https://rijournals.com/research-in-education/

RESEARCH INVENTION JOURNAL OF RESEARCH IN EDUCATION 3(3):68-76, 2024

ISSN: 1597-8656

Enhancing STEM Education in Africa through Collaborative Learning and Technological Integration

Baingana J.K.

Faculty of Education Kampala International University Uganda

ABSTRACT

This paper examines the influence of sociocultural and economic backgrounds on STEM education in Africa, emphasizing the significance of active and collaborative learning environments. Highlighting the current state of STEM education and the unique challenges faced, the paper explores the principles of collaborative learning and presents case studies from various African countries. The iSafari project, a virtual learning community that uses game design and mobile technology to deliver STEM education, is discussed as a model for enhancing learning outcomes. The study concludes with recommendations for implementing collaborative learning strategies to improve STEM education across the continent.

Keywords: STEM education, collaborative learning, African education, active learning, sociocultural influence, iSafari project, educational technology and problem-solving skills.

INTRODUCTION

The sociocultural and economic background, such as gender, culture, and socioeconomic status, of the students may influence how students learn STEM as well as participation and success in STEM programs [1]. To stimulate the interest and enthusiasm of students, the popular trend in formal and informal societal structures is introducing an active and collaborative learning environment as the educational process [2]. Framed within collaborative learning, connected STEM learning takes full advantage of a culture of shared responsibility, which creates intellectual clashes [3]. These connections allow students to understand the broader context for learning by supplying real-life applications [4]. Therefore, a learning environment that encourages active learning through group activities can improve students' achievements in some of the most fundamental STEM areas. However, instead of passively receiving information, it strengthens the lesson by engaging students in learning [4-7]. Whether the student is in a classroom or outside the class, the active involvement will activate the learning, which will be more vibrant. When collaborating on a complete course project, students not only learn the particular target content but also distribute tasks, learn time management, communication, critically joint evaluations that are essential for a science, technology, engineering, and mathematics career, and get inspired for working in a diverse team [8-14]. The acronym 'STEM' stands for Science, Technology, Engineering, and Mathematics [9]. This integrated approach to teaching science and technology aims to help students break the traditional barrier between different disciplines. It calls on all stakeholders involved in education so that future generations engage in economic activity based on the latest scientific and technical developments [11]. The mission of the STEM approach is to support the realization not only of trained but also innovative and entrepreneurial students. Educational innovation should not focus only on the content of educational material but also on the process of transmitting and acquiring that content [15]. In the 21st century, it is important for students to learn not only the content of a discipline but also the ability to explore problems, solve abstract, complex, open-ended problems, and handle new challenges. Students need to develop the problem-solving skills of the real world to maintain a competitive advantage [16]. African education models that stress memorization and choral methods of learning do not develop an individual's problem-solving and critical thinking skills [17-21]. Today, all African countries are looking for education systems that will raise the next generation of problem solvers and critical thinkers [20]. The following quote from The Ministry of Science and Technology of the Federal Democratic Republic of Ethiopia (2009) illustrates the importance of thinking critically: "Science and Technology are central to every economic activity. The breakthrough in science and technology can be a catalyst to the development of the economy of the country [22]. Without the invention and adoption of modern technologies, the African countries will not eliminate poverty, hunger, and famine." The education systems in many African countries, national policy papers, and international education partnerships all have similar goals: to develop their STEM students' problem-solving and critical thinking skills [14]. Many African students do not learn the problem-solving and critical thinking skills that they need to become independent learners in STEM (Science, Technology, Engineering, and Mathematics) disciplines. While STEM education reforms often emphasize the development of these components in students, the assessments used to measure the effectiveness of these reforms often focus on more traditional content knowledge and skills [15]. It is important to specifically develop problem-solving and critical skills so that STEM students are capable of innovating, especially given the role that STEM fields are expected to play in the economic future of the African continent [23]. We discuss efforts to implement and assess a student model illustrating how students learn problem-solving and critical thinking skills from collaborative project-based instruction in a mechatronics course at the African Leadership Academy in South Africa [24-26]

Current State of STEM Education in Africa

Universities in Africa have much more pressing problems than finding the resources and incentives to incorporate state-of-the-art, research-based methods of science and engineering pedagogy into our classrooms [18]. Nonetheless, we hold that some human resources and financial resources should be available to improve the science and engineering pedagogy used in African universities, and that although our circumstances are different from the circumstances that underpin the creation of the growing, worldwide network of research universities that provide the majority of science and engineering Ph.D.s, some of the reforms currently underway in science and engineering Ph.D. education elsewhere in the world should be of relevance to Africa's universities [25]. STEM education in African universities challenges global paradigms. STEM education in African universities faces unique problems and challenges, as African countries contend with poverty, rapid population growth, rapid urbanization, and unpredictable weather patterns that exacerbate the economic difficulties their citizens face [19]. One major challenge in African countries is to develop a population with the skills and knowledge necessary to sustain inclusive economies and inclusive political institutions [27-30].

