African Centres of Excellence

ACEITLMS publications in 2020-2021

In the implementation and achievement of its mission of strengthening human capacity to deliver research-based quality teaching and learning of mathematics and science, in the year 2020/2021 ACEITLMS published 39 research papers in different international journals.

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Ag-partners Rwanda supported ACEIoT students to attend VivaTech 2021

Paris hosted VivaTech 2021, a global technology event that brought together the best innovation actors aiming to ignite positive change in business and for society. From the past events, VivaTech has proven to be a global catalyst for digital transformation and startup growth.

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ACEESD with partners organize the 6th IEEE Southern Power System Conference

The African Centre of Excellence in Energy for Sustainable Development in partnership with different partners are organizing the 6th IEEE Southern Power Electronics Conference (SPEC 2021) to be held in Kigali from 6th to 9th December 2021.
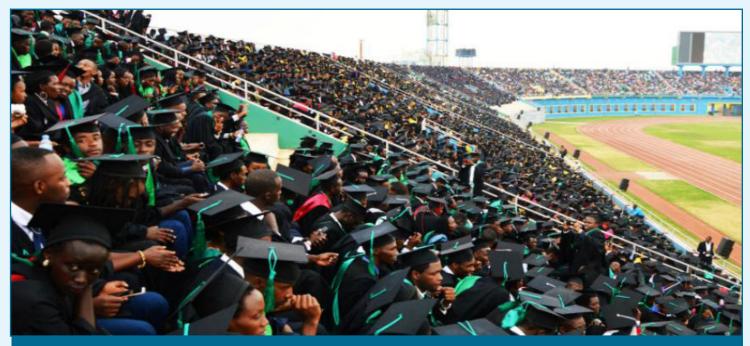
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ACE II first Master's students among UR students to graduate

The first cohort from four African Centres of Excellence under the Eastern andSouthern Higher Education Centres of Excellence project (ACEII) are set to graduate in a graduation ceremony slated on 27th August 2021.

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ACE II first Master's students among UR students to graduate

UR graduation is slated on 27th August 2021 (Photo internet)

The first cohort from four African Centres of Excellence under the Eastern and Southern Higher Education Centres of Excellence project (ACEII) are set to graduate in a graduation ceremony slated on 27th August 2021.

The graduation ceremony will take place virtually due to the measures to curb the spread of Covid-19 pandemic.

James Mucyo is set to graduate from the African Centre of Excellence in Data Science. He specialized in Actuarial Sciences. After completing the industrial attachment at Rwanda Military Hospital, he got hired. James is one of many who got hired before completing their studies after the companies have appreciated their performance.

He attributes this performance to the highly skilled lecturers that the Centre has brought during their course period.

"I am thankful to the Centre for bringing in these lecturers from abroad who gave us skills that are really needed", he said.

> " I am thankful to the Centre for bringing in these lecturers from abroad who gave us skills that are really needed... Nowadays, data management is highly needed. With the skills I got in this field, I am sure I will make a use of it in my organization and transfer the knowledge to my colleagues "

He said that given that Rwanda has adopted the use of technology in all daily activities, there is also a need for knowledge about data management since technology is all about data. "Nowadays, data management is highly needed. With the skills I got in this field, I am sure I will make a use of it in my organization and transfer the knowledge to my colleagues", he said.

Mucyo is much appreciative to the Centre which provided all necessary support be financial or academic to have all course completed smoothly. Students to graduate enrolled in 2017 but their graduation delayed due to the covid-19 pandemic.

The Southern and Eastern Africa Higher Education Centres of Excellence project (ACEII) which started in 2017 has the main objective to deliver relevant and quality education, and applied research addressing key development challenges.

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ACEITLMS PUBLICATIONS DURING LAST YEAR 2020-2021

For the implementation of its mission of strengthening human capacity to deliver research-based quality teaching and learning of mathematics and science, ACEITLMS students and associate members published 39 research papers in different international journals, during last year 2020-2021. Twenty of them were published in journals indexed by Scopus. The following is the list of papers that were published in journals indexed by Scopus.

