

BRIEF CURRICULUM VITAE



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Prof. Elijah I. Omwenga, PhD

Education and Professional Experience: Professor Elijah I. Omwenga holds a PhD in Computer Science from the University of Nairobi in the area of Information Systems. He also has a Masters degree in Computer Science from the National University of Science and Technology (NUST), Bulawayo; a Post-graduate Diploma in Computer Science, Nairobi; and a Bachelor of Education (Sc.) degree from Kenyatta University. He is an Associate Professor at the School of Computing and Informatics, University of Nairobi. Omwenga is a seasoned Software Engineer with over 25 years of experience.

National/International Service and Leadership:

Elijah serves in a number of National Boards including The National Commission for Science, Technology and Innovation (NACOSTI) and The ICTA Authority (ICTA). He is also serving as the Chairman of the Consortium for National Health Research (CNHR) and Member at the Child Fund International as part of his social responsibility. He is also the President of the African Association for Teacher Educators and the African representative to the World Forum for Associations of Teacher Educators (WFATE).

Elijah is the immediate past University of Nairobi ICT Director where he served for the maximum period of six years (2006-2012). He is a consultant for Kenya Commission for University Education (CUE) in the curriculum review and accreditation division. He has previously served as a board member in the National Council for Science and Technology, the Chairman of the African Virtual Open Resources and Initiatives Organisation (AVOIR) and a board member of the Kenya Education Network (KENET).

Elijah was instrumental in providing Technical ICT advise and solutions to the Kenya National Examinations Council during the 2008/09 period.

Teaching and Curriculum Development: Elijah teaches both undergraduate and postgraduate students at the School of Computing and Informatics. His main area of specialisation is Information Systems, Software Engineering and ICT and Management. He teaches Operating Systems, Computer Programming, Organisation and Management, Software Engineering, Systems Analysis and Design, ICT and Management and Strategic Information Systems to PhD students at the School of Business. He is a core member of the School of Computing and Informatics in all matters curriculum development and review.

Research: Elijah has benefited from international and local research grants: VLIR (Belgian) and UNESCO. He is an author of over 53 (fifty three) scientific papers in reputable journals, tens of technical papers, and an author of three books. He has also successfully supervised over 45 Masters and Postgraduate students and six PhDs in the last ten years. He has been involved in the

design, development and implementation of over thirty large Information Systems. He is engaged in research on deployment of low bandwidth mobile/electronic/web-based applications.

Career Summary

Professional Experience

Twenty four (24) years of professional experience in **Teaching and Research; Leadership and Administration; Design and Implementation** of Large Information Systems; Carrying out **Consultancy** services for both the Private Sector and Government and doing community service from time to time within our country. I highlight some aspects as below:

(i) Teaching

Teaching both undergraduate and postgraduate students in Computer Programming, Organisation and Management, Strategic Information Systems, ICT and Society, Research Methods, Operating Systems, Computer Networks and others has enabled me develop deep understanding in both the **theoretical and practical skills** in Computer Science, ICT Management, Social contexts for projects implementation and mitigation interventions to reduce chances of failure.

(ii) Research

I have been involved in several research projects in the past 18 years but four notable ones that have had impact in **solving problems in our society** are identified below:

- Project Leader in a study to develop technical and educational quality indicators and functional parameters for **ICT-supported education** in institutions of higher learning in Kenya and the region. A VLIR (Belgian) funded research project for **KSh.10 million** (2013-2016). Two Papers out of this project published in international high impact journal.
- Developed Science, Technology and Innovation policy guidelines and briefs for post-conflict countries of Sudan, South Sudan and Somalia under the sponsorship of **UNESCO** (2013/14)
- Team Leader of the VLIR-UON (Belgian) Open Learning research project (2003-2012) with a total grant of KSh. **45 Million**. The research project facilitated over 20 high quality papers in high impact journals in ICT, Education and Computer Science; supported human resource **capacity building for 5 PhD students**; supported the development of e-learning and Open Learning products; helped purchase critical infrastructure equipment for the University of Nairobi and facilitated lasting partnerships with researchers in the North.
- Designed, developed and implemented the **first fully-fledged e-learning system** called **Wedusoft**. The system was implemented and used for a period of 7 years in 9 Universities across Africa between 2004 and 2010.

Other research interests and outputs: Ubiquitous computing, e-Learning, ICT integration in institutions of learning, Information Systems for low-bandwidth environments, Computing for Development. I have Supervised 6 PhDs and 30 Masters students in the last 10 years.