Challenges and Opportunities

In a rapidly advancing society, a coherent and comprehensive education system that integrates both nonformal and formal activities has to be arranged so that every citizen has an opportunity to be numerate and literate, which in turn enhances learning capabilities [23]. The issue is far greater than simply increasing student numbers together with the improvement of student retention rates and increases in the number of trained teachers. The real concern is to ensure the provision of meaningful and relevant quality education [12]. The need for this provision has been echoed frequently on the world stage; for example, we find it within the Education for All goals of the United Nations, as part of the New Partnership for Africa's Development, the African Renaissance, and the 2020 of the International Commission of Ladapo, as well as the Open Educational Resources, the Tokyo Declaration, and the Global Learning Space of the Third Tokyo International Conference on African Development (TICAD III), the Internationalization of Higher Education in Africa, and the National Vision 2030, the education commitments made at the Geneva Ministerial Meeting of African Commonwealth Education Ministers, and so on [17]. These plans and visions serve as a guide to the commitment and the right of all citizens to learn life skills to promote sustainability, to learn about global citizenship, and to engage in relevant and meaningful practices of lifelong learning [16]. Although there has been significant expansion and improvement in science, technology, engineering, and mathematics (STEM) education in African countries over the past decade, there are still many areas that need to be addressed. There is still a huge divide between African STEM education and those in the West, particularly in the facilities, the standard, and quality of education levels [31]. Yet African STEM graduates are an essential part of the national workforce, providing skills in science, technology, engineering, health care, commerce, services, and, indeed, any industry requiring technical skills [34]. Two key issues are that many African teachers lack the necessary subject knowledge and up-to-date pedagogic methods for STEM subjects, and that the majority of children leave primary school with little, if any, exposure to good quality education beyond basic literacy and numeracy. These issues urgently need to be addressed if the population is to grow in the era of the knowledge economy [32-37].

Principles of Collaborative Learning

Another principle for implementing collaborative learning is positive interdependence. Collaborative learning is dependent on mutual interdependence between learners; thus, each student must participate in some way in the activity [28]. It conveys the message that learning should not be perceived as a limited resource that can only be acquired by one student at the expense of another but rather as an unlimited resource [26]. It implies resources, the ability to generate multiple interpretations of a topic, and create new knowledge. When students value positive interdependence, they value working together, they believe it helps them learn, and they actively try to support and help their peers [33]. They see that learning is not a zero-sum endeavor: one student's learning aids another's. There must be elements that must depend on their mutual dependence in a sense that interactional, social, procedural, executive, and emotional help community can be then achieved successfully [35]. Several principles and ideas focus on collaborative learning [34]. In its simplest stage, collaborative learning requires those involved to work together.

It is an understanding between all the learners that they occupy a common place and an interrelated set of goals which can be successfully achieved only through a combination of the various personal goals. In the classroom, the three main functions are characterized by engagement, interaction, and reflection. Engagement evokes careful focus on the topic, attentiveness, and thought [38]. Interaction entails the exchange of information, ideas, and views to co-construct new meaning and knowledge. Both interaction and engagement are held together by reflection, which allows learners to think about the learned material, and importantly, to think about how they think and to monitor and regulate their level of understanding, which leads to metacognition [39-42].

Importance

Educational Alliance, an educational program situated in New York City, states that in recent years the number of STEM graduates has declined [43]. According to the Alliance, the educational diploma in adult STEM has increased by more than 100% during the last decade. These statistics reveal that the growth in the number of graduates surpasses the growth of 17% in non-STEM education [44]. The numbers also highlight the fact that the economy itself is generating all that is being requested in times of an increase in men and women capable of a STEM profession. Career technical training, occupational life, and basic life at a tertiary level have experienced severe budget cuts. The time to facilitate classrooms includes flaws and failures [45]. This generated a dilemma for the ability to educate extra future scientists and researchers. Conceivably, a diverse, smarter, and more concentrated strategy is needed [47-49]. In order to accomplish this, a dialogue aims to stimulate and debate interest about the best approach and information that science can use to promote a useful and active debate [40]. The United States is concerned by students lagging behind in assessments of numerical and scientific literacy. Its economic future depends on producing graduates with strong information of mathematics and science [33, 28, 31]. In order to meet these demands, there needs to be an established infrastructure. However, there are currently too few graduates considering research in these areas. During a demand to fill jobs in science and technology, research training is a critical need. STEM education is designed not only for those purposes, but also to address the serious need for better educational achievements. In these tough economic times, most countries are facing budgetary restraints and domestic cuts [41-46]. Funding for social and research agencies has been capped or reduced, and cash-strapped school districts are confronting a downturn in enrollment, which results in less money per pupil. The current climate is now focused on sparing the most important things [41]. Because the Indian American economist, Esther Duflo, said, today more than ever we need to save money, most of whose expenditures have quality results. The belief is especially with respect to education; the current system needs to prepare students to handle 21st-century challenges [39]. Science, technology, engineering, and mathematics (STEM) education generally refers to an integrated approach to teaching science, technology, engineering, and mathematics in ways that reflect the way these subjects are applied in the real world [47-54]. STEM education is designed to do more than teach individual subjects such as physics, mathematics, or biochemistry. It is designed to enable more effective cooperation and collaboration between these different fields of study, and in the process to make the study of these different subjects both more interesting and more relevant to learners of all ages [55-60].