1. Ndihokubwayo, K., Uwamahoro, J. & Ndayambaje, I. (2020). Implementation of the Competence-Based Learning in Rwandan Physics Classrooms: First Assessment Based on the Reformed Teaching Observation Protocol. EURASIA Journal of Mathematics, Science and Technology Education, 16(9),1-8. *https://www.ejmste.com/article/implementation-of-the-competence-based-learning-in-rwandan-physics-classrooms-first-assessment-based-8395*

2. Ndihokubwayo, K. , Uwamahoro, J. & Ndayambaje, I. (2020). Usability of Electronic Instructional Tools in the Physics Classroom. EURASIA Journal of Mathematics, Science and Technology Education. 16 (11), 1-10. *https://www.ejmste.com/article/usability-of-electronic-instructional-tools-in-the-physics-classroom-8549*

3. Ndihokubwayo, K., Uwamahoro, J. & Ndayambaje, I. (2020). Effectiveness of PhET Simulations and YouTube Videos to Improve the Learning of Optics in Rwandan Secondary Schools. African Journal of Research in Mathematics, Science and Technology Education. 24(2), 253-265. *https://www.tandfonline.com/doi/full/10.1080/18117295.2020.1818042*

4. Mukuka, A., Mutarutinya, V., & Balimutajjo, S. (2021). Mediating effect of self-efficacy on the relationship between instruction and students' Mathematical reasoning. Journal on Mathematics Education, 12(1) 73-92. *https://ejournal.unsri.ac.id/index.php/jme/article/view/12508*

5. Musengimana, J., Kampire, E. & Ntawiha, P. (2021). Factors Affecting Secondary Schools Students' Attitudes toward Learning Chemistry: A Review of Literature. EURASIA Journal of Mathematics, Science and Technology Education,17(1),1-12. *https://www.ejmste.com/article/factors-affecting-secondary-schools-students-attitudes-toward-learning-chemistry-a-review-of-9379*

6. Ndihokubwayo, K., Nyirahabimana, P. & Musengimana, T. (2021). Teaching and Learning Bucket Model: Experimented with Mechanics Baseline Test. European Journal of Educational Research, 10(2), 525-536. *https://www.eu-jer.com/EU-JER_10_2_525.pdf*

7. Ndihokubwayo, K., Ndayambaje, I. & Uwamahoro, J. (2021). Analysis of Lesson Plans from Rwandan Physics Teachers. International Journal of Learning,Teaching and Educational Research, 19(12), 1-29. *https://www.ijlter.org/index.php/ijlter/article/view/2872/pdf*

8. Njiku, J., Mutarutinya, V. & Maniraho, J.F. (2021). Building Mathematics Teachers' TPACK Through Collaborative Lesson Design Activities. Contemporary Educational Technology, 13(2), 1-14. *https://www.cedtech.net/article/building-mathematics-teachers-tpack-through-collaborative-lesson-design-activities-9686*

9. Opanga, D. & Nsengimana, V. (2021). Practice in Teaching and Learning of Invertebrates: Evaluating the Effectiveness of Pedagogical Language Strategies in Tanzania Secondary Schools. EURASIA Journal of Mathematics, Science and Technology Education, 17(2), 1-22. *https://www.ejmste.com/article/practice-in-teaching-and-learning-of-invertebrates-evaluating-the-effectiveness-of-pedagogical-9697*

10. Ukobizaba, F., Nizeyimana, G.& Mukuka, A. (2021). Assessment Strategies for Enhancing Students' Mathematical Problem-solving Skills: A Review of Literature. EURASIA Journal of Mathematics, Science and Technology Education, 17(3), 1-10. *https://www.ejmste.com/article/assessment-strategies-for-enhancing-students-mathematical-problem-solving-skills-a-review-of-9728*

11. Nsengimana, T., Mugabo, R.L., Hiroaki, O. &Nkundabakura, P. (2021). Science Competence-based Curriculum Implementation in Rwanda: A Multiple Case Study of the Relationship between a School's Profile of Implementation and its Capacity to Innovate. African Journal of Research in Mathematics, Science and Technology Education, 24(3), 38-51. *https://www.tandfonline.com/eprint/9CUYETD2VAUVGGDNJZ8H/full?target=10.1080/18117295.2021.1888020*

12. Uwamahoro, J., Ndihokubwayo, K., Ralph, M. & Ndayambaje, I. (2021). Physics Students' Conceptual Understanding of Geometric Optics: Revisited Analysis. Journal of Science Education and Technology, 30(1). *https://link.springer.com/article/10.1007/s10956-021-09913-4*

13. Mbonyiryivuze, A., Yadav, L.L., & Amadalo, M.M. (2021). Students' attitudes towards physics in Nine Years Basic Education in Rwanda. International Journal of Evaluation and Research in Education (IJERE), 10(2), 648-659. *http://ijere.iaescore.com/index.php/IJERE/article/view/21173*

14. Ukobizaba, F., Ndihokubwayo, K., Mukuka, A. & Uwamahoro, J. (2021). From what Makes Students Dislike Mathematics towards its Effective Teaching Practices. Bolema- Mathematics Education Bulletin, 35(70),17. *https://www.scielo.br/j/bolema/a/YBFLXFrXv7KWQWYNm6BjN4B/?lang=en*