(iii) Consultancy

I have been engaged in various capacities for UNESCO and African Network for Scientific and Technological Institutions in Africa (**ANSTI**) in their Science, Technology and Innovation (**STI**) programmes to mainstream ICT use in Science and Engineering in universities in Africa (2004-to date). I have also done consultancy work for Commission for University Education (**CUE**), eGovernment (**GOK**), Ministry of Planning and National Development, former ICT Board, African Virtual University, InfoDEV, **UNDP**, Flemish Interuniversity Council (**VLIR-Belgium**), Germany Exchange Program (**DAAD**), British Council, World Forum for Teacher Educators (**WFATE**) among other national and International organisations. During my work as a consultant, I have produced tens of Technical reports and documents that have been instrumental in creating notable impact in the development of Science, ICT and Innovation in Kenya and Africa.

(iv) Management, Leadership and Service to the University

(a) As Coordinator (2014 March to date) of the Information Technology Enabled Services/Business Processing Outsourcing (**ITES/BPO**) Centre at the University of Nairobi where I am responsible for the management and administration of the Centre's programmes.

(b) As ICT Director (2006-2012) of the University of Nairobi where I mainstreamed Information Communication Technology in the University with the following sample of high impact successful projects:

- Provided the necessary support to the University of Nairobi in achieving **Excellent Performance** in the GoK Performance Contracting programme in 2010/11. Was a core team member in the development and implementation of an effective performance management system for marked improvement – **The Marshall Plan** - that was instrumental in this regard and in International webometrics ranking.
- Developed the **ICT Policy and Standards, ICT Automation Policy, ICT Strategic plan** and achieved phenomenal growth in **Computer Networking, Fibre Technology Connectivity, Wireless Fidelity Network, VOIP Connectivity** and Information Systems implementation - all of these earning the University one of the best **Webometrics** International ranking in Africa. For instance as the ICT Director I co-chaired with the Finance Officer the implementation committee for the **Financial Management Information System (FIMS)** which helped realise increased level of efficiency for fee collection by over 50%. By 2012, the University of Nairobi achieved 100% email use by staff through innovative methods that we designed: issuance of payslip by email, sending notices by email, and using email for official communication thus saving on paper and messengerial services. **ICT was appreciated as a lifestyle** by staff and students.
- Provided leadership (University of Nairobi, 2012) in the **merger of the ICT department with Telephones section** to create one entity with 148 members of staff. A challenging exercise that saw the University embrace Voice-over-IP (VOIP) communication system through re-skilling and upgrading of the

Telephony infrastructure. The new HR structure developed was successfully implemented.

- A core team member in the development of the University of Nairobi **Strategic plan of 2008-2013** and reappointed to review it.
 - Achieved a **huge ICT budget growth** from 56 Million in 2006 to 206 million in 2012 – the period within which I was the ICT Director. The average absorption rate stood at 80% amid challenging procurement rules and regulations.
- (c) In the recent staff job evaluation (Feb, 2015) I achieved the ‘**Outstanding**’ rank in Leadership and Administration; Teaching and Research; and Consultancy and Community service.
- (d) During my tenure as the Director of ICT, appointed Chairman of the ICT Committee and member of the Central Development Committee that documented the **Quality Management System (QMS) / Processes** that led to the successful certification of the University in the ISO 9001:2000. I achieved the Vice Chancellor’s commendation for the effort.
- (e) Appointed the Chairman of the Quality Management System Documentation and QMS Automation System using **Q-Pulse (2008-2012)**. I achieved the Vice Chancellor’s commendation for the effort.
- (f) Presided over a **Rapid Results Initiative (RRI)** in 2010 that realised success in two major ICT projects: Reduction of time of issuance of Student Transcripts from several weeks to two days and reduction of the time the students spend for clearance from 10 days to one day.
- (g) **Thorough knowledge of various government legislation and regulations** for financial management, procurement and governance. I have attended tens of internal and international training programs on Governance, Management and Leadership. I have been trained on Financial prudence, Integrity and Leadership, Procurement and disposal of assets, Vision 2030 and the Kenya Constitution 2010.
- (h) Appointed Chairman of the UON’s Central Administration departments’ **Disposal Committee** (2011-to date) when I was the ICT Director and was retained in this position even after expiration of my term as Director.
- (i) Consulted for the government of Kenya through the former e-Government Directorate to develop **Career Progression Plans and ICT Literacy curricula** for all cadres of staff in the Government ministry (2012). Detailed appreciation of government functions was part of the assignment.
- (j) Awarded a contract to implement a Business Process Outsourcing/ Information Technology Enabled Services (**BPO/ITES**) project by the Kenya ICT Board (KICTB) (2012-15).