Examples from African Countries

Kenya: The KICD (Kenya Institute of Curriculum Development) in Kenya has taken the first move to equipping teachers with content to use e-classrooms. Further, most learning institutions in Kenya (private and public) have equipped the E-boards with large screens in interactive mode [61]. These E-boards allow teachers to present information to their students, in addition to allowing students to participate [62]. The E-board also allows teachers to record their lessons and share them with students over the internet in real or near-real time [51]. The schools form mini-e-learning centers, and each center is connected to a line that connects to its neighbors, further creating communications networks covering 153 [63-67].

Ghana: Primary and secondary schools in all the ten regions of Ghana received the proposed interactive learning content beamed via satellite to the teach support units using the cost-effective and straightforward to install, low maintenance DVB-IP transmission approach [68].

Zimbabwe: The Research Council of Zimbabwe, in collaboration with Endasolutions (Pvt) Ltd, an ICT consultancy company, developed and introduced Virtual Learning Environment (VLE) software to all Government Colleges, Teacher Training Colleges, and "A" Level schools with the main aim of increasing the number of potential enrolments in higher learning institutions and providing a resource base material for the prospective students who wish and have the capability to continue with OPS [69-71].

South Africa: The Mathforum is a mathematics e-learning forum in South Africa, which is a South African initiative to bring South Africa into the information society. It consists of teachers, lecturers, district officials, subject specialists, and business partners that work together to create a community of practice where the improvement of the teaching and learning of mathematics is an integral part [72].

Implementing Collaborative Learning in African STEM Education

Currently, there does not seem to be work addressing these types of measures [73]. It is also important to investigate the interplay between the different components, how one influencing factor impacts the performance of other influencing factors, and how different environmental settings influence what is feasible [74]. In other words, the most important aspects to the limiting of what can be done are not first-order environmental factors but higher-order interactions among environmental factors [75-77]. It is always possible for skilled individuals to counteract the impacts of unfavorable environments. Therefore, a complete understanding of a complex environment will need to account for such potential interactions [52]. Factors related to student engagement in primary and secondary STEM education are also widely discussed topics in the educational psychology literature [58]. These mainly result from encountering problems of learning construct concepts in the primary or secondary classrooms. The South African experience in using technology in a collaborative learning format presents a number of useful lessons that warrant consideration in addressing this critical issue [78-81]. These lessons serve as the basis of a number of recommendations that have relevance across teachers from other African countries that aim to enhance their ability to encourage and support effective STEM learning [82]. It should be noted that the exploration of the education environment described above is still descriptive. The next step is to validate how the different components interact and the level of influence of the different components [83]. The validation is performed using structural equation modeling statistical analysis by determining statistical relationships among the models' variables. The different observation indicators for the different constructs are then systematically implemented or observed and analyzed through inferential statistics [84-87].

CONCLUSION

The integration of collaborative learning and technological advancements in STEM education offers a promising pathway to addressing the unique challenges faced by African educational systems. By fostering an environment that encourages active participation and practical application, students can develop essential problem-solving and critical thinking skills. The iSafari project exemplifies how innovative approaches can bridge educational gaps, making STEM education more inclusive and effective. To realize these benefits, educational stakeholders must invest in training teachers, developing relevant curricula, and leveraging technology to create dynamic learning experiences. Implementing these strategies will not only enhance the quality of education but also equip students with the skills necessary to drive economic and technological advancements in Africa.