15. Kibga, E. S., Gakuba, E & Sentango, J. (2021). Developing students' curiosity through chemistry hands-on activities: A case of selected community secondary schools in Dar es Salaam, Tanzania, EURASIA Journal of Mathematics, Science and Technology Education, 17(5), 1-17. *https://www.ejmste.com/article/developing-students-curiosity-through-chemistry-hands-on-activities-a-case-of-selected-community-10856*

16. Ndihokubwayo, K., Ndayambaje, I. & Uwamahoro, J. (2021). Classroom Observation Data Collected to Document the Implementation of Physics Competence-Based Curriculum in Rwanda. Data in Brief, 35. *https://www.sciencedirect.com/science/article/pii/S2352340921003395*

17. Salma, S. M., Uwamahoro, J., Nzotungicimpaye, J. & Orodho, A. J. (2021). Assessing the Level of Secondary Mathematics Teachers' Pedagogical Content Knowledge. EURASIA Journal of Mathematics, Science and Technology Education, 17(6), 1-11. *https://www.ejmste.com/article/assessing-the-level-of-secondary-mathematics-teachers-pedagogical-content-knowledge-10883*

18. Byusa, E., Kampire, E. & Mwesigye, R. A. (2020). A case study on chemistry classroom practices in the Rwandan secondary schools. Heliyon, 7(6), 7. *https://www.sciencedirect.com/science/article/pii/S2405844021014559*

19. Bob, C. N., Gakuba, E & Habinshuti, G. (2021). An Overview of Inquiry-based Science Instruction amid Challenges. EURASIA Journal of Mathematics, Science and Technology Education.

20. Munyemana, J.J., Nsanganwimana, F., & Gaparayi, G. (2021). Secondary school Teachers' levels of integrating ICT tools into Biology teaching and learning process. International Journal of Education and Practice (IJEP).

www.aceitlms.ur.ac.rw

Students from ACEs commit to improve the quality of education

ACEs Students are supposed to improve the quality of education after graduation (photo archive)

Students who are pursuing master program in African Centres of Excellence have committed to improve the quality of education once they graduate. The issue of quality of education has been a topic for discussions for many years.

Geoffrey Twesigye is a Master's student at African Centre of Excellence in Internet of Things (ACEIoT). Sited in his home Kicukiro District, he is attending an online class in respect of set measures to curb the spread of covid-19 pandemic.

Twesigye testified that he is getting special and enough skills in technology which will help him improve the quality of education once he graduate.

"Our Centre is different from other higher learning institutions. These IoT- related courses are unique in the region at master's level.

> **"Our Centre is different from other higher learning institutions. These IoT- related courses are unique in the region at master's level. I am sure once I graduate I will be having skills that you can not find anywhere else."**

I am sure once I graduate I will be having skills that you can not find anywhere else," he said.

After graduation, I will make sure I transfer the skills I got to other higher learning institutuions", he added.

Clementine Umuhoza, another student from the African Centre of Excellence for Innovative Teaching and Learning Mathematics and Science (ACEITLMS). She is completing the master's program in Mathematics Education. She said that the Centre is designed differently from others.

"Our program focuses on science education with new technologies, which makes it different from other higher learning institutions. We used to study science itself but now we are having science with education. Therefore, we will contribute in improving the science education", she said.

Ag-partners Rwanda supported ACEIoT students to attend VivaTech 2021

Students were facilitated to attend VivaTech 2021

Paris hosted VivaTech 2021, a global technology event that brought together the best innovation actors aiming to ignite positive change in business and for society. From the past events, VivaTech has proven to be a global catalyst for digital transformation and startup growth.

Thanks to the support from Ag-partners Rwanda, four students from the African Center of Excellence in Internet of Things (ACEIoT) have been able to attend this year's edition. The students are Eric Nizeyimana, a PHD student and three Masters students namely Samson Ooko, Marvin Ogore and Rosemary Nalwanga. The main foundation of their different research works is to develop smart applications with AI running on tiny embedded

"The technology can be used to accelerate the Ecological Transformation through data & people and leverage the technology not only in weather monitoring but also in disease detection use cases such as cholera outbreaks."

devices, a cutting-edge technology and research field known as edge AI or TinyML.

Samson whose thesis is based on edge AI application for prediction of respiratory diseases got a unique opportunity to interact and share ideas with leading company

CEOs working on the application of AI in healthcare for diagnostics and drug design.

The move to non invasive early diagnosis was emphasised with the participants appreciating the efforts of Samson and ACEIoT towards making this a reality in Africa. Rosemary working on environmental conservation using a precision farming system participated in sessions that emphasised the need for such solutions and got a chance to share challenges and opportunities that can further be explored especially in relation to connectivity problems in rural Saharan Africa and the environmental degradation nightmare.