National and International Service

Designed, Developed and Implemented the Online course on V2030 – www.vision2030online.co.ke for the former Ministry of Planning, National Development and vision 2030 (2012/4). Thorough knowledge of the National goals, policies and developmental objectives, pillars, tenets and medium term plans of the Vision was necessary for a successful implementation of the project.

- (a) **Board membership / Chairman (2014 – to date)** of the HR committees of the ICT Authority (ICTA) and National Commission for Science Technology and Innovation (NACOSTI) respectively.
- (b) Currently serving **(2012 to date) President** of the African Association for Teacher Educators and the African representative to the World Forum for Associations of Teacher Educators (WFATE)
- (c) Appointed **Chairman to the Consortium for National Health Research (CNHR)** Board of Management (2015-to date). CNHR is an international organisation whose mission is to facilitate conducting of relevant research for health and training that addresses the priority health and development needs of the majority of Kenyans.
- (d) Participated in the development of the **National ICT Master** plan 2014-2017.
- (e) Previously served as the **Chairman** of the African Virtual Open Resources and Initiatives Organisation (AVOIR) and a board member of the Kenya Education Network (KENET)
- (f) Reappointed for **5 consecutive times as the Rapporteur General (2005-todate) for the UNESCO's** bi-annual Conference of Vice Chancellors, Deans, Directors and Provosts of Science, Engineering and Technological Institutions in Africa (COVIDSET)
- (g) Served as a committee member in a Ministerial committee to investigate the error in the mean grade in the **2007 KCSE Examination**. Resolved the issue and correct certificates were issued to the 3600 affected students.
- (h) I was subsequently appointed to serve as the Chairman of the Task Force (2008) that was responsible for upgrading the **KNEC ICT infrastructure, Systems and Operations**. Developed an ICT Master plan and road map

Community Service

I support **ChildFund International**. A charity NGO that helps children from poor or disadvantaged backgrounds in Kenya realise their potential.

Recent Publications (2015-2016)

1. Omwenga, E.I., Gakuu, C.M., Oboko, R.O., Kidombo, H.J., Mbwesa, J.K., Waiganjo, P.W., & Libotton A. (2016). Quality Indicator Framework for Assessing DEel Programs in Kenya: A Technological and Educational Functional Parameters Approach. *Journal of Emerging Trends in Computing and Information Sciences*, 7(4), 191-199. Retrieved from <http://www.cisjournal.org> (ISSN) 2079-8407
2. Asiligwa Bonface I., Omwenga Elijah I. (2016). A Roadmap for the Adoption of Government E-payments in Kenya. *Journal of Emerging Trends in Computing and Information Sciences*, 8(1), 20-28?. Retrieved from <http://www.cisjournal.org> (ISSN) 2079-8407
3. Gitau M., Omwenga E.I. (2016). Application of the UTAUT Model to understand Factors Influencing the use of Web 2.0 tools in e-learning in Kenyan Public Universities. *Journal of Emerging Trends in Computing and Information Sciences*, 7(4), 204-209. Retrieved from <http://www.cisjournal.org> (ISSN) 2079-8407
4. Otieno I., Omwenga E. I. (2016b). Towards the Development of a Citizen-Centric Framework for Evaluating the Impact of E-government: A Case Study of Developing Countries. *Journal*

of *Emerging Trends in Computing and Information Sciences*, 7(3), 147-153. Retrieved from [http://cisjournal.org/ \(ISSN\)2079-8407](http://cisjournal.org/ (ISSN)2079-8407)