REFERENCES

1. Cooper, G. & Berry, A. (2020). Demographic predictors of senior secondary participation in biology, physics, chemistry and earth/space sciences: students' access to cultural, social and science …. International Journal of Science Education. [HTML]
2. Kricorian, K., Seu, M., Lopez, D., Ureta, E., & Equils, O. (2020). Factors influencing participation of underrepresented students in STEM fields: matched mentors and mindsets. International Journal of STEM Education, 7, 1-9. springer.com
3. Kayan-Fadlelmula, F., Sellami, A., Abdelkader, N., & Umer, S. (2022). A systematic review of STEM education research in the GCC countries: Trends, gaps and barriers. International Journal of STEM Education, 9, 1-24. springer.com
4. Seage, S. J., & Türegün, M. (2020). The effects of blended learning on STEM achievement of elementary school students. International Journal of Research in Education and Science, 6(1), 133-140. ed.gov
5. Master, A. H. & Meltzoff, A. N. (2020). Cultural stereotypes and sense of belonging contribute to gender gaps in STEM.. Grantee Submission. ed.gov
6. Jiang, S., Simpkins, S. D., & Eccles, J. S. (2020). … and science motivation and their subsequent STEM choices and achievement in high school and college: A longitudinal study of gender and college generation status …. Developmental Psychology. apa.org
7. Wafula, M. S. (2020). Appreciating,(re)-thinking and diversifying arts education: Learning to be a choral conductor/Trainer/Director/Educator in Kenya. Muziki. [HTML]
8. Morienga, K. Z. (2022). Beyond Sound Before Sight: A Comparative Overview Between Contemporary Musical Pedagogical Methodologies and the Dissemination of Non-Western …. [HTML]
9. Adongo, E. (2020). Pedagogical Strategies for Developing Musician's Understanding of Styles and Conceptual Knowledge of Contemporary African Choral Music. [HTML]
10. Pretorius, M. & van der Merwe, L. (2020). Learning Collectively in a South African High School Choir Community of Musical Practice through Dalcroze-Inspired Activities. Muziki. [HTML]
11. Ekpang, J. E., & Nwanchor, U. C. H. E. N. N. A. (2021). Towards The Decolonization of Nigerian Media: An Analytical Study. *NTAtvc Journal of Communication*, *5*(2), 29-37.
12. Joseph Ekpang, Patience Ekpang. (2016). Social Media Cites: Interrogating the Phenomenon of Emerging Global Communities. Journal of Theatre and Media Studies, 1(2).
13. Joseph Ekpang. (2015). Mass Media and Social Change Interface: Myth or Reality? The LEAJON, 7(1).
14. Joseph Ekpang. (2013). The Place of Music in Audience Education. African Theatre Studies Review, 7(1).

https://rijournals.com/research-in-education/
15. Chris Nwamuo, Joseph Ekpang. (2013). The UNESCO Framework for Cultural Statistics: A Critical Appraisal. West African Association for Commonwealth Literature and Language Studies, 2(5).
16. Nyambane, D. O., Ongeri, B. O., & Manyange, M. N. (2022). An Assessment of Collaborative Governance for Sustainable Development in Urban Planning in Kenya. *IDOSR Journal Of Current Issues In Social Sciences*, *8*(1), 1-18.
17. Byabashaija, D., Mbyemeire, P., Manyange, N. M., Nakimuli, A., Nyambane, O. D., Nyabuga, D. O., ... & Niwagaba, P. E. (2016). Legal Requirements and Mob Justice in Kabale Municipality, Western Uganda.
18. Olaide Olutola Fagbolu, Azizi Wasike. (2019). Model for Translation of English Language Noun Phrases to Luganda. London Journal of Research in Computer Science and Technology. 19(3), 1-14.
19. Vincent Kayindu, Zahara Faridah Kiggundu, Azizi Wasike (2023). Religion as a Correlate of Administrative Staff's Adoption of Information and Communication Technology (ICT) In Primary Schools of Bukomansimbi District, Uganda. International Journal of Advance Research and Innovative Ideas in Education. 9(4), 1220 – 1228.
