my meeting with the Secretary-General of the Nigerian National Commission for UNESCO (NATCOM- UNESCO) on my arrival in Nigeria. The Secretary-General shared my view that African Nations must come together in a single forum and identify how to work together and how each nation could be relevant globally in engineering education. In 1999, I was appointed as one of the Consultants to work on UNESCO Draft Programme and Budget for 2000/2001 (30C/5) which was subsequently submitted to UNESCO Paris.

In the document, I identified some projects for sponsorship by UNESCO out of which approval was given for 'Sub-Regional Workshop on New Engineering Curriculum'. When the approval of the proposal was conveyed to me in January 2002. I decided to expand the scope to include other African countries to enable us come together as a family and examine our common problems in engineering education with a view to finding appropriate solutions to them.

ARCEE 2002

In 2002, UNESCO gave a grant through the Nigerian National Commission for UNESCO. This grant together with the counterpart funding provided by the University of Lagos was used to organize ARCEE 2002.

The objectives of the conference were:

- (i). To bring stakeholders in engineering and technology together to brainstorm on recent development
- (ii). Identify the problem in member nations and proffer appropriate solutions to them
- (iii). Examine the importance of transborder training and exchange programmes for both students and lecturers of engineering and technology education.

The Conference was held between 23rd and 25th September, 2002 at University of Lagos Guest Houses and Conference Halls. There were eighty (80) Participants from six countries, namely Nigeria, South Africa, Ghana, Sierra Leone, Liberia and Senegal. Forty one (41) papers were presented during the conference. At a meeting during the conference, it was decided that the conference should be held biennially and to be rotated among the member nations. It was agreed that Nigeria should still host the year 2004 series.

After the conference a communiqué was prepared which was made available to the participants and sent to some organizations both within and outside Africa (Appendix I)

ARCEE 2004

ARCEE 2004 was sponsored by University of Lagos with support from ANSTI, DTCA and UNESCO. The conference was held at the University of Lagos from 20th - 22nd September, 2004. Its theme was 'Retooling Engineering Education for Sustainable Development. There were eighty seven (87) Participants from Africa countries - Nigeria, Senegal, Sierra Leone, Ethiopia, Kenya and South Africa. Thirty eight (38) papers were presented. A communiqué was prepared after the conference (Appendix II)

Networking

In order to sustain the conference and to disseminate information about the conference to other member nations, A 5-person Steering Committee was set up during the ARCEE 2004. Each member was given a specific assignment. The members of the Committee, their portfolios and assignments are presented below:

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|----|---------------------------|---|
| 1) | Prof. Funso Falade | Chairman, (Nigeria). To links up with the Regional Coordinators and coordinate other regions not listed below e.g. North Africa |
| 2) | A/Prof Duncan Fraser | Co-chair, (South Africa). Coordinator, Southern Africa |
| 3) | Prof (Mrs.) Aissatou Gaye | Member, (Senegal) Coordinator Francophone Africa |
| 4) | A/Prof Redwood Sawyerr | Member, (Sierra Leone) Coordinator Anglophone (West Africa) |
| 5) | Prof. S.M. Shitote | Member, (Kenya) Coordinator East Africa |

University of Lagos was chosen as the secretariat of the Committee.

Action Plan

Based on the communiqué that was drawn up from the deliberations during the conference, the following preliminary action plan was drawn up for implementation between year 2004 and 2006.

- a) The capacity for the attendance at the conference for the representatives from the member nations should be strengthened via networking e.g. setting up a website and establishing an e-newsletter to be circulated to all engineering institutions in Africa.
- b) Relationship with ANSTI, DTCA, NEPAD and UNESCO is to be strengthened.
- c) Credit Transfer Mechanism
A mechanism of credit transfer between recognized institutions for students who may wish to transfer to other institutions before the completion of their various engineering degree programmes should be formulated.
- d) Promotion of exchange programme and linkages between African universities as well as trans national industrial placement
- e) Removal of international fee barriers for students from other African countries

ARCEE 2006

The next conference – ARCEE 2006 will take place in Pretoria, South Africa. The details are not yet available.

OBSTACLE

Funding is the major problem of the programme. At the planning stage of the last two meetings, when the 'Call for papers' were sent out, many people expressed interest to attend

provided we could give financial assistance but only few could be assisted because of limited funds. Efforts are being made to source fund from both regional and international organizations for ARCEE 2006 to ensure good participation from member nations.

CONCLUSION

The 'Call for papers' for ARCEE 2006 will soon be out. We want you to be part of it and also to disseminate information concerning the programme to all stakeholders in engineering and technology education.

RECOMMENDATION

It is recommended that the stakeholders in engineering and technology should participate actively in the conference both financially and morally for therein lies our strength.