5. Mwakondo, F.M, Muchemi, L. & Omwenga, E.I. (2016). Proposed Model for Predictive Mapping of Graduate's Skills to Industry Roles Using Machine Learning Techniques. *International Journal of Engineering and Science (IJES)* 2016, 5(4), 15-24. Retrieved from [www.theijes.com \(ISSN\)2319-1813](http://www.theijes.com (ISSN)2319-1813)
6. Otieno I., Omwenga E. I. (2016a). Citizen-Centric Critical Success Factors for the Implementation of E-Government: A Case Study of Kenya Huduma Centres. *Journal of Emerging Trends in Computing and Information Sciences*, 7(2), 102-109. Retrieved from [http://cisjournal.org/ \(ISSN\)2079-8407](http://cisjournal.org/ (ISSN)2079-8407)
7. Ileri, B. N., & Omwenga, E. I. (2016a). Mobile Learning: A Bridging Technology of Learner Entry Behavior in a Flipped Classroom Model. In J. Keengwe, & G. Onchwari (Eds.) *Handbook of Research on Active Learning and the Flipped Classroom Model in the Digital Age* (pp. 106-121). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-9680-8.ch006. Retrieved from <http://www.igi-global.com>
8. Otieno I., Omwenga E. I. (2015). E-Waste Management in Kenya: Challenges and Opportunities. *Journal of Emerging Trends in Computing and Information Sciences*, 6(12), 661-666. Retrieved from [http://cisjournal.org/ \(ISSN\)2079-8407](http://cisjournal.org/ (ISSN)2079-8407)
9. Makau, G.K., Omwenga, E.I., Muranga, N.J. (2015b). The Critical Technological Factors of E - Government in Kenya. *International Journal of Computer Applications Technology and Research (IJCATR)*, 4(2), 92-97. Retrieved from [http://www.ijcat.com/ \(ISSN\) 2319-8656](http://www.ijcat.com/ (ISSN) 2319-8656)
10. Makau, G.K., Omwenga, Elijah, I. & Nzomo Daudi N (2015a). The Critical organizational Factors of e-Government in Kenya. *International Journal of Computer Applications Technology and Research (IJCATR)*, 4(4), 246-252. Retrieved from [www.ijcat.com \(ISSN\) 2319-8656](http://www.ijcat.com (ISSN) 2319-8656)
11. Bonface N. Ileri, Omwenga, Elijah I. (2015). Modelling an Institutional Mobile Learning Readiness Analyser. *Journal of Education and Practice*, 6 (5), 104-110. Available at <http://www.iiste.org/Journals/index.php/JEP/article/view/20028/20385>
12. Okadapau Moses O., Omwenga, Elijah I., Oboko, Robert O. (2016). State and Extent of Electronic Commerce Adoption among SMEs in Kenya. *Accepted for publication in the Journal of Emerging Trends in Computing and Information Sciences*, 7(4).
13. Ileri, B. N., & Omwenga, E. I., Oboko, Robert O. & Wario R. (2016b). Developing Pedagogical Skills for Teachers: A Learner Centered Approach for Technology Supported Instruction. *Accepted for publication In J. Keengwe, & G. Onchwari (Eds.) Handbook of Research on Active Learning and the Flipped Classroom Model in the Digital Age*. Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-9680-8.ch006.

Publication prior to 2014

14. Omwenga, E.I., Kinoti, Patrick (2011). Towards the Development of a Framework for Open Courseware for Emerging Economies: the case of Kenyan public Universities. *In Aisbett, J., Gibbon, G., Rodrigues, A.J., Migga, J.K., Nath, R. and Renardel, G.R. (Eds) Special Issues in Computing and ICT Research* Volume VII: Kampala, Uganda: Fountain Publishers. Retrieved from <http://cit.mak.ac.ug/iccir/downloads/ICCIR11.pdf>
15. Omwenga, Elijah I. (2011). Modelling a Computer-mediated Learning Infrastructure: Concepts, Principles and Implementation Requirements. *Lambert Academic Publishing, Berlin*. Book available at <http://www.amazon.com/Modelling-Computer-mediated-Learning-Infrastructure-Implementation/dp/3845408588>
16. Omwenga, Elijah I. (2011), Text-Based Productivity Tools. African Virtual University Open Educational Resources (AVU). Book available at <http://oer.avu.org/handle/123456789/83>
17. Mbogo T., Omwenga, Elijah I. and Peter Waiganjo W. (2010). *A Framework for Distributed Learning Objects Repository*. Lambert Academic Publishing, Berlin. Book available at <http://www.amazon.com/Framework-Distributed-Learning-Objects-Repository/dp/images/3838379179>
18. Omwenga E.I., (2010), *ICT for Science and Engineering Education – Models for best practice implementation*. Proceedings of the 3rd International Conference on Virtualization in Higher Education: Universalization of the University for a Better World. Havana, Cuba.
19. Oboko, R., Wagacha, P. W., Omwenga, E. I., & Libotton, A. (2009a) Comparison of different machine learning algorithms for the initialization of student knowledge level in a learner model-based adaptive e-learning system. *International Journal of computing and ICT Research*, 3(1), 50-56. Retrieved from <http://ijcir.org/volume3-number1/Volume3%20Issue%201%202009-1.pdf>
20. Oboko, R., Wagacha, P. W., Omwenga, E. I., Libotton, A., & Odotte, Z. (2009b). Nonobtrusive determination of learning styles in adaptive web-based learning. *East African Journal of Information Sciences*, (EAJIS) VOL 1 No.002 (2009) 1(2), 1-18.
21. Gakuu, C. M., Libotton, A., Omwenga, E. I., Kidombo, H. J. (2008). *Factors that influence lecturers' participation in Distance Education: the case of the University of Nairobi*. Journal of Educational Fountain, School of Education, University of Nairobi.
22. Omwenga, E. I., Rodrigues A. J. (March 2006). Towards an Education Evaluation Framework: Synchronous and Asynchronous E-learning Cases. *Journal of the Research Centre for Educational Technology*, Kent, www.rcetj.org.