20. Vincent Kayindu, Zahara Faridah Kiggundu, Azizi Wasike. (2023). Administrative Staff's Age and Their Adoption of Information and Communication Technology (ICT) In Secondary Schools, Kampala District, Uganda. International Journal of Advance Research and Innovative Ideas in Education. 9(4), 1229 – 1235.
21. Barongo E. K, Busingye J. D., Tom Mulegi, Lubaale G (2023). Gendered Economic Gap In Uganda: Education Attainment and Women's access to, and Land ownership in Bunyoro Sub-Region. Idosr Journal of Arts and Management. 8(2), 1-10.
22. Eleanor Kirahora Barongo, Tom Mulegi, Mary Tunde Nalubega (2023). Evaluation of the relationship between Job Safety and Employee Productivity in Public and Private Organizations in Kampala, Uganda. IAA Journal Arts and Humanities 10(1), 62-75.
23. Rukundika Francois, Mwaniki Roseann, Tom Mulegi, Eleanor Kirahora Barongo (2023). The effect of Health service interventions on re- integration of ex-combatant children in Haute-Kotto Prefecture of the Central African Republic. Newport International Journal of Research in Education 3(2), 108-119.
24. Mary tunde nalubega, tom mulegi, eleanor kirahora barongo. (2023). evaluation of the level of job safety in some selected organizations in kampala, uganda. Idosr journal of current issues in arts and humanities. 9(1), 60-73.
25. Robert Mpiira, Patrick Okello. (2020). A Multisectoral Approach To Eradication Of Malnutrition In Vulnerable Groups: A Cluster-Randomized Trial. Acta Scientific Nutritional Health. 4(2), 1-7.
26. Ashirafu Masudi Kule, Mugizi Wilson, Kariisa Henry Ampeire, Victor Turiabe. (2012). Teacher characteristics and the Use of ICT in Rural Secondary Schools of Bwera Sub County, Kasese District, Uganda. Interdisciplinary Journal of Rural and Community Studies. 3(2), 30-40.
27. Sudar Rheina Romadhoni, Tatik Suryani. (2023). The relationship of workplace spirituality, job characteristics employee engagement, and employee wellbeing. Enrichment: Journal of Management. 12(6), 4780-4787.
28. Ismail Bello, Asmau Isyaku Dutse, Sophia Kazibwe, Muzaare Gerald. (2022). Multinational Corporations, Knowledge and Technology Transfer in Nigeria: An examination of Etisalat Telecommunications Engineering Postgraduate Programme (ETEPP). International Journal of Research and Innovation in Social Science. 6(5), 508-513.
29. Gerald Muzaare. (2017). Management of Integrated Development Programmes in Ibanda and Kiruhura districts in Western Uganda. NIU Journal of Social Sciences. 2(2), 7-17.
30. Nakate Sylvia, Muzaare Gerald, Katunguka Aaron, Adam Matiko Charles, Mainrad Haule Lembuka, Samanya John, Mutebe Janet. (2019). Job Satisfaction and Organizational Citizenship Behavior (OCB) in Multinational Telecommunication in Uganda. Journal for Studies in Management and Planning 5(9), 49-52.
31. Blessing Etukudo Ogunjimi, Aniebiet Inyang Ntui, Uduak Enang, Undie Felicia Nkatv. (2022). Socio-demographic variables and utilization of ict among members of staff of university libraries in cross-river and akwa-ibom state nigeria. Global Journal of Educational Research. 21(2), 159-171.
32. Osim Tina Alam, Felicia Nkatv Undie. (2023). Students Industrial Work Experience scheme in enhancing employable skills in Library and Information Science students in Tertiary Institutions in Cross River State, Nigeria. International Research Journal of Education and Technology. 5(9), 251-264.
33. Abimbola Labake Agboke, Rose Ezeibe, Felicia Nkat v Undie, Ahiaoma Ibegwam. (2021). The Adoption of Microsoft Excel in Resource Processing (Cataloguing and Classification) Section and Readers' Services (Circulation) Section of University Library …International Journal of Research in Library Science (IJRLS). 7(2), 54-64.