ARCEE 2002 COMMUNIQUÉ

Consistent with the objectives of the 1st African Regional Conference on Engineering Education, the communiqué derived from the papers presented at the conference and the recommendations, the communiqué committee presents the highlights as follows:

1. Restructuring the engineering and technological education curriculum e.g by creating industrial development centres to be linked to institutions of engineering education in furtherance of the applications and projects-oriented approach integral to teaching engineering.
2. Deriving the bulk of the curriculum from mainly the operations of the local industries and gradual transition from departmental to cost effective 'SYSTEMS' organisation of faculty should commence now.
3. The curricula in engineering and technology education in Africa have also to be updated by way of incorporating technology enhanced teaching and learning environment especially Information and Communication Technology (ICT) Systems.
4. Students Industrial Work Experience Scheme and other hands-on experience programmes should be strengthened and allowed to last up to a calendar year continuously.
5. New initiatives in teaching and learning e.g. Internet Based Approach.
6. Academic Development Programmes (ADP) for the disadvantaged and special programmes for low performance candidates where applicable.
7. Engineering and Technology Education should ensure practises that lead to a sustainably safe environment.
8. Total Quality Management (TQM) in engineering technology and education processes should begin from the primary school levels and admission stages into tertiary institutions.
9. Diversification of funding in such a way that is adequate and sustainable e.g. adequate and timely release of funds, empowering industry/Institution relationship to generate adequate income without compromising academic/professional standards.
10. Acquisition of technology through the involvement of formal engineering and technology education systems in bilateral industrial agreements between states.
11. Promotion of exchange programmes and linkages between African universities and equivalent institution overseas for mutual benefits.
12. Establishment by African states of Global Minimum Requirements for Accreditation (MRA) for all practicing engineers, be they local or foreign.

13. Strengthening of regional cooperation in engineering education through institutions like the African Network of Scientific and Technological Institutions (ANSTI), the UNESCO International Centre for Engineering Education (UICEE) and African Regional Conference on Engineering Education (ARCEE).
14. It is recommended that production of appropriate manpower and the re-training of staff should be enhanced through the train-the-trainer programme in various institutions in collaboration with industry.
15. Women in Science and Engineering (WISE) awareness workshops should be vigorously pursued in the African Sub-region especially to promote Engineering for women.
16. Special Engineering and Technology Programmes for the handicapped.
17. Greater supervision of the learning process in engineering and technology and reduction of pedagogical tendencies in teaching.
18. Sustained symbiotic relationships between the African Regional Conference on Engineering Education (ARCEE) and the New Partnership for Africa's Development (NEPAD) for purposes of African development.
19. Introducing innovative ways to assist students in acquiring greater understanding of engineering concepts.

ARCEE 2004 COMMUNIQUÉ

Consistent with the objectives of the 2nd African Regional Conference on Engineering Education, together with the papers presented and discussions held, the communiqué committee presents the highlights as follows:

1. The Engineering curriculum should take cognisance of the local applications. Staff without industrial experience should be encouraged to take necessary attachment
2. The curricula in engineering and technology education in Africa need to be updated by way of incorporating technology enhanced teaching and learning environment especially Information and Communication Technology (ICT) Systems and internet-based systems.
3. Students' Industrial Work Experience Scheme and other hands-on experience programmes should be strengthened.
4. Engineering and Technology Education should incorporate aspects of the environment, sustainable development and entrepreneurship in an integrated way.
5. Mechanisms of quality assurance should be developed in the institutions.
6. One of the greatest challenges facing engineering education in African countries is the level of funding of institutions by the governments, which severely compromises the ability to deliver quality education to the students.
7. Promotion of exchange programmes and linkages between African universities as well as trans national industrial placement plus removal of international fee barriers for students from other African countries.
8. Development of mechanisms for regional recognition of engineering programmes as well as credit transfer.
9. Establishment of an identity and institutional structure for engineering education through the introduction of the African Commission for Engineering Education (ACEE).

10. Strengthening of regional cooperation in engineering education between ACEE and institutions like the African Network of Scientific and Technological Institutions (ANSTI), Directorate of Technical Co-operation in Africa (DTCA), the AU, NEPAD, UICEE and UNESCO.
11. Enhancement of Regional postgraduate training by establishment of postgraduate training centers in suitable institutions in order to promote the development of the next generation of academic staff.
12. Encouragement of women to enter engineering careers.
13. Enhancement of student learning through the use of more interactive teaching methods.
14. The ARCEE should be held biennially and rotated among the member nations.
15. Mechanisms must be developed for promotion of ARCEE to all institutions in the region as well as funding of their activities.