23. Omwenga, E. I. (2006). ICT for Educational use: Cases of implementing a partnership approach model for reaching Target Groups. In Kizza, J., Aisbett, J., Vince, A., Wanyama, T. (Eds) Special Topics in Computing and ICT Research: Advances in Systems Modelling and ICT Applications (P. 328-339) Kampala, Uganda: Fountain Publishers. ISBN 13: 978-9970-02-604-3; ISBN 10: 9970-02-604-6. Available at <http://cit.mak.ac.ug/iccir/downloads/SREC06.pdf>
24. Omwenga, E.I., Waema, T.M., & Eisendrath, G.P.C., Libotton A. (2005). *Development and Application of an Objectives-Driven Econtent Structuring and Deployment Model (ODC-SDM)*, African Journal of Science and Technology (AJST), Science and Engineering Series 6(1), pp 45-50.
25. Omwenga, E., Waema, T., & Wagacha, P. (June 2004). A model for introducing and implementing e-learning for delivery of educational content within the African context. African Journal of Sciences and Technology 5(1) 35-48.
26. Oboko, R., Wagacha, P. W., Omwenga, E. I., & Libotton, A. (2008). Value Difference Metric for Student Knowledge Level initialization in a Learner Model-based Adaptive e-Learning System. In Aisbett, J., Gibbon, G., Rodrigues, A.J., Migga, J.K., Nath, R. and Renardel, G.R. (Eds) Special Topics in Computing and ICT Research: Strengthening the Role of ICT in Development (P. 411 - 439). Kampala, Uganda: Fountain Publishers. ISBN 978-9970-02-871-2. Available at http://mak.academia.edu/florencetushabe/Papers/276464/The_Status_of_Software_Usability_In_Uganda
27. Omwenga, E. I., Chepken C.K., Bishar D. (August 2005b). Complexity reduction in the formative evaluation process using the QuizIntegrator. In *Sustainable ICT capacity in developing countries*. Makerere University, Kampala, Elsevier Publishers pp 142-147.
28. Omwenga, E.I., Njoroge, M.M., & Ngahu E. K. (June 2005a). A Novel Approach to e-Content Development Process: Complexity Reduction and Process Automation. In: Kommers P, Richards G. (eds.), *World Conference on Educational Multimedia, Hypermedia and Telecommunications. ED-MEDIA 2005*. Association for the Advancement of Computing in Education, Montreal, Canada, pp 3475-3480
29. Omwenga, E., Waema, T., & Eisendrath, G., Libotton A. (June 2005b). Development and Application of an Objectives-driven E-content Structuring and Deployment Model (ODC-SDM). In: Kommers P, Richards G. (eds.), *World Conference on Educational Multimedia, Hypermedia and Telecommunications. ED-MEDIA 2005*, Association for the Advancement of Computing in Education, Montreal, Canada, pp 573-578