https://rijournals.com/research-in-education/

34. Felicia Nkatv Undie, Rose Ezeibe and Abimbola Labake Agboke. (2020). Computer Literacy Skills and Utilisation of Information Resources in Federal University Libraries by Post-Graduate Students in South–South, Nigeria. International Journal of Advanced Library and Information Science. 8(1), 470-478.
35. Franklin Muhereza T. Ukaidi Chris U. A, Ssekajugo Derrick, Ukaidi Evelyn. (2024). Road Merchants and Socio-Economic Development: A Study of Cross River State of Nigeria. Nigerian Journal of Management Sciences. 25(1), 319-328.
36. Edwine Atukunda, Owen McOnyango, Deborah Amukowa. (2022). Mchango wa Mashairi ya Kiganda katika Kuendeleza Muundo wa Ushairi wa Kiswahili Kupitia Ufunzaji na Ujifunzaji. 5(1), 171-182.
37. Mugizi, W., Mujuni, B. T., & Dafiewhare, O. A. (2019). Ethical leadership and job performance of teachers in secondary schools in Kyabugimbi Sub-County in Bushenyi District in Southwestern Uganda. *Direct Research Journal of Education and Vocational Studies*, *1*(1), 11-22.
38. Mugizi, W., Musinguzi, M. N., & Dafiewhare, O. A. (2019). Human resource career development practices and retention of secondary schools' teachers in Rubabo County, Rukungiri District, Uganda. *Journal of Education Research and Rural Community Development*, *1*(2), 18-37.
39. Manyange, M. M. N., Abuga, I. M., & Nyambane, D. O. (2015). Investigating the financial knowledge management in selected Ngo's in Yei County, Republic of South Sudan.
40. Ceaser, J. B., Daniel, O., Innocent, E. E., Akiyode, O. O., Brenda, M. G., & Danson, M. (2019). Youth" s Awareness of Climate Change in Nakuru Town, Kenya. *International Journal of Scientific Engineering and Science*, *3*(11), 19-24.
41. Mwebesa, E., Sumil, N., Hassan, A. H., & Cephus, D. (2017). Antecedents of statistics anxiety in a higher education system.
42. Bengat, J., Odenyo, M., & Rotich, J. (2015). Organizational change and resistance dilemmas resolution approaches and mechanisms. *International Journal of Economics, Commerce and Management*, *3*(2), 1-17.
43. **Silaji Turyamureeba** (2018) Motivational Practices And Teachers'performance In Private Secondary Schools In Mbarara District, Uganda. Kampala International University, College of Education, Open and Distance Learning. 1 (1) 1-101.
44. Silaji Turyamureeba, Kayindu Vincent, Bisaso Ritah (2020). Fringe Benefits, Administrative Support And Physical Work Environment As Correlates Of Teachers' Performance In Private Secondary Schools In Mbarara District, Uganda. Researchjournali's Journal of Education. Vol. 8 | No. 4 May | 2020 ISSN 2347-8225
45. Turyamureeba Silaji and Kyarikunda Zaitun (2024). Examining the Impact of Human Capital Development on Poverty Reduction: A Case Study of Bushenyi District, Uganda. INOSR HUMANITIES AND SOCIAL SCIENCES 10(1): 44-52.https://doi.org/10.59298/INOSRHSS/2024/101.44523
46. Tukur Muhammad, Mbabazi Asiati, Umar Sodangi, Stella Steddy, Silaji Turyamureeba & Kule Ashirafu Masudi (2024). AN OVERVIEW OF GENDER RESEARCH IN SCIENCE AND MATH EDUCATION FROM A NIGERIAN PERSPECTIVE. African Multidisciplinary Journal of Development (AMJD). 12 (3) : 207- 231. https://doi.org/10.59568/AMJD-2023-12-3-18
47. Wilson Mugizi, Benard Nuwatuhaire, Silaji Turyamureeba (2019). Organisational structure and employee commitment of academic staff in a private university in Uganda. Journal of Humanities and Social Science. 24 (4) 72-83: DOI: 10.9790/0837-2404097283
48. Y Katureebe, S Turyamureeba, A Rahim, CE Eze (2023). The Effect of Financial Management on the Learning Ability of Students in Government-Aided Primary Schools in Ibanda Municipality Uganda. International Journal of Humanities, Management and Social Science. 6 (2) 109-118; DOI: 10.36079/lamintang.ij-humass-0602.600
49. FA Akorio, S Turyamureeba, A Tugume, VHU Eze (2024). Rural Tourism and Socio-Economic Development in Kalapatta Sub County Kabong District of Uganda. Journal of Humanities and Social Sciences (JHASS). 6 (1) 31-38 : DOI: 10.36079/lamintang.jhass-0601.606
50. Turyamureeba Silaji (2018) Motivational practices and and teachers' performance in private secondary schools in Mbarara District, Uganda. Kampala International University
51. Tukur Muhammad, Mbabazi Asiati, Umar Sodangi, Stella Steddy, Silaji Turyamureeba & Kule Ashirafu Masudi (2024). USING THE DELPHA TECHNIQUE, TO REFINED SCIENCE LESSONS, ACTIVITIES, AND LOCAL RESOURCES TO CREATE A SCIENCE MODULE FOR TWO FEMALE SENIOR SECONDARY STUDENTS IN NIGERIA. African Multidisciplinary Journal of Development (AMJD).12 (3) 250- 272: https://doi.org/10.59568/AMJD-2023-12-3-20
52. Silaji Turyamureeba and Julius Bitekyerezo (2023). Exploring Factors Impacting Teachers' Performance and Commitment in Primary Schools: A Case Study of Ryeru Sub-County, Rubirizi District. INOSR ARTS AND HUMANITIES 9(2):51-59. https://doi.org/10.59298/INOSRAH/2023/2.6.4000