Eric Nizeyimana who is doing research on monitoring air pollution using blockchain, AI and edge computing attended the session which was oriented on IoT and learned how IoT serves a transformation in making solutions to real world problems. Marvin got to understand unique solutions on Cloud & Data Management using deeptech & AI Tech for the Environment.

The technology can be used to accelerate the Ecological Transformation through data & people and leverage the technology not only in weather monitoring but also in disease detection use cases such as cholera outbreaks.

www.aceiot.ur.ac.rw

ACEESD with partners organize the 6th IEEE Southern Power System Conference

The IEEE SPEC 2021 will take place in Kigali Marriot Hotel

The African Centre of Excellence in Energy for Sustainable Development in partnership with different partners are organizing the 6th IEEE Southern Power Electronics Conference (SPEC 2021) to be held in Kigali from 6th to 9th December 2021.

The 6th IEEE Southern Power Electronics Conference (SPEC 2021), offers an ideal opportunity for researchers, engineers, academics and students from all over the world to bring the latest technological advances and applications in power electronics to the Southern Hemisphere, as well as to network and promote the discipline.

Cutting edge researchers in the field will present keynote speeches

> **"The 6th IEEE Southern Power Electronics Conference (SPEC 2021), offers an ideal opportunity for researchers, engineers, academics and students from all over the world to bring the latest technological advances and applications in power electronics"**

during a four-day program that also features tutorials and technical session on theory, analysis, design, testing and advances within the fieldof power electronics.

Topics to cover include Devices & components, Power converters, Energy Storage, E-mobility, Power supplies, Motor drives and actuators, and other related topics such as Power electronics education, Hybrid teaching of power electronics, Protection and data analytics, Power electronics for medical applications, and Cyber physical aspects for power electronics.

The deadline for submission of digest is 31st August 2021.

Other partners in the organization of this conference include IEEE Power Electronics Society, Carnegy Mellon University and Kigali Collaborative Research Center (KCRC).

www.aceesd.ur.ac.rw

Our respective programs

African Centre of Excellence in Data Science (ACEDS) based at UR-College of Business and Economics, Gikondo

We have Day and evening Programs:

- Master/PhD of Science in Data Science in Data Mining
- Master/PhD of Science in Data Science in Econometrics
- Master/PhD of Science in Data Science in Biostatistics
- Master/PhD of Science in Data Science in Demography
- Master/PhD of Science in Data Science in Actuarial Sciences

N.B: All PhD programs are by research.

In partnership with Data Science Council of America (DASCA), we also offer certified professional Short courses:

      a. Associate Big Data Engineer (ABDE)
      b. Senior Big Data Engineer (SBDE)
      c. Associate Big Data Analyst (ABDA)
      d. Senior Big Data Analyst (SBDA)
      e. Senior Big Data Analyst (SBDA)

More details: www.aceds.ur.ac.rw

African Centre of Excellence for Innovative Teaching and Learning Mathematics and Sciences (ACEITLMS) based at UR-College of Education, Rukara

We have Day and Weekend Programs:

- Master of Education in Biology Education
- Master of Education in Chemistry Education
- Master of Education in Physics Education
- Master of Education in Mathematics Education
- PhD in Biology Education
- PhD in Chemistry Education
- PhD in Physics Education
- PhD in Mathematics Education

N.B: All PhD programs are by research.

More details: www.aceitlms.ur.ac.rw

African Centre of Excellence in Internet of Things (ACEIoT) based at UR-College of Science and Technology, Nyarugenge

We have the following Programs:

- Master/PhD of Science in Embedded Computing Systems (ECS)
- Master/PhD of Science in Wireless Sensor Computing (WSC)

N.B: All PhD programs are by research.

Short courses:

a. Rapid Prototyping
b. Blockchain Fundamentals and Applications
c. Drone fundamentals and applications
d. LoRA technologies
e. IEEE GRSS Drone Sensor Deployment

More Details: www.aceiot.ur.ac.rw

African Centre of Excellence in Energy for Sustainable Development (ACEESD) based at UR-College of Science and Technology, Nyarugenge

We have the following Programs:

- Master/PhD of Science in Energy Economics
- Master/PhD of Science in Renewable Energy
- Master/PhD of Science in Electrical Power Systems

N.B: All PhD programs are by research.

Short courses:

Power Engineering, Smartgrid, Microgrid

More Details: www.aceesd.ur.ac.rw
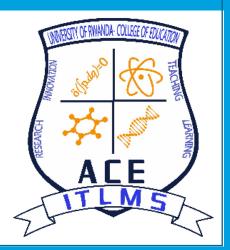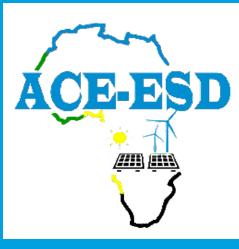
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