30. Gakuu C.M., Libotton A., Omwenga E.I. (Feb. 2007). Towards enhancing readiness to adopt distance education and e-learning by University of Nairobi Lecturers. *Proceedings of the 1st International Conference in Computer Science and ICT COSCIT 2007, 5-7th February 2007, Nairobi*, pp29-37
31. Omwenga E.I., Waema T. M. (Dec. 2006). Towards Development of a Model Expressing a set of E-learning Variables. Reviewed Proceedings of the 12th International Conference on Technology Supported Learning and Instruction (Online-Educa-Berlin), Nov 28th –Dec 1st 2006, Berlin, Germany pp 425-433.
32. Omwenga E.I., Waema T. M., Eisendrath G.E. (Nov. 2002). Modelling an E-learning Infrastructure with a Content Calibrator within a Resource-constrained Environment. *Proceedings of the 8th International Conference on Technology Supported Learning and Instruction (Online-Educa-Berlin)*, Nov 27th –Dec 3rd 2002, Berlin, Germany pp 88-89.
33. Omwenga E. I., Waema T. M. (Dec. 2001), An asynchronous framework for a flexible web-driven courseware development and learning environment. *Proceedings of the International Conference on Transformation of Higher Education Management* Nov 12-15 2002, Kenyatta University, Nairobi, Kenya pp41-43.
34. Omwenga E I., and Dzionu C. K., [Nov. 1999], An interactive Infrastructure for Facilitating Learner-Participation within a Web-enabled Courseware Delivery Environment: *Proceedings of the World Internet Society conference (INET'99)* June 22-25 1999 in San Jose, California.
35. Dzionu C.K., Mulvey, M., and Omwenga E I., [Nov 1998], An infrastructure for a Web-based courseware Development System: *Proceedings of the 3rd Berlin International Conference on Technology Supported Learning*, Berlin Dec 2-4 1998.

Chapters in Books

1. Ileri, B. N., & Omwenga, E. I. (2016a). Mobile Learning: A Bridging Technology of Learner Entry Behavior in a Flipped Classroom Model. **In** J. Keengwe, & G. Onchwari (Eds.) *Handbook of Research on Active Learning and the Flipped Classroom Model in the Digital Age* (pp. 106-121). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-9680-8.ch006. Retrieved from <http://www.igi-global.com>
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7. Omwenga, E., Waema, T., & Eisendrath, G., Libotton A. (June 2005b). Development and Application of an Objectives-driven E-content Structuring and Deployment Model (ODC-SDM). **In**: Kommers P, Richards G. (eds.), *World Conference on Educational Multimedia, Hypermedia and Telecommunications. ED-MEDIA 2005*, Association for the Advancement of Computing in Education, Montreal, Canada, pp 573-578

Scholarly Books Published

1. Manaka R., Omwenga E. (2015). *Online assessment in public universities: an implementation framework for online assessment*. LAP LAMBERT Academic Publishing. OmniScitum Marketing DEV GmbH. ISBN 978-3-659-75585-9
2. Omwenga, Elijah I. (2011). *Modelling a Computer-mediated Learning Infrastructure: Concepts, Principles and Implementation Requirements*. Lambert Academic Publishing, Berlin
3. Omwenga, Elijah I. (2011), *Text-Based Productivity Tools*. African Virtual University Open Educational Resources. AVU. Book available at <http://oer.avu.org/handle/123456789/83>
4. Mbogo T., Omwenga, Elijah I. and Peter Waiganjo W. (2010). *A Framework for Distributed Learning Objects Repository*. Lambert Academic Publishing, Berlin

5. ANSTI, Omwenga E. I. (2005). **State of Science and Technology Training Institutions in Africa.** UNESCO, Nairobi.

Technical Publications

1. Omwenga, E.I., ANSTI/UNESCO (2016). *University Education and Technology in Science, Engineering and Technology in Africa post 2015.* Action Plan of the Sixth Regional Conference of Vice Chancellors Provosts, Deans of Science, Engineering & Technology (COVIDSET 20015), Enugu, Nigeria, 5-7 October 2015. <http://www.ansti.org>
2. Omwenga, E.I., ANSTI/UNESCO (2014). *Harnessing Africa's Scientific, Engineering and Technology Innovation for sustainable development: the Role of Universities.* Action Plan of the Fifth Conference of Vice-Chancellors, Provosts and Deans of Science, Engineering and Technology (COVIDSET 20013), Gaborone, 6-7 November 2013. Retrieved from <http://www.ansti.org>
3. Omwenga, E.I., ANSTI/UNESCO, (2012). *Enhancing capacity in Science, Engineering and Technology in response to emerging industrial and socio-economic needs of Africa: the role of Universities and Research Institutions.* Action Plan of the Fourth Conference of Vice-Chancellors, Provosts and Deans of Science, Engineering and Technology (COVIDSET 20011), Durban, 23-25 November 2011. Retrieved from <http://www.ansti.org>
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Referees

Available on request.