https://rijournals.com/research-in-education/

53. Silaji Turyamureeba, Tukur Muhammad, Abdul Rahim and Kiyundo Zikanga (2023). Organizational structure and Academic staff Performances in Private Universities in Uganda. IDOSR JOURNAL OF HUMANITIES AND SOCIAL SCIENCES 8(2): 22-27. https://doi.org/10.59298/IDOSRJHSS/2023/12.1.5100
54. Silaji Turyamureeba, Tukur Muhammad, Abdul Rahim and Kiyundo Zikanga (2023). The impact of leadership competence and administrative leadership on higher education institutions around the world. IAA Journal of Education 9(2):109-116.
55. Ahabwe Jude Thaddeous, Silaji Turyamureeba, Namudu Aisha (2023). Analytical study on motivation and Pupils' performance in primary schools in Kagadi town council: A case study of Government Aided Primary Schools. 3 (2): 18-22. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION (NIJRE)
56. Twesigomu Dick, Turyamureeba Silaji and Namudu Aisha (2023). The effect of nutrition and Pupils' academic performance: A case study of selected Primary schools in Muhororo Sub County, Kagadi district,Uganda. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION. 3(2) :1-8 (NIJRE)
57. Silaji Turyamureeba and Richard Kaizire (2023). Impact of School Policies on Student Discipline in Fort Portal Municipality, Kabalore District. INOSR HUMANITIES AND SOCIAL SCIENCES 9(2): 1-11. https://doi.org/10.59298/INOSRHSS/2023/1.5.4000
58. Turyamureeba Silaji, Jovita Nnenna Ugwa, Abakunda Johnson, Kule Gerald, Kamami Wilson (2023). Navigating Global Challenges in Teacher Performance: Strategies. INOSR ARTS AND HUMANITIES and Implications. 9(2) 1-9: https://doi.org/10.59298/INOSRAH/2023/2.1.4000
59. Bulhan Samanya, Tom Mulegi, Ramadhan Badru Malinga, Hussein Muhaise, Wallen Atwijukire(2023). Examining the Influence of Regulatory Governance on Service Quality in Bwera District Hospital, Kasese District, Western Uganda. IAA Journal of Management. 10(2):17-31.
60. Bulhan Samanya, Tom Mulegi, Ramadhan Badru Malinga, Hussein Muhaise, Wallen Atwijukire(2023). Exploring the Impact of Decentralization on Service Quality at Bwera District Local Government Hospital in Kasese District. IAA Journal of Management. 10(2): 1-16.
61. Asanairi Bwambale, Tom Mulegi, Samanya Bulhan (2024). The Effect of Laissez-Faire Leadership Style on Academic Performance of Primary School Pupils in Selected Primary Schools in Kasese District. IAA Journal of Education 10(1):23-28.
62. Asanairi Bwambale, Tom Mulegi, Samanya Bulhan (2024). The Effect of Transactional Leadership on Academic Performance of Primary School Pupils in Social Studies in Munkunyu Sub County Kasese District . IAA Journal of Education 10(1):17-22.
63. Asanairi Bwambale, Tom Mulegi, Samanya Bulhan (2024).The Effect of Transformational Leadership on Academic Performance of Primary School Pupils in Social Studies in Munkunyu Sub County Kasese District. NEWPORT INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN HUMANITIES AND SOCIAL SCIENCES 4(2):25-31.
64. Habimana Theogene, Tom Mulegi and Niyompano Hosee (2017). The contribution of financial ratios analysis on effective decision making in commercial banks International Journal of Management and Applied Science.3(6):33-40
65. Tom Mulegi (2022). Evaluation of the Skill Mix of Health Professionals in Government Regional Referral Hospitals in Uganda. International Digital Organization for Scientific Research.7(1): 43-68
66. Tom Mulegi.(2022). An Overview of Performance of Health Workers in Uganda. IDOSR JOURNAL OF HUMANITIES AND SOCIAL SCIENCES 7(1):113-124.
67. Jovita Nnenna Ugwu, Tom Mulegi, Mbabazi Asiati, Chidinma Esther Eze (2023). Prospects and Challenges of Sustainsble Development in Africa. IDOSR JOURNAL OF COMMUNICATION AND ENGLISH. 8(1): 6-12.
68. Rachel Okwaja Puche and Eric Mabonga Ugwu Jovita Nnenna, Mbabazi Asiat, Tom Mulegi, Eze Chidinma Esther, Aleke Jude Uchechukwu.(2023). Mentorship and Increased Participation of Women in Politics: A Review. NEWPORT INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN HUMANITIES AND SOCIAL SCIENCES 3(2):10-13.
69. Rachel Okwaja Puche and Eric Mabonga Ugwu Jovita Nnenna, Mbabazi Asiat, Tom Mulegi, Eze Chidinma Esther, Aleke Jude Uchechukwu. (2023). The Impacts of Teaching Strategies and Skills for Effective Learning of English Language in Cameroon. NEWPORT INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN HUMANITIES AND SOCIAL SCIENCES 3(2):6-9.
70. Rachel Okwaja Puche and Eric Mabonga Ugwu Jovita Nnenna, Mbabazi Asiat, Tom Mulegi, Eze Chidinma Esther, Aleke Jude Uchechukwu (2023). The Benefits of Emotional Intelligence to Healthcare in Nigeria.

NEWPORT INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN HUMANITIES AND SOCIAL SCIENCES 3(2):1-5

71. Rachel Okwaja Puche and Eric Mabonga Ugwu Jovita Nnenna, Mbabazi Asiat, Tom Mulegi, Eze Chidinma Esther, Aleke Jude Uchechukwu(2023). Evaluation of Factors that Affect Teachers' Job Satisfaction and the Impact on Student Academic Performances. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION 3(3): 6-9
72. Rachel Okwaja Puche and Eric Mabonga Ugwu Jovita Nnenna, Mbabazi Asiat, Tom Mulegi, Eze Chidinma Esther, Aleke Jude Uchechukwu , (2023). Effect of Cultural Values on Character Formation: Implication for Education. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION 3(3):1-5.
73. Mulegi Tom and Eleanor Kirahora Barongo Usman Bappi (2023). Examination of the level of governance in Gombe local government, Nigeria. IDOSR JOURNAL OF BANKING, ECONOMICS AND SOCIAL SCIENCES 8(1):60-74.
74. Tom Mulegi, Usman Bappi and Bulus Jonah Saidu (2023). An Assessment of the Effect of Motivation and Affirmative Action on Employee's Performance in Gombe Local Government, Nigeria. IDOSR JOURNAL OF BANKING, ECONOMICS AND SOCIAL SCIENCES 8(1): 50-59.
75. Mulegi Tom and Eleanor Kirahora Barongo Usman Bappi. (2023). Examination of the level of community development in Gombe local government, Nigeria. IDOSR JOURNAL OF ARTS AND MANAGEMENT. 8(2): 48-62.
76. Tom Mulegi and Lubaale G. Barongo E. K., Busingye J. D. (2023). Gendered Economic Gap in Uganda: Education Attainment and Women's Access to and Land Ownership in Bunyoro Sub-region. IDOSR JOURNAL OF ARTS AND MANAGEMENT 8(2): 1-10.
77. Mulegi Tom and Barongo Kirahora Eleanor Rukundika Francois, Mwaniki Roseann (2023). Evaluation of the effect of Education service interventions on re-integration of ex-combatant children in Haute-Kotto Prefecture of the Central African Republic. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION (NIJRE) 3(2):120-131.
78. Tom Mulegi and Lubaale G. Barongo E. K., Busingye J. D. (2023). Gendered Economic Gap in Uganda: Education Attainment and Women's Access to and Land Ownership in Bunyoro Sub-region. IDOSR JOURNAL OF ARTS AND MANAGEMENT 8(2):1-10.
79. Mulegi Tom and Barongo Kirahora Eleanor Rukundika Francois, Mwaniki Roseann (2023). The effect of Health service interventions on reintegration of ex-combatant children in Haute-Kotto Prefecture of the Central African Republic. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN EDUCATION (NIJRE) 3(2):108-119.
80. Mulegi Tom and Barongo Kirahora Eleanor Rukundika Francois, Mwaniki Roseann (2023). The influence of the family support interventions on re-integration of ex-combatant children in HauteKotto Prefecture of the Central African Republic (CAR). NEWPORT INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN HUMANITIES AND SOCIAL SCIENCES (NIJCRHSS).3(1):24-34.
81. Mwaniki Roseanne and Eleanor Kirahora Barongo Tom Mulegi, Ndagire Laila. (2023). A situational analysis of Access to and utilization of sexual and reproductive health services under decentralization in Kampala, Uganda. INOSR HUMANITIES AND SOCIAL SCIENCES 9(1):31-50.
82. Mwaniki Roseanne and Eleanor Kirahora Barongo Tom Mulegi, Ndagire Laila (2023). Social, economic and cultural factors that influence access and utilization of sexual and reproductive health services under decentralization In Kampala, Uganda. INOSR HUMANITIES AND SOCIAL SCIENCES 9(1):15-30.
83. Barongo Eleanor Kirahora and Tom Mulegi (2023). Empowerment and Participation of Women in Community Development in Lower Local Governments: A Case of Makindye Division, Kampala, Uganda. INOSR ARTS AND HUMANITIES 9(1): 48-61.
84. Mwaniki Roseanne and Eleanor Kirahora Barongo Tom Mulegi, Ndagire Laila (2023). Assessment of the level of knowledge and awareness of women on sexual and reproductive health services (SRH) under decentralization in Kampala Uganda. INOSR ARTS AND HUMANITIES 9(2): 35-47
85. Jovita Nnenna Ugwu, Tom Mulegi, Mbabazi Asiati, Chidinma Esther Eze (2023). Challenges Confronting Community Newspapers in Meeting Aesthetics Standards. IDOSR JOURNAL OF COMMUNICATION AND ENGLISH 8(1): 1-5
86. Jovita Nnenna Ugwu, Tom Mulegi, Mbabazi Asiati, Chidinma Esther Eze.(2023). Barriers to Women Leadership. IDOSR JOURNAL OF ARTS AND HUMANITIES 9(1): 6-10
87. Tom Mulegi (2015). Skills and motivation of work performance of health professionals in government regional referral hospitals in Uganda:presented at the Canadian International Conference on Advances in Computer Science, Humanities and Education, April 1-2, 2015, Dubai, UAE.conference paper. http://hdl.handle.net/20.500.12306/1304

CITE AS: Baingana J. K. (2024). Enhancing STEM Education in Africa through Collaborative Learning and Technological Integration. RESEARCH INVENTION JOURNAL OF RESEARCH IN EDUCATION 3(3):68-76